The large attendance at the recent session of the Planters’ Labor and Supply Company was most gratifying evidence of the interest taken in its deliberations. A free interchange of thoughts and experiences gathered in the field and the boiling house is sure to bring out new ideas on every day work, and to correct the impression which too often possesses us that we know everything necessary to be known in the special branch of industry we may be engaged. Sugar manufacture is, of all others, a progressive art, developing rapidly each year; and it will never reach perfection until the pure sucrose can be sent out from the factory, as it some day will be, at a much less cost than now. The early decades of the twentieth century may witness this perfection.

It is well for the business men and capitalists of Honolulu to become better acquainted with the business men of our rural districts, who are spending their best years in developing the rich sources of wealth that dot our group, from Mana on Kauai to Hilo and Kau on Hawaii. These gatherings demonstrate that all the intelligence and worth of these islands are not confined to the counting rooms of the metropolis, and that without the brains, muscle and executive ability displayed in the rural districts, in the mill, the laboratory and workshop, the former would barely
find an existence. The two main springs of our industries—the holders of capital and the holders of the plow—should gather together in council at least once a year, for interchange of views and to open new currents of progressive thought. We must not forget that the centrifugal machine—one of the grandest inventions ever made for cheapening the cost of sugar—sprung from the brain of a Hawaiian mechanic, the late David M. Weston, who was the engineer in the employ of the Honolulu Flour Company, then controlled by the writer. Simple as this invention is, its origin was accidental, and was suggested by the rapid drying of a wet cloth spinning round on a burr mill stone which was being set up in the above mill, about the year 1850.

And this brings us to the question whether our association, which is the only one here devoted to agriculture and mechanics, may not become more useful by opening its doors to all deserving applicants who may wish to join it. It was organized in 1882, as a corporation, by sugar planters and those in sympathy with them, the chief object at the start being to provide laborers, which were then greatly needed. It has continued to preserve till now the main features adopted at the organization, with a very limited membership. This magazine has frequently invited worthy persons to join the society, but the answer has invariably been—"Yours is a sugar planter's company, and we are not sugar planters." It is therefore not surprising that the association to-day consists almost exclusively of those who are or have been planters and those interested in sugar.

With the view of removing this popular prejudice, and having an authorized invitation issued from the company itself, one of the resolutions proposed by the editor of this monthly at the last meeting, was intended to furnish such invitation to all engaged in any industrial pursuit to become members. A committee was appointed to ascertain whether coffee planters desired to join. This was very well, but besides coffee planters, there are others interested in oranges, rice, bananas, pineapples and other minor industries, to say nothing of capitalists, merchants, engineers, chemists, and skilled mechanics, who are interested in the development of these islands, and might aid us with their practical knowledge.
Instead of a membership of only fifty or sixty individuals, we ought to have one or two hundred.

Another point on which a few words may not be amiss is the briefness of the sessions. The meetings formerly laste for several days, and the discussions brought out by the various reports were the most instructive and interesting of the proceedings. During the past two or three years, there has been a feeling that the time spent in the meetings was time lost, and that the proceedings must be hurried along as rapidly as possible. A speaker, handicapped with the idea that the sessions must close to-day or at farthest to-morrow, does not speak with that freedom that he would if he knew that he could tell all that he wished to. We express the views of many members when we urge that more time be given hereafter for discussion on matters of general interest to those present, even though the services occupy three or four days. It will be time well spent for all who attend.

ANNUAL MEETING OF THE PLANTERS' LABOR AND SUPPLY COMPANY.

The thirteenth annual meeting of the Planters' Company was held in this city, commencing on Monday, the 5th instant, at 10 o'clock A. M., in the Hall of the Chamber of Commerce.

The attendance at the opening session was larger than has been the case for some years, and all the plantations, excepting three or four, were represented by their agents or managers. Wm. G. Irwin, Esq., presided, with Messrs. C. Bolte, secretary and F. M. Swanzy, treasurer, also at the desk.

American Minister Resident, Ellis Mills, American Consul, C. H. Hart and others.

The proceedings were opened with the reading by Mr. C. Bolte of the thirteenth annual report of the secretary, as follows:

SECRETARY’S REPORT.

Since the last Annual Meeting of this Company, held January 22nd, 1894, the Trustees have held twenty-three meetings at which the following objects have received full attention.

LABOR.

The Labor Question has been the principal object of discussion. The only actual supply of agricultural laborers during this year has come from Japan and strenuous efforts of the Trustees to procure laborers from other countries have so far not lead to any definite results, but there are good prospects of the removal of difficulties which are yet in the way.

Of the regular Japanese contract laborers there have arrived since October 23rd, 1893,—June 27th, 1894, the 26th lot 1190 men, 296 woman, which have been distributed to the different Plantations.

And other steerage passengers have arrived, as follows:

<table>
<thead>
<tr>
<th>Country</th>
<th>Males</th>
<th>Females</th>
</tr>
</thead>
<tbody>
<tr>
<td>Japanese</td>
<td>2419</td>
<td>604</td>
</tr>
<tr>
<td>Chinese</td>
<td>836</td>
<td>95</td>
</tr>
<tr>
<td>Portuguese</td>
<td>54</td>
<td>20</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>3309</strong></td>
<td><strong>719</strong></td>
</tr>
</tbody>
</table>

a good many of whom no doubt have gone to work on Plantations.

The Departures for the same period were:

<table>
<thead>
<tr>
<th>Country</th>
<th>Males</th>
<th>Females</th>
</tr>
</thead>
<tbody>
<tr>
<td>Japanese</td>
<td>1893</td>
<td>418</td>
</tr>
<tr>
<td>Chinese</td>
<td>1030</td>
<td>58</td>
</tr>
<tr>
<td>Portuguese</td>
<td>117</td>
<td>66</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>3040</strong></td>
<td><strong>542</strong></td>
</tr>
</tbody>
</table>

The Trustees have tried to re-inaugurate immigration of Portuguese laborers from the Azores and Madeira and from China, and they have also tried to procure Lascar Laborers. For particulars, the Secretary begs to refer to the report of the Committee on Labor. An arrangement has also been
made to prevent the desertion of contract laborers by a system of pass books.

EXPERIMENTAL STATION LABORATORY.

The Trustees have been in correspondence with Dr. Stubbs of the Louisiana Sugar Experiment Station with the view of procuring the services of an experienced agricultural Chemist who might travel about among the different Plantations giving advice to Managers about fertilization and other matters and who should have a Laboratory in Honolulu where a younger Chemist would help him to do the analytical work. The Trustees desire to mention here that Dr. Stubbs has taken great pains in this matter and shown great interest in our affairs and that they are much indebted to him for the valuable aid and information he had rendered.

WEATHER.

The temperature during the last twelve months has been favorable and the variations between day and night temperature during last winter have not been as great as during the previous one. Rainfall has been scant and drought has prevailed in several localities, as the following statistics, for which I am indebted to Mr. C. J. Lyons, will show:

RAINFALL FROM OCTOBER, 1893, TO OCTOBER, 1894.

<table>
<thead>
<tr>
<th>HAWAII</th>
<th></th>
<th>MAUI</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Waiakea</td>
<td>132 inches</td>
<td>Makawao</td>
<td>28 inches</td>
</tr>
<tr>
<td>Honomu</td>
<td>129 &quot;</td>
<td>Hana</td>
<td>28 &quot;</td>
</tr>
<tr>
<td>Laupahoehoe</td>
<td>89 &quot;</td>
<td>Olowalu</td>
<td>8 &quot;</td>
</tr>
<tr>
<td>Paauhan</td>
<td>34 &quot;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kohala</td>
<td>45 &quot;</td>
<td>Lihue</td>
<td>33 inches</td>
</tr>
<tr>
<td>Kealakeakua</td>
<td>50 &quot;</td>
<td>Kilauea</td>
<td>61 &quot;</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>OAHU.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kahuku</td>
<td>34 inches</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ewa</td>
<td>25 &quot;</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Honolulu, Oct. 1st, 1894.

C. Bolte, Secretary.

The report was accepted and ordered to be printed in the Planters' Monthly.

The treasurer's report was then read by Mr. Swanzy, showing the receipts for the year to have been $6,334.70, and the expenditures $6,264.63, leaving a balance of $170.07.
TREASURER'S REPORT.

F. M. Swanzey, Treasurer, in account with Planters' Labor and Supply Company:

<table>
<thead>
<tr>
<th>Oct. 28, 1893.</th>
<th>To Balance $1,400 12</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>To Plantation Dues to October, 1894, 53 Plantations 1,650 00</td>
</tr>
<tr>
<td></td>
<td>To Personal Dues to October, 1894, 36 Individuals 290 00</td>
</tr>
<tr>
<td></td>
<td>To Assessment of 2 cents per ton on 1892-3 Crop, 149,729 tons 2,994 58</td>
</tr>
<tr>
<td></td>
<td>$6,334 70</td>
</tr>
</tbody>
</table>

By Half A. Koebele's Salary and Expenses for 12 Months to October 31, 1894 $1,943 50

By H. M. Whitney for Services as Editor of Planters' Monthly for 15 Months to September 30, 1894 750 00

By C. Bolte for 8 Months' Services as Secretary to September 30, 1894 400 00

By E. Hutchison for Services in re Portuguese Immigration 250 00

By L. A. Thurston for Immigration 1,500 00

By Cable Messages to Bombay in re Indian Labor $39 15

By Legal Expenses in re Indian Labor 25 00

By Japanese Pass Books and Expenses on same 1,060 96

By Printing and Advertising 102 80

By Premium on Draft $1500 sent L. A. Thurston 18 75

By Stationery 5 00

By Postages, etc 32 25

By Interest on Cash Advances 16 97

By Binding Planters' Monthly for the Archives of the Company 20 25

By Half A. Koebele's Salary and Expenses for 12 Months to October 31, 1894 $1,943 50

By H. M. Whitney for Services as Editor of Planters' Monthly for 15 Months to September 30, 1894 750 00

By C. Bolte for 8 Months' Services as Secretary to September 30, 1894 400 00

By E. Hutchison for Services in re Portuguese Immigration 250 00

By L. A. Thurston for Immigration 1,500 00

By Cable Messages to Bombay in re Indian Labor $39 15

By Legal Expenses in re Indian Labor 25 00

By Japanese Pass Books and Expenses on same 1,060 96

By Printing and Advertising 102 80

By Premium on Draft $1500 sent L. A. Thurston 18 75

By Stationery 5 00

By Postages, etc 32 25

By Interest on Cash Advances 16 97

By Binding Planters' Monthly for the Archives of the Company 20 25

Balance 170 07

Total $6,334 70

Nov. 5. To Balance $170 07

E. and O. E. F. M. Swanzey, Treasurer.

Honolulu, Nov. 5, 1894.

In presenting this statement I am pleased to be able to report that all the sugar plantations on the islands, with the exception of two, are now subscribers to the funds of this company. Of our personal subscribers four have resigned during the past year, and new names have been added to take their places.
All subscriptions have been paid to October, 1894, with one exception.

The balance of $170.07 remaining in the treasury is insufficient to meet the requirements of the ensuing year, and the company is asked to provide means for the defraying of the necessary expenses. The regular amount of these expenses is about $3500, to which should be added a sum sufficient to meet incidental and unforeseen demands which are liable to arise at any time.

The Planters' Labor & Supply Company has for some years been working for the benefit—not only of sugar planters—but the entire agricultural community of these islands, but up to the present it has been supported almost entirely by the subscriptions and contributions of sugar planters. At this day when the coffee and fruit industries are benefiting to so great an extent by the work and expenditures of this company it would seem but right that they should have an opportunity to contribute to its funds, especially as the company has recently undertaken to pay half the salary and expenses of Mr. Koebele, (the other half being paid by the Government,) who is doing so much to discover the enemies of the many pests and blights which afflict our coffee and fruit trees. The company is also negotiating for the services of the best agricultural chemist obtainable with a view of having at hand the services of a capable scientist to determine all questions requiring scientific elucidation. These services, like those of Mr. Koebele and of the trustees of the Planters' Labor & Supply Company, will be at the disposal of the agriculturists of these Islands, and an effort should be made to induce all such agriculturists to become members of this company and subscribers to its funds.

Honolulu, Nov. 5, 1894.

F. M. Swanzy, Treasurer.
Swanzy the credit of preparing it. The report was accepted and ordered printed in this monthly.

Mr. Baldwin called attention to the fact that Portuguese laborers might be obtained at the Cape Verde Islands, if not at the Azores, and thought it would be well to call Mr. Thurston's attention to it. This information had been obtained from a well-informed Portuguese, who knew that emigrants were obtained there for other countries and may possibly be induced to come here as well.

Mr. Jno. A. Scott of the Hilo plantation, presented the report of the committee on cultivation, of which he was chairman. The report will be found on page 501. It recommends the encouragement of share-planting. He thinks that the cane should be purchased outright from the growers, as is done elsewhere. Also refers to stripping of cane, which in some districts is an absolute necessity, while in dry districts it is not so necessary.

Mr. Morrison, in commenting on this report, stated a fact which is not generally known—that no stripping is required at Makaweli, thus saving to the plantation a heavy expense, which varies in different localities from ten to twenty dollars an acre. On a large plantation like Makaweli this is a great saving.

Mr. Baldwin said that stripping is a local question; in wet localities cane must be stripped, while in dry districts like Makaweli on Kauai and Ewa on Oahu, it has been found to be unnecessary.

Mr. Cook inquired whether the plan adopted by Mr. Kinney of Honomu—planting cane five feet by five—was any improvement over that practiced by other planters. Mr. Goodale replied that this was, as yet, an experiment, but the cane was looking very fine.

The report was accepted and ordered printed.

**AFTERNOON SESSION.**

The report of the committee on machinery was read by Mr. A. Young of the Honolulu Iron Works. He referred to the new Cora sublime-roller mill recently ordered from St. Louis for the Ewa plantation on this island; also to the improvements being made abroad with the view of extracting
more sugar from the cane. The report is confined to sugar machinery, and speaks favorably of the results of the Krajewski crusher and the national cane shredder, both of which are valuable aids in extracting cane juice.

Mr. Baldwin, in commenting on this report, spoke of the favor with which the new nine-roller mills were being received in Louisiana. Wherever they have been introduced they have given much satisfaction. In his recent visit to Louisiana he was very forcibly impressed with the fine machinery which has recently been introduced there. These new mills are far ahead of anything we have here. They have one great advantage over us in the cheapness of their fuel. What we most lack in all our mills is more powerful machinery.

Mr. Scott called attention to a newly invented Scotch device for extracting juice from cane without the aid of rollers, which promises to increase the product of sugar at a less cost, and referred to the low price of sugar and the necessity of securing every aid to extract all the sugar that is in the cane and the juice.

Report ordered printed.

Mr. Atherton, as chairman of the committee on Legislation, said there having been no session of the Legislature within the past year, the committee had no report to make. He thought that the Planters' Labor and Supply Company should take some action in the matter of the proposed Portuguese immigration and lay the same before the first or special session of the Legislature. The first shipment of Portuguese laborers from Madeira to these islands would be expensive, and he thought the Government should bear a part of it. It would be only fair to ask the Government to pay the expenses of the females brought to this country, as was formerly done. The first shipment would be the most expensive, and after that the planters could bear it.

Mr. Jones, as one of the committee on legislation, referred to the new tariff bill passed by Congress, and the fact that it expressly continues the Hawaiian reciprocity treaty, and that such continuation is largely due to the persistent efforts of Mr. F. P. Hastings, our charge at Washington, who has not only spent his time but his money in preserving to us this
great boon of the treaty, when he could ill afford to do it. Several other gentlemen spoke to the same purport.

Mr. Cook moved that the recognition of Mr. Hastings' services be acknowledged by the trustees, who are empowered to act in this matter as they deem best.

The report on reciprocity having been called for, Mr. Cooke of the committee, stated that as the matter of reciprocity had already been referred to, no further report seemed necessary.

Mr. W. W. Goodale, from the committee on transportation, said that no report had been prepared, as nothing new in the way of transportation has been invented, and the mode of transportation on each plantation depends on the natural conditions of each.

Mr. Morrison, chairman of the committee on the manufacture of sugar, stated that no report had been prepared, but in lieu of it, he would offer a paper which he had written relative to a new departure made at the Makaweli mill. Accompanying it were several tables which appear with the statement which will be found following his report.

No report was received from the committee on live stock.

Mr. Andrew Moore read a lengthy and interesting report on forestry. It was his opinion that if there is no check to the destruction of forests on Hawaii, the cultivation of the soil must cease. He urged that prompt action be taken in this matter.

Mr. Marsden, who has lived on Hawaii, and has seen the denudation steadily going on, said it was owing more to cattle than to the axe.

A warm debate followed, in which Messrs. Cooke, Irwin, Moore, Marsden, Baldwin and others participated, ending with a motion by Mr. Baldwin that the next committee be instructed to act in co-operation with the Government, with a view to check further denudation.

The report on fertilizers was received, read and ordered printed.

**EVENING SESSION.**

Mr. Marsden read the report of the committee on tobacco, calling attention to the fact that as good wrapper tobacco leaf can be grown here as in Sumatra, provided that proper
seed be planted. He exhibited some fine samples which he said would readily fetch from $3 to $4 per pound in the United States, where such wrappers cannot be produced. About 800 pounds can be raised to the acre.

The same gentleman also read the report of the committee on fibres—ramie, sisal, sansevieria, and also the tanning root canaigre, of each of which he exhibited specimens, which show that they will all grow well here, and strongly urged their being planted, as a market can be had for all that may be raised.

Both reports were accepted and ordered printed.

In lieu of the report on tea and coffee, letters were presented from members of the committee, furnishing statements which will be read with interest by all engaged in this branch of industry.

During the discussion on coffee culture which followed, Mr. Cook remarked that the lady birds now being distributed by the Commissioner of Agriculture, had proven a formidable foe of the blight and had completely rid the trees of blight in localities where the bugs were applied. This opinion was confirmed by other speakers.

TUESDAY MORNING, NOV. 9.

Met at 10:30 A. M. President Schaefer in the chair. Secretary Bolte reported the election of officers of the company from among the trustees, they being:

President—F. A. Schaefer.
Vice-President—F. M. Swanzy.
Treasurer—P. C. Jones.
Secretary—C. Bolte.
Auditor—J. B. Atherton.

Mr. Baldwin brought up the matter of providing ways and means for the coming year, and proposed an assessment of five cents per ton for general expenses and five cents per ton for laboratory and chemist, if required, in all ten cents per ton; two and a half cents to be levied at once, and further assessments as may be called for. He expressed himself as strongly in favor of an experimental station, fully equipped with a laboratory, and thought that Prof. Stubbs would be
the best man to undertake the work, and stated that some correspondence had taken place with him regarding it.

Mr. Irwin remarked that a splendid location for such a station was offered in the neighborhood of Punchbowl. The land could be procured from the Government and an expert might be obtained to manage it.

Mr. Bolte read the outline of the proposition for an experimental station. It proposed to pay the expert chemist $3,600 and assistant $1,800. The laboratory would cost $1,000, the passage money of experts $1,000, work on the station $500, and still the work would be only just begun. He thought the experimental station would after a time be self supporting. Every plantation had to expend money for the work contemplated for the station, but after the expense of starting had been made, it would be self sustaining.

Mr. Goodale thought it unwise to attempt the station this year. His idea was that the chemist should put in at least ten months investigating the various plantations in the islands. Different districts were subjected to different physical conditions and different methods had to be employed. An experimental station in Honolulu would be worthless to plantations in the rainy districts of Hawaii from the fact that conclusions applicable to local conditions would not do for a general proposition.

Mr. Swanzy said the previous speaker had hit the intentions of the trustees exactly. It might not be easy to carry on an experimental station here by the same methods as are employed in Louisiana. They wanted as head of the station, not only a chemist but an agriculturist—an agricultural chemist.

Mr. Baldwin spoke to similar effect. The principal services of the manager would be in traveling around among the plantations. There were many agricultural periodicals in Europe, which most of the planters could not read. At such a station the contents of such publications as would be valuable to our planters could be translated.

Mr. Morrison thought a great deal of the value of such a station would be in a reading room where information in foreign languages could be utilized. He moved that the trustees be authorized to proceed with the project.
This being seconded was unanimously adopted.

Mr. Swanzy considered it scarcely fair that sugar planters should bear all the expense of promoting scientific agriculture. Some means might be devised for enlisting the aid of coffee planters.

Mr. Hall stated that it was the idea of the coffee men to bear a part of the burden mentioned. When or how he did not know, but the matter was receiving earnest discussion.

Mr. Scott objected to calling on coffee planters for aid at the present time, as the industry was in its infancy, and yielded no income.

On motion of Mr. Goodale, the following committee was appointed to confer with the coffee planters on the subject of bearing their quota of the expenses undertaken: W. W. Hall of Honolulu, W. Goodale of Onomea and J. A. Scott of Hilo.

Mr. H. M. Whitney offered a set of resolutions, urging the Government (1) to establish a bureau of information; (2) to push the construction of roads for opening up agricultural lands, particularly through the coffee lands on Hawaii; (3) to press on the United States Government the importance of direct cable communication between that country and these islands; (4) approving the efforts to secure Portuguese laborers; (5) that coffee planters and others engaged in developing the resources of these islands, be invited to join the planters' association as members.

Mr Irwin referred to the Bureau of Information established some years ago, as being in a very feeble state. It had sent one man to China and another to Australia. Its funds had one become exhausted, yet it was capable of being revived to greater usefulness. He doubted if the Government subsidy of $100 a month to the Paradise of the Pacific did much good. The money could probably be better employed in aiding a reorganized Bureau of Information.

Mr. Young saw several good points in the resolutions, but did not think it right to ask for roads for particular districts, as all the islands paid taxes alike.

No action was taken on the resolutions. The meeting then adjourned sine die.
LIST OF SUBSCRIBERS TO THE PLANTERS' LABOR AND SUPPLY CO.

HAWAII.

Waiakea Plantation.
Pepeekeo Plantation.
Lunaupahoehoe Sugar Co.
Kukaiau Mill Co.
Punaalii Plantation Co.
Niulii Mill & Plantation.
Union Mill Co.
Hutchinson Sugar Plantation.
Hilo Sugar Co.
Honoulu Sugar Co.
Ookala Sugar Co.
Hamakua Plantation Co.
Honokaa Sugar Co.
Kohala Sugar Co.
Hawi Mill & Plantation.
Hawaiian Agricultural Co.
Onomea Sugar Co.
Kukalau Plantation Co.
Hamakua Mill Co.
Pacific Sugar Mill.
Puehuenue Plantation Co.
Ryecroft Plantation.

MAUI.

Kipahulu Sugar Co.
Haiku Sugar Co.
Waihee Sugar Co.
Olowalu Sugar Co.
Reciprocity Sugar Co.
Paia Plantation.

Wailuku Sugar Co.
Pioneer Mill.
Hana Plantation Co.
Hawaiian Commercial & Sugar Co.
Waikapu Sugar Co.
W. Y. Horner Plantation.

OAHU.

Waianamalo Sugar Co.
Waialua Plantation.
Heeia Agricultural Co.

Waianae Plantation.
Kalakaua Plantation.
Ewa Plantation.

KAUAI.

Kilauea Sugar Co.
Lihue Plantation.
Elele Plantation.
Waimea Sugar Mill Co.
Makue Sugar Co.
Grove Farm Plantation.

Hawaiian Sugar Co.
Meier & Kruse.
Hanamalu Mill.
Koloa Sugar Co.
Gay & Robinson.
Kekaha Sugar Co.

INDIVIDUAL SUBSCRIBERS.

Ahlborn, L.
Alexander, S. T.
Atherton, J. B.
Bailey, W. H.
Baldwin, H. P.
Bishop, C. R.
Bolte, C.
Brewer, C. & Co.
Castle, W. R.
Cooke, C. M.
Davies, T. H. & Co.
Dillingham, B. F.
Dole, S. B.
Gifford, W. M.
Goodale, W. W.
Hackfeld, H. & Co.
Hall, W. W.
Irwin, W. G.
Jones, P. C.
Kay, T. S.

Knudsen, V.
Kynnersley, C. S.
Lowrie, W. J.
Marsden, J.
Morrison, H.
Parke, W. C.
Renton, C. F.
Renton, Jas.
Schaefer, F. A.
Smith, A. H.
Smith, W. O.
Spencer, J. G.
Spalding, Z. S.
Tenney, E. D.
Walker, T. R.
Wilcox, A. S.
Wilcox, G. N.
Whitney, H. M.
Young, Alex.
REPORTS READ BEFORE THE PLANTERS' MEETING.

REPORT OF LABOR COMMITTEE.

COMMITTEE—H. P. BALDWIN, F. M. SWANZY.

The momentous question of Labor has, during the past year, engaged much of the attention, not only of the Labor Committee but of the entire Board of Trustees, and in laying before you the result of the work done in this all important branch of their duties, the Trustees, through your Committee, can only express their regret at this result not being a tall commensurate to the time and effort expended in its attainment. Nevertheless it may be safely said that these efforts have not been wasted, for, if no great results have been reached, the foundation at least of an improvement in the condition of our labor market has been laid.

In countries such as this, the conditions under which field labor is conducted render it necessary that the laborers should be of a race capable of continued exertion under a tropical sun, and no other class of labor will ever be able to thoroughly assist in the development of the not inconsiderable agricultural resources of these islands. Under normal conditions the natives of the soil would be its natural cultivators; but the extent to which agricultural operations are being carried on now together with the natural indisposition of the Hawaiians to engage in field work renders dependence on native labor impossible, and we are forced to look for other nationalities capable of filling the place which the natives would otherwise occupy.

The field labor with which we have an intimate acquaintance is that from Portuguese states, China, Japan, and the Islands of the South Pacific. Unfortunately, however, the supply of Portuguese and Chinese laborers has been cut off, as has the supply from the South Pacific, and for some time we have been obliged to confine ourselves almost exclusively to Japanese. This nationality is, in many respects, very satisfactory labor; but with the increase in their numbers
there has become evident a disposition on the part of the Japanese to combine on the slightest pretext for the purpose of opposing their employers; thereby interfering with the welfare of the estates on which they are located. Under these circumstances it has been considered desirable to procure some other class of labor, not with the object of entirely dispensing with the Japanese, but in order to satisfactorily supplement their labor and render planters less dependent on any one nationality. The efforts of the Trustees and of your Committee have been largely directed towards providing some means whereby this absolute dependence on Japanese labor may be avoided, and during the past nine months as many as twenty-four meetings have been held for the discussion of labor topics.

Chinese. Early in the year it was suggested that an effort be made to procure more Chinese, and permission from the Government to import a number, under the Act of 1892 was obtained. The term under which such men were to be brought here were approved of by the Chinese officials, and an agent was engaged to go to China to procure the men. It was, however, learnt in May, that under the English emigration law the only Chinese who are now permitted to leave Hongkong for these islands are previous residents holding return passports issued by the Hawaiian Government, and no new emigrants can be passed by the Hongkong authorities. We were also informed that the only way to have these restrictions removed would be to have the Hawaiian government negotiate directly with the British government and obtain its permission for special lots of men. It was therefore useless sending a recruiting agent to China, and efforts were then directed towards the removal of the "tabu" on free emigration from Hongkong, with which object negotiations are at this time being carried forward.

East Indians. A good deal of consideration was next given to the possibility of introducing labor from the north-west portion of India by way of Beloochistan, and an agent was authorized, under certain conditions, to import a trial lot of these people. It was however found that it would be impracticable to obtain them in the manner proposed by the agent and the project was abandoned; but not before a con-
considerable amount of information additional to that which we already possessed on the subject of East Indian labor, had been acquired.

Portuguese. As a number of our planters had expressed a strong desire for a further supply of Portuguese laborers, and as it was stated that quite a number of this nationality who had emigrated to California from this were anxious to return, an effort was made to induce a few hundred families to come back here. This effort was, however, only partially successful as the majority of the Portuguese in California had gone into land cultivation on a small scale while others had found occupation of a sufficiently profitable nature to indispose them towards migrating again.

The services of Mr. E. Hutchinson were then enlisted to ascertain what the prospects were of getting from the Azores or Madeira a number of immigrants. This gentleman left here in May last for Europe on private business, promising to carry out our commission as soon as he possibly could; but as he has not been heard from, the presumption is that he has found a difficulty in getting the information wished for, or has not yet been sufficiently free from his personal engagements to enable him to make the required investigation.

The departure of Mr. L. A. Thurston for Europe gave the Trustees an opportunity to avail themselves of his services (by the permission of the government), and it was arranged that he should visit the Azores and Madeira, and if necessary Lisbon, to arrange for the reopening of Portuguese emigration from those countries if it was possible to do so. In consideration of these services the company paid to Mr. Thurston the sum of $1500 towards defraying his expenses. In the event of Mr. Thurston's mission being attended with success arrangements will be made for the immediate shipment of about 600 men with a proportion of families. The business matters conducted with this emigration have been placed in the hands of Mr. H. F. Glade of Bremen, and it is hoped they will be carried to a successful issue. We have been informed, however, that the recent extensive emigration from Azores and Madeira has so far reduced the labor population of those islands that wages have increased there, and an indisposition
at present exists to emigration, so that too much dependence should not be placed upon the possibility of obtaining further Portuguese. In a little while, however, Mr. Thurston will be heard from, and we will then know exactly what the prospects are.

JAPANESE. Since last year several emigration companies organized under the laws of Japan have entered the field, and have issued prospectuses setting forth the terms under which they are prepared to supply labor, and a number of laborers are now coming forward under the auspices of one of these companies. A number of Japanese have also come into the country recently without engagements, and are laboring on plantations under contracts made on the spot.

The supply of Japanese labor seems to be one on which drafts can be made for a considerable time, and were it not for the circumstances already referred to, there would not be any necessity to seek elsewhere for labor. The tendency to strike and desert, which their well nigh full possession of the labor market fosters, has shown planters the great importance of having a percentage of their laborers of other nationalities.

The disposition to strike is one which it is less difficult to account for than it is to control; the men are well treated and fairly dealt by, but notwithstanding this they never fail to seize on the smallest grievance, of a real or imaginary nature, to revolt and leave work, and it is a matter for regret that the facilities in the shape of free legal defense do much to promote appeals to the law courts on frivolous pretexts. The demagogic element among the laborers kindles and keeps alive an antagonistic sentiment against employers which would be non-existent but for the efforts of the agitators, and when the specially retained counsel of the Japanese government in open court justifies the most flagrant outrages by laborers—as was done in the course of the trial of some strikers from Ewa plantation in September last—the possibility of controlling the badly disposed among the laborers becomes a work of extreme difficulty. It is needless to state that such lawlessness and tendency to strike as that which is sometimes betrayed by the Japanese would not be tolerated in their own
country, and would appear to have been bred of the comparative comfort in which they find themselves in this country. For this tendency to strike the only remedy possible is the introduction of some other class of labor to supplement the Japanese, and it is to be most earnestly hoped that this other class can be procured.

The desertion of contract men has been, to a great extent, checked by the pass-book system brought into use this year with the assistance of the Japanese consular officials and inspectors, and if the plantation managers will rigidly adhere to the agreements made by them, and to the instructions given them, there is no doubt a stop will be put to the deserts. As in every other matter of a similar nature, community of action is necessary, and it is to be hoped that in the interests of the whole body of planters none may be found who are not in sympathy with the pass-book system.

General. Your Committee believes it to be possible in different ways to confine the agricultural laborers specially brought here for field labor to agricultural occupations, but in no way can this better be done than by a Universal Registration Law. Arguments against such a law have been frequently and forcibly made, but they do not alter the fact that the proper and thorough carrying out of such a law would inflict hardship; but the same objection exists to many other laws. In a community like ours the injustice it would work would be lost sight of in the amount of benefit to be derived from it.

The suggestion recently made to the government that we turn to Belgium for our labor supply—or a part to it—is one which should not be lightly acted upon, as Northern Europeans are unsuited both by constitution and inclination for general cane field work.

The precise number of agricultural laborers in these islands is not possible to arrive at accurately, as all statistics of nationalities include traders and mechanics as well as field laborers. The following figures—for which we are indebted to Mr. J. B. Castle, Collector-General of Customs—may prove of interest as showing the proportion of the nationalities from which the supply of imported labor is mainly drawn:
CENSUS TABLE.

Population of Chinese Males January 1, 1894 ................................. 13,905
Arrived January 1 to October 19 .................................................. 988
Departed " " " ................................................................. 774—209

Population Chinese Males October 19, 1894 .................................. 14,114

Population of Japanese Males January 1, 1894 ................................. 20,913
Arrived January 1 to October 19 .................................................. 2,385
Departed " " " ................................................................. 1,632—963

Population Japanese Males October 19, 1894 .................................. 21,876

Population Portuguese Males January 1, 1894 ................................. 4,565
Arrived January 1 to October 19 .................................................. 148
Departed " " " ................................................................. 13—135

Population Portuguese Males October 19, 1894 .................................. 4,700

In response to a circular letter addressed to the managers of sugar plantations on these islands, figures have been received showing the number and nationality of laborers on each plantation. From these figures the following table has been compiled.

TABLE SHOWING THE NUMBERS OF THE DIFFERENT NATIONALITIES LABORING ON THE PLANTATIONS.

<table>
<thead>
<tr>
<th>Nationality</th>
<th>Under Contract</th>
<th>Not Under Contract</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hawaiian</td>
<td>704</td>
<td>798</td>
<td>1,502</td>
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<tr>
<td>Portuguese</td>
<td>220</td>
<td>1,483</td>
<td>1,703</td>
</tr>
<tr>
<td>Chinese</td>
<td>147</td>
<td>2,096</td>
<td>2,243</td>
</tr>
<tr>
<td>Japanese</td>
<td>7,468</td>
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</tr>
<tr>
<td>Others</td>
<td>95</td>
<td>304</td>
<td>399</td>
</tr>
<tr>
<td></td>
<td>8,634</td>
<td>8,292</td>
<td>16,926</td>
</tr>
</tbody>
</table>

This table deals with males only. Females and children engaged on plantations are shown below.

<table>
<thead>
<tr>
<th>Nationality</th>
<th>Women</th>
<th>Children</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hawaiian</td>
<td>27</td>
<td>2</td>
</tr>
<tr>
<td>Portuguese</td>
<td>136</td>
<td>270</td>
</tr>
<tr>
<td>Chinese</td>
<td>16</td>
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<tr>
<td>Japanese</td>
<td>1,063</td>
<td>9</td>
</tr>
<tr>
<td>Others</td>
<td>25</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>1,288</td>
<td>241</td>
</tr>
</tbody>
</table>

Table of Women and Children engaged on Sugar Plantations.

In comparing the table showing the population of the nationalities supplying our labor with that showing the number and nationality of the laborers engaged on Sugar Plantations, it must be borne in mind that the former table include merchants, mechanics, and all occupations as well as field
laborers, and accounts only for arrivals in and departures from the islands, without taking mortality in consideration at all.

It should also be considered that the month of October, when the labor statistics were compiled, is about the quietest month of the year on our plantations, and is one (especially in those districts where long spells of dry weather have been frequent) when the minimum of labor is reached. Figures compiled in January or February when the factories are working would probably show a greatly increased number of employes on sugar estates, and a correspondingly reduced difference between the numbers of the employed and the unemployed.

Coffee and other growing industries account for a large number of Japanese laborers, and the rice fields of course give occupation to hundreds of Chinese.

Your Committee has been unable to ascertain the number and nationality, of laborers engaged in agricultural pursuits outside of sugar, that being a task which they had neither the machinery nor the time to accomplish.

H. P. Baldwin,
C. Bolte,
F. M. Swanzy.

REPORT OF COMMITTEE ON CULTIVATION.


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

Your committee being widely separated, has been unable to meet and draw up a report as a committee; so I submit the following as a personal report on cultivation.

While we have been making improvements in our mills by introducing labor-saving machinery, in our field work we have not been as progressive in the adoption of labor-saving implements that are in use in other countries, such as steam, sulky, and wheeled plows, rotary cultivators, fertilizers distributors, stubble diggers, etc. Such as have been introduced within the last few years have effected a great saving both
in manual and animal labor and given more thorough cultivation.

After the land is cleared, I believe in thorough plowing, as the finer the land is broken up the better results will be obtained.

It is always well to plow the land several weeks before planting, leaving it exposed in the rough state to the sunlight and atmosphere, but when every acre is kept under cultivation it is not always convenient to let it remain idle for any length of time.

In the Hilo district owing to the surface soil being only four to six inches in depth, we do not require to plow deep, but I prefer to turn up from a half to one inch of the subsoil at every plowing to help to maintain the depth of surface soil by bringing this to the surface and exposing it to the air. It is very necessary not to bring too much of this soil to the surface as it contains very little organic matter, and what little good soil there is may be destroyed.

Even these light soils during the past few years, by thorough cultivation and a judicious use of manures, have been brought to a high state of production compared with that of former years, and during the past crop have yielded a little over four tons of sugar per acre from all kinds of cane.

When there is deep alluvial soil I believe in deep plowing, as by so doing fresh soil is brought to the surface to feed the plant. In the dry districts the land will retain moisture longer by being thoroughly loosened to greater depth, and by constant and shallow cultivation prevent too rapid evaporation of the same, as shown by experiments printed in the PLANTERS’ MONTHLY, June 1893, page 274, on Shallow Cultivation.

In Hamakua during the past fifteen months Mr. A. Moore informs me that there have been only (37) thirty-seven inches of rain, and by his deep plowing and his method of cultivation with open furrows, as if for irrigation, he has produced a fair crop of cane, and he claims that this method is preferable to hilling, generally practiced in dry unirrigated districts. The rows are generally five to five and one-half feet apart, thus permitting sufficient room for light and circulation of
air to nourish the canes; if the rows are restricted to four or four and one-half feet the canes will be smaller and of a spindly nature, and in rich strong soil six or six and one-half feet is better, as by the increased room the cane develops a larger and heavier stick and more to a hill than in the narrow rows.

**Seed.**—Good fresh tops from healthy plant cane cannot be surpassed and are generally selected when available.

Lalas are also found to be good seed when large enough. Frequent changes of seed from high to low lands are advantageous. It is also a great advantage to flume the seed where possible as it assists it to sprout more quickly than it otherwise would. I plant in a continuous row, laping the seed, in the early part of the season on the high lands, but on the lower land leaving the seed an inch or two apart as I find it comes thick enough if the seed is good.

In planting the seed in the Hilo district, it is necessary that it have only a light covering of soil over it, as if covered too deep, it is liable to rot especially on the high lands where it is necessary to plant early and before the ground has much warmth, while in the drier districts it is necessary to cover it to the depth of one and one-half inches.

After the young plant has made its appearance above ground, it is necessary that it be kept free of weeds so that the growth is not checked, and as soon as it is far enough advanced it is necessary to apply the fertilizer, which is generally done when the canes are ten to twelve inches high.

By the constant use of small plows and harrows or cultivators, the land between the row is kept in a thorough state of cultivation until the canes become so large that it is impossible for the animals to get through without destroying it.

**Stripping.**—In the wet districts it is very necessary that the cane be stripped, at least twice, but there is often great damage done by removing a number of green leaves and thus checking the growth of the stalk as seen by the one or two short contracted joints. Only the dry leaves or the ones that come off without any exertion should be removed.

In the irrigated sections on these Islands it is a question whether it is best to attempt stripping, especially in fields
where the canes are giving such extraordinary yields as at Ewa and Makaweli, as a large quantity of cane is destroyed by the stripping gangs.

From a statement furnished me by Mr. Lowrie of Ewa, he shows plainly that with canes ground after February, it makes little difference whether they are stripped or not, and unstriped cane contained less glucose than that which was stripped. In Cuba stripping is not generally practiced.

Ratooning here has been carried to extremes in former years. in some cases cane was ratooned a dozen times, now it has narrowed down to one crop of twelve or eighteen months ratoons. The method of ratoon cultivation is similar to the plant crop. But during the past season an implement called a stubble digger has been introduced from Louisiana for thoroughly loosening the soil about the roots of the old stools, thus allowing the air and moisture to get to them and also enabling more shoots to come forth than otherwise would. In fertilizing the ratoons by distributing the fertilizer with the machine on top of the stools and passing the stubble digger over them the fertilizer is thoroughly mixed with the soil and permits it to get to the roots to feed them. Thus saving a gang of men to do the work, as by the old method of distributing by hand and covering with the hoes, besides it is done in a more effective manner.

Planting on shares is about abolished on these islands, and where canes are purchased the most just way for all parties is a stipulated price per ton of cane of given density of juice and quotient of purity. This is the method practiced in the beet sugar factories all over the world, and by so doing it gives the careful cultivator his just reward.

Ewa plantation has had in operation for some years a profit sharing agreement with their laborers whereby the men are given a certain field or section of field after it has been plowed, planted and has received its first watering, to care for and bring the said cane to maturity, then cutting and loading it on the cars, the laborer to be paid at the rate of one dollar per ton of 2000 pounds for said work. Mr. Lowrie claims this plan is working very satisfactory with them, and I understand that it is being tried on some of the other plantations on the Islands. The time has not arrived where the
milling and planting interests can be separated and placed in the hands of individual men, owing to the lack of sufficient labor of the required class to make it a success.

I trust the company will be able to carry out the suggestion that was discussed at the last annual meeting of establishing an experimental station on these Islands as I consider that it would be of the greatest assistance in developing the sugar business, and the small amount required from each individual plantation would be insignificant compared with the benefits to be derived.

John A. Scott,
Chairman of Committee on Cultivation.
Wainaku, Hilo, October 30th, 1894.

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REPORT ON MANUFACTURE.


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

Dear Sir:—I beg to hand you the accompanying figures arranged in four different tables from the last season's diffusion in the Makaweli Mill.

Our chemist, Mr. Fries, who was in charge of the manufacturing department during the entire campaign, has prepared them for publication by verifying them with the recorded daily work of the factory, and I think they can be depended upon, for no trouble was spared to have them as full and complete as possible.

The cane was all weighed and samples from the chips taken at regular intervals during day and night for analysis, the sucrose, invert sugar and non sugar determined, juice from cells and after leaving Yaryan Evaporator as well as masse suites were sampled and analysed, so also the different grades of sugar in their proportions and finally all waste molasses. Various trials for entrainment from Yaryan and vacuum pans were also made during the season. To examine all in detail would be too tedious unless we are interested
directly in the diffusion of cane or wish to compare it with extraction by milling.

I am aware the loss as here recorded of 19 per cent. of all the sucrose in the cane is too much for such a process as diffusion and believe with all the parts working properly, it need not exceed 15 per cent. but I am satisfied diffusion will not supplant the crushing of cane in our islands nor gain any further ground among us, unless sugar advances greatly in value.

To this, I think, most of us will accede not that diffusion has been a failure in any of the plants in Hawaii, but from the fact that it is more expensive to produce a ton of sugar by it in labor, superintendence and in fuel, and is less suited to our local circumstances than milling. Good extraction in the cells of a diffusion battery is dependent in a measure on the length in proportion to diameter of the vessels, but more on the fineness of chip and heat in the first two or three of the series. Dry lime is also said to be preferable to milk of lime, besides is a saving in evaporation.

Filtration of the juice we have found advantageous in removing suspended impurities, but the invert sugar and solids usually called non sugars remain in solution and give trouble all through the subsequent work. It is here we are confronted with one of the most serious troubles of diffusion juice, for although clear and bright it generally carries relatively more albumen and dissolved silica and frequently more glucic acid than mill juices and so deposits in the first vessels of the multiple effect a copious scale which impedes the process of evaporation, while the second and third vessels of such an evaporation have a thin lime scale. Two very different methods have been proposed for the elimination of these troublesome substances from the juice before it passes to the evaporators—the one by superheating under pressure and subsequent filtration—the other is called cold defecation, viz., the juice is limed with from 2 to 3 per cent. of the cane's weight, carbonic acid gas at the temperature of the juice from 125 to 130 degrees Fahr. added, then forced through a filter press, any excess of lime remaining is precipitated with phosphoric acid.

The first method is in some measure being practiced in
Louisiana, the second in Java, where its inventor claims
great things for it, the excess of lime breaks up invert sugar
into harmless substances and removes much of the wax and
gummy matters which retard evaporation in the effects and
vacuum pans.

Quadruple effects are now common and we may expect in
the near future the adoption of fifth and sixth effects with
corresponding saving in heat. Sugar engineers are now
recommending a complete change in having the last vessels
of multiple effects much smaller than the first in the series.
This would seem to be rational for the last vessels have a
much smaller volume to deal with than the first. A gain of
20 per cent on the effectiveness of a triple effect is claimed
by reversing the working of the vessels.

For evaporating our juices, I believe the vertical style is
perhaps most advantageous all round, they certainly are more
cheaply and easily cleaned and less subject to scaling, while
some horizontal evaporators have excellent arrangements for
preventing entrainment and that is a consideration, but
whichever style is preferred the juice should reach the vacuum
pans at not less than 28 degrees Be at 70 degrees Fahrenheit
for the concentration in this vessel always entails loss by
entrainment until grain is formed, it diminishes as the strike
is being closed and vanishes before discharging into the
mixer.

It is good practice to finish a strike with very dilute juice
or a few charges of water in order to dissolve the very fine
grain which inevitably forms, however careful the work.
This fine grain can, if boiling be conducted slowly, be
absorbed in a great measure with the more perfect crystals
and so a larger percentage of No. 1 be obtained.

That this point is worth attention may be verified by any
one if he will polarize the molasses as they are run from No.
1 and do the same a day or so afterwards when the fine grain
which escaped through the screens of the centrifugal has
subsided.

Yours Respectfully,

H. Morrison.

Makaweli Mill, Kauai.
### Makaweli Mill - Season 1893-94, Yarian Report

<table>
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<tr>
<th>DATE</th>
<th>Diffus' Juice</th>
<th>Concentrated Juice</th>
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<tr>
<td>&quot; 28th &quot; June 2nd &quot;</td>
<td>9.5</td>
<td>21.1</td>
<td>21.2</td>
<td>64.6</td>
</tr>
<tr>
<td>June 4th &quot; &quot; 9th &quot;</td>
<td>9.4</td>
<td>21.5</td>
<td>19.0</td>
<td>56.3</td>
</tr>
<tr>
<td>&quot; 11th &quot; &quot; 16th &quot;</td>
<td>9.2</td>
<td>22.1</td>
<td>20.0</td>
<td>58.4</td>
</tr>
<tr>
<td>&quot; 18th &quot; &quot; 23rd &quot;</td>
<td>9.3</td>
<td>22.3</td>
<td>20.1</td>
<td>58.3</td>
</tr>
<tr>
<td>&quot; 25th &quot; &quot; 26th &quot;</td>
<td>9.6</td>
<td>18.3</td>
<td>17.4</td>
<td>47.5</td>
</tr>
<tr>
<td>July 4th &quot; July 7th &quot;</td>
<td>8.8</td>
<td>26.6</td>
<td>24.0</td>
<td>67.0</td>
</tr>
<tr>
<td>&quot; 9th &quot; &quot; 12th &quot;</td>
<td>8.0</td>
<td>26.6</td>
<td>26.3</td>
<td>70.0</td>
</tr>
</tbody>
</table>

Average ........................................ 9.2 | 24.0 | 21.4 | 61.7 | 3.1 |

### Steam Pressure, Vacuum

- **First Vessel**: 7 lbs.
- **Second Vessel**: 1 lb.
- **Third Vessel**: 1 lbs.
- **Fourth Vessel**: 15 lbs.
- **Condenser**: 26 lbs.
**HAWAIIAN SUGAR COMPANY.**

**SEASON 1893-1894.**

December 7th, 1893, to July 12th, 1894.

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>G. &amp; R.'s Res. Pl. C.</td>
<td>37,817,056</td>
<td>6,481</td>
<td>14.60</td>
<td>20.38</td>
<td>16.50</td>
<td>92.60</td>
<td>16.68</td>
<td>13.24</td>
<td>80.00</td>
<td>5.27</td>
<td>19.06</td>
<td>24.35</td>
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<tr>
<td>H. S. Co. Pl. C.</td>
<td>18,571,756</td>
<td>2,937</td>
<td>16.60</td>
<td>21.04</td>
<td>12.98</td>
<td>97.00</td>
<td>17.44</td>
<td>14.50</td>
<td>9.60</td>
<td>5.28</td>
<td>18.22</td>
<td>22.92</td>
</tr>
<tr>
<td>Jan. 15th to Jan. 27th, 1894</td>
<td>18,571,756</td>
<td>2,937</td>
<td>16.60</td>
<td>21.04</td>
<td>12.98</td>
<td>97.00</td>
<td>17.44</td>
<td>14.50</td>
<td>9.60</td>
<td>5.28</td>
<td>18.22</td>
<td>22.92</td>
</tr>
<tr>
<td>Feb. 12th to March 10th, 1894</td>
<td>29,067,476</td>
<td>4,600</td>
<td>15.40</td>
<td>20.09</td>
<td>17.70</td>
<td>84.50</td>
<td>15.28</td>
<td>12.77</td>
<td>84.50</td>
<td>4.07</td>
<td>4.81</td>
<td>7.97</td>
</tr>
<tr>
<td>March 10th to March 28th, 1894</td>
<td>18,533,633</td>
<td>2,609</td>
<td>15.40</td>
<td>20.09</td>
<td>17.70</td>
<td>84.50</td>
<td>15.28</td>
<td>12.77</td>
<td>84.50</td>
<td>4.07</td>
<td>4.81</td>
<td>7.97</td>
</tr>
<tr>
<td>April 24th to April 30th, 1894</td>
<td>4,152,270</td>
<td>710</td>
<td>15.50</td>
<td>18.36</td>
<td>18.67</td>
<td>85.50</td>
<td>15.28</td>
<td>12.77</td>
<td>84.50</td>
<td>4.07</td>
<td>4.81</td>
<td>7.97</td>
</tr>
<tr>
<td>May 7th to May 19th, 1894</td>
<td>26,097,745</td>
<td>4,340</td>
<td>15.40</td>
<td>20.17</td>
<td>17.80</td>
<td>86.50</td>
<td>17.09</td>
<td>12.77</td>
<td>84.50</td>
<td>4.07</td>
<td>4.81</td>
<td>7.97</td>
</tr>
<tr>
<td>May 21st to June 21st, 1894</td>
<td>14,290,000</td>
<td>2,478</td>
<td>15.40</td>
<td>20.17</td>
<td>17.80</td>
<td>86.50</td>
<td>17.09</td>
<td>12.77</td>
<td>84.50</td>
<td>4.07</td>
<td>4.81</td>
<td>7.97</td>
</tr>
<tr>
<td>June 4th to June 16th, 1894</td>
<td>17,768,505</td>
<td>2,673</td>
<td>15.40</td>
<td>20.17</td>
<td>17.80</td>
<td>86.50</td>
<td>17.09</td>
<td>12.77</td>
<td>84.50</td>
<td>4.07</td>
<td>4.81</td>
<td>7.97</td>
</tr>
<tr>
<td>June 18th to June 28th, 1894</td>
<td>4,321,863</td>
<td>1,215</td>
<td>15.40</td>
<td>20.17</td>
<td>17.80</td>
<td>86.50</td>
<td>17.09</td>
<td>12.77</td>
<td>84.50</td>
<td>4.07</td>
<td>4.81</td>
<td>7.97</td>
</tr>
<tr>
<td>July 4th to July 12th, 1894</td>
<td>6,830,527</td>
<td>1,215</td>
<td>15.40</td>
<td>20.17</td>
<td>17.80</td>
<td>86.50</td>
<td>17.09</td>
<td>12.77</td>
<td>84.50</td>
<td>4.07</td>
<td>4.81</td>
<td>7.97</td>
</tr>
</tbody>
</table>

**Note:**
- **G. & R.'s Res. Pl. C.**
- **H. S. Co. Pl. C.**
- **H. S. Co. Bat.**
- **G. & R. Bat.**

**TABLE OF AVERAGES:**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Jul 1894</td>
<td>68.50</td>
<td>68.50</td>
<td>68.50</td>
<td>68.50</td>
<td>68.50</td>
<td>68.50</td>
<td>68.50</td>
<td>68.50</td>
<td>68.50</td>
<td>68.50</td>
</tr>
</tbody>
</table>

**Additional Notes:**
- The table includes data on cane, cane juice, diffusion juice, and sugar production for different months of the season.
- The data shows monthly production figures for two different companies, G. & R.'s Res. Pl. C. and H. S. Co. Pl. C.
- The season spans from December 7th, 1893, to July 12th, 1894.
Nov., 1894.]  THE PLANTERS' MONTHLY.  

**HAWAIIAN SUGAR COMPANY.**

**Makaweli Mill—Season 1893 94.**

<table>
<thead>
<tr>
<th>Description</th>
<th>Weight of cane</th>
<th>Sugar obtained</th>
<th>Sucrose</th>
<th>Sucrose in cane</th>
<th>Polarization</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>200,581,345 lbs</td>
<td>26,785,365 lbs</td>
<td>25,336,625 lbs</td>
<td>15.60%</td>
<td>94.6%</td>
</tr>
</tbody>
</table>

**LOSS IN EXTRACTION.**

<table>
<thead>
<tr>
<th>Description</th>
<th>Per 100 Cane</th>
<th>Per 100 Sucrose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Loss in exhaustion chips</td>
<td>.560</td>
<td>3.59</td>
</tr>
<tr>
<td>Loss in cutters</td>
<td>.039</td>
<td>.25</td>
</tr>
<tr>
<td>Loss in waste water</td>
<td>.050</td>
<td>.32</td>
</tr>
<tr>
<td>Mechanical losses in battery</td>
<td>.078</td>
<td>.50</td>
</tr>
<tr>
<td>Total loss in extraction</td>
<td>.727</td>
<td>4.66</td>
</tr>
</tbody>
</table>

**LOSS IN MANUFACTURE.**

<table>
<thead>
<tr>
<th>Description</th>
<th>Per 100 Cane</th>
<th>Per 100 Sucrose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Loss in waste molasses</td>
<td>.78</td>
<td>5.00</td>
</tr>
<tr>
<td>Loss in inefficient evaporation and consequent entrainment in Yaryan and Vacuum pan</td>
<td>1.23</td>
<td>7.87</td>
</tr>
<tr>
<td>Mechanical losses in handling</td>
<td>.23</td>
<td>1.50</td>
</tr>
<tr>
<td>Total loss in manufacture</td>
<td>2.24</td>
<td>14.37</td>
</tr>
</tbody>
</table>

**PER CENT. OF WATER IN BAGASSE.**

<table>
<thead>
<tr>
<th>Description</th>
<th>Per cent.</th>
</tr>
</thead>
<tbody>
<tr>
<td>First Mill, Young's Feeder</td>
<td>55.4</td>
</tr>
<tr>
<td>Second Mill, Riley's Feeder</td>
<td>62.0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Description</th>
<th>Number of cells</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>35,000</td>
</tr>
<tr>
<td>Weight of cane</td>
<td>200,581,345 lbs</td>
</tr>
<tr>
<td>Sugar manufactured</td>
<td>26,785,365 lbs</td>
</tr>
<tr>
<td>Sucrose in cane</td>
<td>15.60%</td>
</tr>
<tr>
<td>Cane Juice—Brix</td>
<td>20.81</td>
</tr>
<tr>
<td>Sucrose</td>
<td>18.06</td>
</tr>
<tr>
<td>Purity</td>
<td>86.8</td>
</tr>
<tr>
<td>Glucose</td>
<td>.70</td>
</tr>
<tr>
<td>Diffusion Juice—Brix</td>
<td>16.36</td>
</tr>
<tr>
<td>Sucrose</td>
<td>13.79</td>
</tr>
<tr>
<td>Purity</td>
<td>84.3</td>
</tr>
</tbody>
</table>


Diffusion Juice—Glucose .................................. .58 per cent.
Dilution .......................................................... 27.3 "
Exhaustion chips—Sucrose .................................... .56 "
Extraction ......................................................... 95.34 "

**SUGAR MANUFACTURED.**

<table>
<thead>
<tr>
<th></th>
<th>Pounds</th>
<th>Pol.</th>
<th>Pounds Sucrose</th>
<th>Per cent.</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>19,690,000</td>
<td>96.5</td>
<td>19,000,850</td>
<td>73.6</td>
</tr>
<tr>
<td>B</td>
<td>5,173,115</td>
<td>89.7</td>
<td>4,640,284</td>
<td>19.3</td>
</tr>
<tr>
<td>C</td>
<td>1,542,250</td>
<td>88.4</td>
<td>1,364,591</td>
<td>5.7</td>
</tr>
<tr>
<td>D</td>
<td>380,000</td>
<td>87.0</td>
<td>330,600</td>
<td>1.4</td>
</tr>
<tr>
<td></td>
<td>26,785,365</td>
<td>94.6</td>
<td>25,336,625</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Days running ................................................................ 162
Tons of cane per day .................................................. 618
Tons of sugar per day .................................................. 82.8
Pounds of sugar per ton of cane .................................. 267
Tons of cane to 1 ton of sugar ..................................... 7.48

<table>
<thead>
<tr>
<th></th>
<th>Pounds</th>
<th>Per 100 Cane</th>
<th>Per 100 Sucrose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sucrose in cane</td>
<td>31,290,690</td>
<td>15.60</td>
<td>100.00</td>
</tr>
<tr>
<td>Loss in extraction</td>
<td>1,458,227</td>
<td>.73</td>
<td>4.66</td>
</tr>
<tr>
<td>Sucrose extracted</td>
<td>29,832,463</td>
<td>14.87</td>
<td>95.34</td>
</tr>
<tr>
<td>Sucrose obtained</td>
<td>25,336,625</td>
<td>12.63</td>
<td>80.97</td>
</tr>
<tr>
<td>Loss in manufacture</td>
<td>4,495,838</td>
<td>2.24</td>
<td>14.37</td>
</tr>
<tr>
<td>Total Loss</td>
<td>5,954,065</td>
<td>2.97</td>
<td>19.03</td>
</tr>
</tbody>
</table>

**REPORT OF COMMITTEE ON MACHINERY.**

COMMITTEE—A. Young, G. R. Ewart, Jas. Renton.

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

Sir:—In dealing with the question of machinery it will be unnecessary perhaps to make particular mention of that which has not in some way been recently modified or improved; and your committee would call attention first to the introduction of the National Shredder by Mr. R. R. Hind, at the Hawi Plantation, Kohala, Hawaii; and later to its adoption by Mr. J. A. Scott at the Hilo Plantation, Hilo,
Hawaii; and also to the contemplated installation of still another shredder of the same kind at the Paauhau Plantation, Hamakua, Hawaii.

The shredder is placed between the cane-carrier and the mill, whether the mill be of the two or the three roller type, and its function is to tear the cane into shreds and chips, without to any great extent extracting the juice, preparatory to its entering the roller-mill.

Then, there is at present being erected at the Pepeekeo, Paia, and Kekaha Plantations, another kind of machine for the purpose of preparing the cane for the mill, known in Cuba and Louisiana as Krajewski's patent cane-crusher. This contrivance, like the shredder, is placed between the cane-carrier and mill, but serves the double purpose of extracting from 52 degrees to 60 degrees of the juice and also crushing the cane preparatory to its entering the roller-mill. The juice thus extracted flows down a spout into the juice-pan of the mill, while the crushed cane, like coarse trash, slides separately down an inclined chute into the roller-mill.

The shredder flies at a high rate of speed; it is composed of two drums having V shaped circular saws bolted together on shafts and running the whole length of the mill-rollers; one of which is placed over the other, with the V shaped saws matching between each other, the one has a much faster motion than the other and whatever cane passes between them is torn up most completely, but as there is no pressure on the cane the juice is not liberated from the shreds till pressed between the mill-rollers. The periphery speed of the upper shredding drum is from 2,000 to 2,500 feet per minute.

The Krajewski crusher has a pair of steel toothed rollers the teeth running zigzag lengthwise along the periphery of the rollers, and the teeth of one roller step in between the teeth of the other roller. The cane passes between the rollers about the same speed that it would pass through mill-rollers, and subjected to almost as great a pressure as that of a roller-mill. The pitch of the teeth on those crusher-rollers is about 5 inches so that the cane though not quite severed, is broken up every 2½ inches or so, and is in
excellent condition to be readily taken by either a two
or a three roller-mill.

These two inventions are timely and important helps
to the roller cane-mill and more particularly to the two
roller-mill: for although good work has been done by the
triple two roller-mills at work at Pahala, Wailuku, Paauhau,
and Kahuku, Plantations great care has had to be exercised
in feeding the cane rollers, but a shredder or a crusher
placed in front of such a mill permits the mill to be run
much closer, with the result that the trash leaving it is much
better crushed than that formerly coming from the second
pair of rollers, consequently in a much better condition
to receive the maceration water and take more of it; then
too, after maceration, the trash has two heavy two roller-
mill compressions and it sent to the furnaces containing
a very small percentage of moisture as compared with work
done in the same mill where no shredder or crusher is used.

With either the shredder or the Krajewski Crusher in
front of it the triple two roller-mill with suitable feeding
appliance is undoubtedly ahead of the double or the triple
three roller-mill for extraction of moisture from the trash;
for the reason that in a two roller-mill all the strain that
the upper roller will stand is exerted against the trash
between that and the lower roller for example, say a
pressure of 800 tons. Whereas in a three roller-mill of the
same size of rollers and with the same pressure, all the
strain that the upper roller will stand, say 800 tons, is
exerted against the trash between both the front and the
back rollers and if we give, of the 800 tons, say 300 tons to
the feed roller and 500 tons to the trash roller, which would
be a fair division, we find that in a three roller-mill, though
there are double the number of compressions, the greatest
pressure would be only about \( \frac{5}{2} \) that of the two roller-mill,
a very serious drawback when we come to the final com-
pression. We may put trash through as many compressions
as we please and after the first one, very little more moisture
will be extracted unless the pressure be increased in each
subsequent compression.

The reason why trains of three roller-mills are used
so extensively, is because by running the mill with a less
pressure on the feed side the mill takes the trash more readily than does a two roller-mill with the whole pressure upon the one compression, unless the two roller-mill has a forced feed. Roller-mills are likely to be used to extract the juice from sugar-cane for some time yet, and we may as well devote our attention to all that will make them more efficient and less troublesome; and just here it might be well to offer some suggestions regarding the troubles attending milling machinery.

There is no more simple contrivance than a sugar-mill, and yet none more subject to breakdowns. In former times, even when a very much less pressure was used than at present, and a very meagre percentage of the juice extracted, uneasy lay the head of the mill manager; for, in those days, all the gearing as well as the crown-wheels of the mills themselves were of cast-iron, and when the mill was stopped at the end of the day, no man could tell what tomorrow would bring forth. But now-a-days steel castings are used extensively for the parts most likely to break down, such as all the pinions as well as the rims of the main spur-wheels together with the roller pinions, or crown-wheels as they are sometimes called, and that great bug-bear, the returner-bar of the three roller-mill, all this tends to lessen the chances of breakdowns; and yet they come in the shape of breaking and loosening of roller-shafts, etc. This seems, under the present mode of constructing mills, to a certain degree, unavoidable where proper crushing is done; and the planter who goes easy on his mill for fear of breaking down is like the laboring man who refrains from going to his work for fear of wearing out his shoes—they both lose in a short time more than would buy new ones.

The breaking of roller shafts is not a new feature in machinery, as many of the planters well know, still it deserves a notice in this report. We will therefore, first mention some of the causes of these breakdowns. One cause is, that in many cases the shafts are too small for the strain they have to stand, and this is notably the case where plantations have been gradually expanding while the machinery has not only not grown with the plantation, but has deteriorated instead. This deficiency in the capacity of the
machinery, in some of those expanding plantations, has partly been overcome by the adoption of continuous night and day work however.

Mill roller shafts are sometimes broken inside of the roller and when this happens it is caused by the shaft having been loosened in one or the other end of the roller, by the destruction of the surfaces of both the shaft and the roller and caused by the vicious acid formed from fermented juice entering between the shaft and the part of the roller in which it is encased. This destruction of the iron progresses slowly at first and more rapidly afterwards till the surface or bearing part of roller on shaft becomes too small to stand the pressure, and that part of the shaft gets loose and begins to work in the eye of the roller, till, in some cases, the eye of the roller is half an inch or more larger than the shaft: this allows the shaft to yield from the middle bearing of the roller continually when the mill is at work, till at last the shaft falls apart. Now, a little prevention is worth a great deal of cure, and it may be as well to mention here that all rollers are perfectly water-tight at the ends when they leave the factory, but the constant heating of the journals causes expansion and contraction—the friction making the shafts hot, and the expressed juice keeping the roller-shells cool—which if not prevented soon admits of the entrance of juice that will create the damaging acid and then the silent work of destruction proceeds.

Now, it is well known that most good paint, after it has hardened, is more or less elastic, and were the mill men to devote their attention to the periodical application of a good thick coat of paint round the ends of rollers where the preventing collars go, say once a week during the grinding season, it would be impossible for the juice or acid to enter and destroy the bearing surfaces. The thick skin of paint would come and go enough to admit of the expansion and contraction without cracking: this simple and inexpensive application would save much loss and annoyance to the mill owner.

The mill roller and shaft of the future will be of one piece of steel, with the journals almost as large as the roller itself, so constructed that it will be impossible to break it. And the breakage of gears sometimes caused by pieces of iron,
etc., getting between the rollers, or from sudden abnormal strain from any cause, will be prevented by having the driving pinion on the engine shaft so constructed that when any undue strain comes upon it, the pinion will simply slip so that the shaft will revolve in it without driving anything. When this happens, the slipping might be made to ring an alarm and the attendant would then stop the engine. This would negative the momentum of the fly-wheel, and is all perfectly practicable and would not cost much; but we are generally too much afraid of venturing out of the old ruts to drop upon very many useful and valuable improvements in our mills.

There is every likelihood that with the probable low prices for sugar in the future, crushing cane, instead of diffusing it, for the purpose of extracting sugar, will continue to be the most popular mode of working. And at present the Ewa Plantation Company is installing a triple three roller-mill; this will give six compressions, and as the rollers are thirty-four inches diameter by seventy-eight inches long, with heavy shafts, ponderous engine and massive steel-rimmed gear wheels and steel pinions, good work will be the result. This mill is to supercede the diffusion apparatus which has been in use at that place for three successive campaigns.

This step, however, should not be understood as pronouncing entirely against the diffusion process. There are several other diffusion plants in this country doing fairly good work and which are likely to be kept in use. The anticipated advance in the price of sugar in the future, owing to the passage of the new American Law, will give diffusion in this country a decided advantage over last campaign. The diffusion plant at Ewa is of too small capacity and has been much too uncertain in its operation to deal with the large crops of cane produced there. If the price obtained for sugar when diffusion was introduced into this country, could have been realized in later years, diffusion would no doubt have been more generally established than it is now.

In the application of diffusion to the sugar cane, there is still much room for improvement, and it is patent to all who have closely observed the endeavors of the friends of diffusion, to make the process popular and profitable, that no
improvement has been made in the plants installed since the introduction of the initial one—the German plant at the Kealea Plantation, Kauai. The manufacturers of that plant were just feeling their way in the construction of such apparatuses at the time the Kealea plant was furnished by them, and to-day they regard it as much behind the diffusion plants they now furnish.

It may justly be said, however, that Kealia diffusion plant has done the best diffusion work in the country up to date. There have been but two complete sets of works erected in this country for diffusion, one at Ewa, on this island, and the other at Makaweli, on Kauai. But in these two plants, being especially designed for diffusion, some progress and many improvements were expected considering the fact that the experience of Kealia was before the promoters of those two full fledged diffusion plants, like an object lesson, before they commenced to make their plans. It should in justice, however, be mentioned that in the arrangement of cane-slicers some improvement has been made in both plants. Instead of having to lift the cane by hand and put it into the chutes of the slicers as at Kealia at first, the slicers of Makaweli and Ewa are fed by cane-carriers like roller-mills, which is a great saving of labor; while on the other hand, more, instead of less fuel is required at the more modern diffusion works referred to.

That it is possible to construct diffusion plants that may be run with less labor than is used at present, and practically without any other fuel than the spent chips, is beyond a doubt; and when the advocates of diffusion have done this there will be hope of successful and profitable diffusion, even though sugar should not net more than $50.00 per ton. One objection constantly made to diffusion is, that it necessitates night and day work, that now falls to the ground because many of the milling plants have lately adopted that plan of working and find it the most profitable and not at all inconvenient.

Next in importance to the extraction of juice from the cane, is its clarification, and yet in many sugar houses this part of the work is performed in a very slipshod and unprofitable manner. Much has been said and written on this important
subject and several attempts have been made, both in this and other sugar countries, to get out of the old ruts and into a more efficient method of performing the work.

It is claimed by some experienced sugar men that when the juice has been properly limed, it ought to be heated up to 235 degrees or 240 degrees F. in order to completely coagulate the albumen contained in it, and experiments conducted here and abroad on a large scale, have proved the correctness of the theory. In the ordinary mode of clarifying juice, open clarifiers are used and consequently 222 degrees is the highest temperature obtainable. In superheating the juice it is necessary to confine it under pressure. This matter has had mention at a previous annual meeting, but as the Ewa Plantation Company is likely to partly adopt the system by the introduction of a more complete apparatus in the coming campaign, than the mere experimental appliance occasionally used during the last two campaigns, it has been thought admissible to again refer to the subject of high temperature clarification and to describe the appliances to be used.

The juice, after being limed and either weighed or measured, flows into a tank from which it is pumped and forced through the tubes of one of a pair of tubular heating drums; these drums lie horizontally the one over the other. The juice enters the upper cluster of tubes in the upper drum and passes at the rate of about two and a half feet per second repeatedly from one end to the other of the drum, till, after passing through each consecutive cluster of tubes, it is delivered into the tubes of the lower drum through which it is forced in the same way. The object of forcing the juice through the tubes at such a high velocity, is to scour them and keep them clean while working for at least 48 hours and if possible for one week.

The tubes in the lower drum are surrounded by live steam from the boilers, and steam is supplied in such quantity as will keep the juice passing through the tubes at a temperature of 235 degrees to 240 degrees. A valve at the outlet of this heater regulates the pressure under which the juice must be kept. This high temperature juice now flowing from the heater, passes through a pipe, still under pressure, into a cylindrical cell standing on end—its diameter about four and a half feet, and its height fifteen feet—at the top of this there
is a pipe leading off to the tubular heating drum first mentioned—the upper heater—and on this pipe there is a save-all close to the cell, while over the heating-drum it is fitted with a loaded valve which may be regulated to any desired pressure. The highly heated juice flows into the bottom of this cell and, being under a much less pressure, boils freely and gives off a great volume of steam which, as fast as it is generated, passes off through the pipe at the top of the cell and into the upper heating drum amongst the tubes through which the cool juice is flowing; thus the escaping heat necessary to be taken from the superheated juice is utilized to heat the juice in the upper heater.

The pressure in this upright cell, called a separator, is very slight—say three pounds per square inch—but still the juice passing from it to the settling tanks is too hot to pass into the atmosphere, and so a counter current tubular decolorator is employed in which the cold juice on its way from the mills to the liming tanks takes the superfluous heat from the hot juice, thus enabling the hot juice to be delivered into the open settlers without causing volumes of steam to fill the house and also gaining the advantage of raising the temperature of the whole of the mill juice—says fifteen degrees or so. The impurities contained in the juice thus treated, will be rapidly precipitated in the settlers. The clean juice from the upper part of the settling tanks is then pumped to the supply tank for Multiple Effect without further cleaning and the bottoms sent to the mud-presses and thence to supply tanks.

When the juice is of such a nature that it will admit of it, however, and it is found that the whole of the juice may be passed through the presses without going to the settling tanks, a pump may be needed between the separator and the decolorator to give pressure enough for the presses. It will be noticed that in this mode of handling the juice, it does not come in contact with the atmosphere from the time it is limed till it reaches the supply tanks of Multiple Effect, and in fact if considered best, it need not come in contact at all till it leaves the vacuum pans and is ready for the centrifugals.

At Kealia Plantation a new method of filtering diffusion juice has been introduced, which has been patented in this country. The filter consists of a series of tanks each having
a middle perforated bottom, above which is filled with beach sand; these tanks are set on a terrace so that the juice passes through the sand in each, and by gravitation, from one to another. These tanks are so arranged that any one or any number of them at a time may be “cut out” for cleaning purposes. The filtration of juice through sand is not new, but the mode of arranging it at Kealia is novel, is said to be effective, and it is claimed that the coral sand has a beneficial effect on the juice passed through beds of it. This arrangement has been tried at the Ewa Plantation towards the end of last campaign, but with what results, is not generally known. It might be stated here that when cane juice has been properly limed and heated to a temperature of 235 degrees or 240 degrees, there is little difficulty in filtering it in any good filter.

An improvement on vacuum evaporators has recently been introduced at the Makaweli Plantation by Mr. H. Morrison. It consists of wooden rods either cylindrical or fluted, held centrally in the tubes through which the boiling juice circulates; the object being to bring a thinner film of juice in contact with the heating walls of the tubes, and also to have the wooden rods collect, to a great extent, the substance that is usually deposited on heating surfaces in the various kinds of Multiple Effect. It is claimed that this simple but valuable improvement will enable the cells of the apparatus to be run much longer without cleaning and that the efficiency, capacity, and economy of steam and labor, will be greatly enhanced by their use. The improvement is an inexpensive one comparatively speaking, and should be tried by all those who are struggling through their work with a limited evaporating capacity. Of course in cases where the construction is such, that the juice surrounds the tube instead of being inside of it, the improvement does not apply. If this simple contrivance proves to answer as well as the introducer expects, from what it has done in the Yaryan at Makaweli, it will prove a boon to planters generally.

Respectfully submitted.

ALEXANDER YOUNG,
Chairman of Committee on Machinery.

Honolulu, Nov. 5th, 1894.
To the Chairman of the Committee on Machinery:

SIR:—The Correspondent of "Engineering" at the Paris exhibition of 1879 wrote to his paper that they made no progress in sugar making machinery, the same old class of engines being used as in the early colonial days, and he could see no reason for it then, that people living in tropical climates were glad enough to let well alone and what had done for their forefathers, would do for them.

The three-roller mill he mentions as being a very unmechanical arrangement, and wondered why something had not been done to get rid of it. I wonder what the same correspondent would say were he to step into one of our modern equipped mills and see the machinery now in use. He could not object to the engines and mitre gear as they are up to date; and he must admire our double, triple and quadruple effects, centrifugals and other things that are to be found in a first class modern mill, not to forget electric lighting. But the three-roller mill is still there, and it would appear from what the newspapers say that it is going to stay with us for some time yet, but why it should when we have the means of doing something better, passes my understanding. I well remember my first impression of a three-roller mill. The gear being out-of-gear if one may use such an expression, as every one who has had anything to do with a three-roller mill knows that the three pinions are not running on their pitch lines and it is impossible to make them do so, as the front roller has to be opened to admit the cane. Besides the above defect, there is the returner bar, that absorbs so much of the power and causes such terrible strains on the shafts. We do not feel the effects of the above defects as we used to, as we have steel pinions and shafts and strong steel returner bars. We have an old wrought iron bar that is bent down in the middle one inch, its dimensions are five and a half inches wide six and a half inches deep, and on the top of that there is a one inch plate twelve inches wide, our rollers are thirty inches by sixty-six inches. That will show where a great deal of the power goes in a three-roller mill. With a two roller mill there is no returner bar, and it is possible to construct gear that will run on its pitch lines.
So that with steel shafts and pinions you reduce breakage to a minimum. The two-roller mill has a drawback, and that is there is no resistance to the cane going through it, and it merely cracks it, and it is only after repeated crushing you can get all the juice extracted.

But now comes the shredder that prepares the cane for the two-roller mill and you have a perfect cane crushing mill. I can give no data of a set of two-roller mills and a shredder, no doubt our chairman can do so as I understand from him he is preparing in his report some account of the shredder and two-roller mills. But I feel confident that any kind of a shredder and a set of two-roller mills will do better work with less power than any three-roller and a two-roller mill with a shredder, or any set of three-three-roller mills can do.

Accounts of boiler setting in all its phases have been presented before you at other meetings and the value of trash as a fuel, chimney drafts and furnaces also. I have been in favor of large furnaces, and I am so yet, and wherever I have put them in, I have been successful. The consumption of fuel in a large furnace in proportion to the work to be done, can be better controlled than in a small furnace. I mean when boilers and works are designed somewhere in proportion. I would not run a ten horse power engine with one hundred horse power boiler and expect economical work.

Hydraulic and steam pumps are in use in mills for pumping number three and four molasses sugars, and they are a great labor-saving machine is the juice strainer and elevator, besides being so much cleaner than when done by hand labor.

Our only salvation with the present low prices of sugar is to adopt all the labor-saving machinery that comes along, and reduce the cost per ton in the mill to the lowest point.

Geo. R. Ewart.

The latest quotation of sugar in New York was $3\frac{1}{2}$ cents per pound for Cuban centrifugals, 96 test. American refinery stock $86.$

Dutch granulated and German granulated sugar held at $4\frac{1}{2}$ cents net cash, duty paid November 1. English granulated was quoted at equal to 4.76 cents per pound, net cash, delivered New York, duty paid.
REPORT OF COMMITTEE ON FORESTRY.

COMMITTEE—A. Moore, W. M. Giffard, J. Hind.

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

Sir:—Your Committee on Forestry beg to submit the following report:

Sugar being the main industry of these islands, and its success dependent entirely upon water, either for natural or artificial irrigation, or for the fluming of cane, we will try to show the importance of forests mainly in connection with our water supply for the above purposes. During the year the subject of forestry has received more than usual attention by reason of several years of drought in some districts, and the general shortage all over the islands, of water where used for irrigating.

During the past twenty years, large areas of forest and bush lands have been cleared for agricultural purposes, and a much larger area even has been practically destroyed by cattle; so much so in the latter case, that in the districts in which lie the larger cattle ranches, probably one-half of the former area of forest and bush land in said districts has almost entirely disappeared. This gives us a destructive combination of forest land cleared for the cultivation of cane and coffee, etc.; that cleared for firewood for domestic and manufacturing purposes; and that destroyed by damage from cattle, etc. We will not pretend to say that the forest lands as a whole should have been left intact, as to do so would simply mean that considerable of the large areas of now cultivated lands from which our main industry is derived, would have been otherwise practically worthless for industrial purposes. But we do contend that wanton waste has been committed in allowing large tracts to be cleared for the purpose of obtaining firewood, etc., and also in allowing cattle to roam aimlessly through the forests, bent on destroying trees, old and young, as well as the thick undergrowth, which latter it is conceded is an absolutely necessary factor for the retention of the moisture required for the feeding of springs, etc. We further contend that the authorities should have legislated with a view
to having a proportion of other lands forested in the neighborhood of where the deforestation was taking place, thereby preventing to a great extent the ultimate destruction of the forest area of these islands, which would take place in event of this system of deforestation being continued in the future.

There being a difference of opinion as to whether our climatic changes are due to any extent to the clearings above mentioned, we will quote the opinions of scientific authorities to show what effects forests have in a country.

Geo. P. Marsh in the “Earth” says, in reference to influence of woods on precipitation: “With the question of the action of forests upon temperature and upon atmospheric humidity is intimately connected that of their influence upon precipitation, which they may affect by increasing or diminishing the warmth of the air and by absorbing or exhaling uncombined gas and aqueous vapor. The forest being a natural arrangement, the presumption is that it exercises a conservative action, or at least a compensating one, and consequently that its destruction must tend to produce pluviometrical disturbances, as well as thermometrical variations. And this is the opinion of perhaps the greatest number of observers. Indeed, it is almost impossible to suppose that, under certain conditions of time and place, the quantity and periods of rain should not depend more or less, upon the presence of forests; and without insisting that the removal of the forest has diminished the sum total of snow and rain, we may well admit that it has lessened the quantity which annually falls with particular limits. Various theoretical considerations make this probable, the most obvious argument, perhaps, being that drawn from the generally admitted fact, that the summer and even the mean temperature of the atmospheric stratum immediately above it, and, of course, whenever a saturated current sweeps over it, it must produce precipitation which would fall upon it, or at a greater or less distance from it.”

Mr. Marsh refers in support of above, as follows:

“Among recent writers, Clave. Schacht, Sir F. W. Hershel, Hohenstein, Barth, Asbjornsen, Boussingault, and others, maintain that forests tend to produce rain and clearings to diminish it, and they refer to numerous facts of observation in support of this doctrine, etc., etc.”
For the benefit of those interested in plantations that depend on springs, or gradual drainage of the water over the surface of the land for fluming or irrigating purposes, we will further quote from Mr. Marsh, as follows: Influence of the forest on the flow of springs:

"It is an almost universal and, I believe, well founded opinion, that the protection afforded by the forest against the escape of moisture from its soil by superficial flow and regularity of natural springs, not only within the limits of the woods, but at some distance from its borders, and thus contributes to the supply of an element essential to both vegetable and animal life."

As the forests are destroyed, the springs which flowed from the woods, and consequently, the greater water courses fed by them, diminished both in number and in volume. This fact is so familiar throughout the American States and the British Provinces, that there are few old residents of the interior of those districts who are not able to testify to its truth as a matter of personal observation.

"Many illustrations by scientific men are given in support of the above theory, among others "The influence of the forest on springs," says Hummel, "it strikingly shown by an instance at Heilbronn. The woods on the hills surrounding the town are cut in regular succession every twentieth year. As the annual cuttings approach a certain point, the springs yield less water, some of them none at all, but as the young growth shoots up, they flow more and more freely, and at length bubble up again in all their original abundance."

Prof. B. E. Fernow, chief of the United States Department of Agriculture, in his introductory remarks on "Forest influences," states that "one of the arguments upon which a change of policy in regard to our forests, and especially on the part of the National Government, is demanded, refers to the influence which it is claimed forest areas exert upon climate and waterflow. It is argued that the wholesale removal and devastation of forests affects climate and waterflow unfavorably." Referring to climatic influences, he states that "we can understand readily that if any influence exists it must be due, in the first place, to the mechanical obstruction which the forests cover presents to the passage
of air currents, and to the action of the sun's rays upon the soil, it must result from a difference in insolation and consequent differences in temperature and evaporation over forest and field. It is also readily understood that the influence can become appreciable only when large enough areas exhibiting such differences are opposed to each other, capable of producing local currents of air which may inter-communicate the characteristics of the one area to the other. The size and character of the forest growth, its density, height, situation, and composition, are, therefore, much more important in determining its influence than has hitherto been supposed. It is not trees, but masses of foliage, which may be effective." The President of the State Board of Horticulture of the State of California, in one of his biennial reports, states that "the effect of forests on climate and consequently on all human activities is well recognized. The Prussian Forestry Commission has demonstrated by experiment, under Prof. Muttrich, that the temperature of trees is nearly constant, at about 54 degrees, and that the temperature and humidity of the air is positively affected by forests. Thus, woodlands have a modifying effect, similar to that of the sea, upon the air that surrounds us, preventing the extremes of heat and cold, and of dryness that would and do occur upon lands where there are no trees. Rapid alterations of temperature are the cause of strong winds, storms, heavy rains, cloud bursts, hails, etc. Forests reduce the violence and frequency of these, and distribute the rainfall more evenly and prevent the extreme and trying dryness always found at times in places from which more than the proper proportion of forest has been removed."

The question of forest influences upon climate, however, still awaits final solution, but as regards the effect which forest cover exerts upon the waterflow and the disposal of water supplies, authorities are nearly all in accord, and we will now undertake to give a few more extracts from reliable works dealing entirely upon this subject.

As regards the disposal of water supplies, in 1891, the American Association for the Advancement of Science, sent a resolution to the Secretary of Agriculture, of which the following is an extract:
"The present policy of forest production and of allowing our waters to run to waste, not only entails the loss of their beneficial influence upon plant production, but permits them to injure crops, to wash the fertile mold from the soil, and even to erase and carry away the soil itself."

Prof. Fernow on this subject says that "without forest management no rational water management is possible." The forest floor reduces or prevents the injurious mechanical action of the rain, and acts as a regulator of water flow. Hitherto, water management in rainy districts has mainly concerned itself with getting rid of the water as fast as possible, instead of making it do service during its temporary availability, by means of proper soil management, horizontal ditches and reservoirs, drainage and irrigation systems combined. It seems to have been entirely overlooked that irrigation, which has been considered only for arid and sub-arid regions, is to be applied for plant production in well watered regions with equal benefit and profit, if combined with proper drainage systems and forest management."

As regards the matter of forest influence upon water flow, etc., Prof. Fernow states that "the general climatic conditions in which the forest is situated, as well as its situation with reference to elevation and exposure, furthermore its composition, whether ever-green or deciduous, its density, its height and extent, the character of the forest floor, the topography, geology or stratification of soil must all be taken into account when discussing the subject of forest influences." The Professor, in referring to the distribution of terrestrial waters, says that "the distribution of the available water supply is almost as important and often a more important factor in the economy of the water than the quantity of available supply itself, and the manner in which this distribution takes place, influences considerably the ultimate availability of the supply for human use. In discussing the distribution of the water supply, it is desirable to follow the natural division of the waters into superficial and underground drainage. The surface run-off gives to brooks and rivers all their variations of stage; the underground drainage gives them their permanent regime. The proportionate division of these two classes of run-off, then, is of the highest
possible importance; we will, therefore, analyze the conditions which determine their relative proportion in order to find how the forest may influence the same. It is evident that the first condition is to be found in the amount and character of the precipitation. A violent rainstorm will furnish more superficial run-off than when, the rain falling slowly, time is given for the soil to absorb it. Rainy and rain-poor or arid climates, short and insignificant rains, short but violent, long and mild, or long, plentiful rains, also periodical, seasonal rains and irregular rainfalls, all these constitute differences in the nature and time of occurrence of the rainfall, which must necessarily affect the relative amounts of the run-off. We find, therefore, based upon this one factor, namely, the nature and time of occurrence of precipitation, differences in the run-off, which are dependent upon differences in climate conditions.

"After water has reached the ground its distribution is determined, first, by the character of the topography and, second, by the nature of the soil and the surface conditions. The topography determines the rapidity of run-off and of collection. The more diversified the country—cut into dells, coves, rills, and furrows, steeper and less steep slopes—the larger the number of runs of unequal length in which the water is collected, while the less diversified the contour the more water must be carried off in each run. Yet where the diversity of configuration is accompanied by steep slopes the run-off may be so rapid that the valley river is filled more rapidly than the river of the open plains country with even slopes of moderate inclination. Thus in some of the river valleys of West Virginia the watersheds are scooped out into such an array of coves, gashes, and water courses and minor watersheds, and so steep and rapid in descent that in spite of the forest cover, a rainfall of a few days will induce a rapid rise of the rivers, while the same amount of rain will hardly wet the ground in a prairie country like Iowa. The second of the above mentioned conditioned determining distribution, the nature of the soil and the surface conditions, comprises a large number of separate, though related, factors. The composition, structure, and stratification of the soil itself its water capacity, its permeability, and other physical
properties; the nature of the underlying rock and its susceptibility to disintegration under the action of erosion; the surface conditions of the soil cover, whether frozen or sunbaked, cultivated or uncultivated, barren or covered with grasses or forests; these are a part of the factors which affect the distribution of the water supply and determine the proportions of surface and underground drainage. On a given territory, then, with given geologic, topographic, and climatic conditions, the only directly variable conditions influencing the manner of drainage are those of the upper soil strata of the soil cover. We are, then, mainly concerned with the water capacity of soils and soil covers the intensity of their water absorption and the amounts of water which are drained through them in given times. We are interested in studying by that means the draining capacity of the soil is increased, and by what means altogether the run-off may be changed in its nature from a superficial to a subterranean one and the reverse."

"The forest cover, has a tendency to preserve the granular, porous structure of the soil, which is favorable to filtration; and as, moreover, the roots furnish channels for unimpeded drainage, it must have the tendency, other things being equal, to allow a more rapid filtration than the naked, mostly compacted soil, or even that of a field or crops after cultivation ceases. While underground, one part of the filtered water becomes stationary as soil moisture retained in the capillaries of the soil, and finally in part to be returned to the air by transpiration from the foliage and evaporation from the surface of the soil. The other part—the surplus above the water capacity of the soil—continues to filter through the soil, gathering into definite channels, collecting in beds or basins, and finally reappearing as springs. The most direct influence of a forest cover upon the discharge would be noticeable on the surface springs, since in these the catchment area and the place of discharge lie close together, while the underground run is not only short, but lies near the surface, and hence experiences most sensibly the effect of the protection against evaporation which the forest cover offers. Deforestation here would no doubt reduce or cut off discharge entirely. In cavern springs an influence could be
exercised only in the indirect manner, by the increase of filtration over the catchment basin. The same pertains to fissure springs whose sources of supply are usually quite removed from evaporative influences, and only where these come nearer the surface or when the spring is only small, may the removal of the shade of forest cover reduce the outflow.”

“With reference to ground water springs, which come to light at a considerable distance from the catchment basin, the conditions of the latter, as far as the influence, increase and preservation of water supplies, and of the area over and under which the waters run collect, is of considerable importance, while the surface condition of the area within which the spring lies, if of impermeable strata, is of less consequence, except that a forest growth may lower the groundwater level by transpiration, should the water quantities furnished from the catchment-basin, not be continuous and sufficient. If these strata consist of permeable soil they would act as a second catchment-basin, and the effect of the soil cover upon the quantity of drain waters (precipitation, evaporation and transpiration) would be directly noticeable. We have seen that the tendency of the forest cover—trees, foliage, litter, moss—is to change a certain amount of surface drainage into subterranean drainage, or, in other words, to reduce the surface waters where they have fallen. Eventually, however, the subterranean waters come to the surface again, and add their stores to the surface waters that are carried away in open runs, brooks and rivers. Finally, then, all the waters that fall of the catchment-basin, except that which is returned to the atmosphere by transpiration or evaporation, becomes surface water; but the manner in which it runs off is the important point.”

“The great number of inequalities which the forest floor offers, in addition to the trunks and stumps and fallen trees, forces the run-off to many detours, thus retarding its flow and collection in the open runs and brooks. The retardation in the waterflow begins even before the rain has reached the soil, for the leaf canopy catches and re-evaporates from twelve to twenty-five per cent of the total fall, and certainly retards the fall of the water to the ground, as can be readily
observed; long after the rain has ceased the water keeps on dripping from the foliage. Thus, although most of the water reaches the ground at last, except in case of very light showers, yet the devious ways in which it reaches the soil makes the flow of water from a forest-covered hill longer in time than if the rain had fallen on a bare slope. As the result of a long continued precipitation, it would be under the same conditions by an unforested slope, but this stage occurs in the forest later than on an unforested soil and later still than on naked soil."

"The great importance of the factor of time in surface drainage, both as regards dangers from freshets and erosion of soil, will be more readily appreciated when we remember that the dangerous waters in the mountains are generally of short duration."

"A difference of 1,000 to 2,000 cubit feet of water per second from a square mile of watershed may often determine whether a dangerous flood is experienced or not. And since a square mile of moss-covered forest floor is capable of absorbing from 40,000,000 to 50,000,000 cubic feet in, say, ten minutes, nearly all of which the naked soil would give up some twelve to fifteen hours earlier, the surface conditions of the watershed must in many cases be determinative in the excesses of runoff in rivers. This important fact should at least be recognized, that the surface conditions of the soil of a watershed are the only controllable factors in the problem."

"Amount of precipitation, topography and character of the soil are the practically unchangeable other conditions which determine the occurrence of freshets and flood. With a forest floor in good condition, small precipitations are apt to be absorbed readily and entirely prevented from running off superficially; with excessive rainfalls, topographical and soil conditions have eventually more influence than the forest floor; from steep declivities and an impermeable soil waters will be shed superficially in spite of and over the forest floor as soon as the latter is saturated at the surface. Yet even so a difference in the run-off will be experienced by the fact that the well protected forest soil prevents erosion, the formation of detritus and the carrying of debris into the runs and brooks below."
The New York Forest Commission, speaking of floods in the Adirondack region and the influences of forests in relation to them, says: "In the uplands of the preserve there are many densely wooded tracts adjacent to others from which the forests have been stripped. The residents agree that in the former floods are unknown, while in the latter they are a yearly occurrence. Their appearance was coincident with the disappearance of the woods. It was then noticed that the bridges, which for many years had sufficed to span the streams during heavy rains, were no longer safe, and new ones with longer spans became a necessity."

In the year 1881 the state of New Hampshire established a forest commission, who were instructed to inquire, among other matters relating to the forests, into "the effect, if any produced by the destruction of our forests upon our rainfall, and consequently upon our ponds and streams."

In concluding their report in the year 1885, the commissioners say: "On one point there is no division of opinion. It is not in the open ground but beneath the trees, that the moisture and the snow accumulate, and are slowly and surely applied to the springs and streams, which then have a perennial flow. Let the same ground be deprived of its shade and this exposure to the sun hastens evaporation, and the rain and melting snow rapidly pass off through the water courses before any sufficient quantity can reach the permanent reservoirs under the surface. The snow on the exposed hill-side may be swept off entirely by the wind; and even when any considerable portion remains, much will evaporate, and after all be lost to the soil and the springs. The soil itself is often washed off, and the exposed rocks often given over to perpetual barrenness."

At a recent meeting of the Boston (U. S. A.) Society of Natural History, the subject of "The influence of forests upon the atmosphere" was presented by Dr. G. L. Goodale. His conclusion, in brief, was that their influence is very slight. In regard to moisture; their direct action in throwing off moisture is, he said, insignificant, but their indirect action in holding back the water which has saturated the soil in rainfall is very great. Droughts and excessively dry atmosphere are consequent upon an extensive cutting away of forest growths.
We could continue to follow up the effects of the destruction of the forest and the influence the latter have on climate, waterflow, etc., etc., by accounts of conditions that exist in parts of Europe as recorded by other scientific men, where large sections of land that at one time supported large and productive communities have, through the reckless destruction of the forests in their neighborhood, become barren, and unable to sustain animal life.

It being but a few years since land was first cleared for agricultural purposes at the islands, the effects of the great change that has taken place in the proportion between forest and cleared land has not had time to be noticed. In some districts we may have arrived at the point where the equilibrium is disturbed, if we have not, how many years, at the rate we have been reducing, the proportion will be required to cause parts of this country, now under cultivation, to become so dry, that they will have to be abandoned for agricultural purposes?

We have all been thinking and working for the present, never thinking of the effects in the future. Up to the present time, but little has been done to preserve any of our forests, or to permit a new growth to replace that destroyed, on lands at present useless for other purposes.

In view of the great importance of this subject to the country and all who are, or may in the future, be connected with it, your committee recommend that a special committee be appointed from the Planter's Labor and Supply Company to urge upon the Government the necessity of making such laws, that may be needed for the maintenance of our forests, for not only the present, but future welfare of the islands.

Should this Government see fit to legislate in this matter and form a “Forest Department” in connection with the present Bureau of Agriculture, we would further suggest that the influence of the Planter's Labor and Supply Company be used to the end that the Government restrict admissions to the Department, to those who have become conversant with their work before responsibility is entrusted to them. It certainly will not pay to proceed by “rule of thumb,” or at best upon such acquaintance with the subject of forestry as could be acquired by study of publications relative to the science as
produced by the Governments of other countries. Such persons would have to learn their business at the expense of this country, it being impossible but that many very expensive mistakes be committed by them. In view of this fact, it would, therefore, be imperative that in order to ensure success, none but the best trained foresters be allowed admission to the department. Alluding to the attainments necessary to constitute a thoroughly efficient Forestry officer, Mr. Vincent in his report on the Forests of Ceylon says: "Forestry is like all other professions; proficiency in it does not and cannot come by intuition. It involves not only questions to be dealt with by the scientific Arboriculturist, but others of a purely economic character, the knowledge of which can only be acquired by study under those whose experience has been large and varied." In July, 1883, Mr. Cantley, the Superintendent of the Botanical Gardens at Singapore, India, published a report on the Forests of the Straits Settlements, showing how greatly they needed protection. The result of his efforts in this behalf was the formation of a small Forest Department with a Superintendent and four assistants, under whom were some subordinates officers, together with a number of forest watchmen. The measures recommended and in part adopted by that Government for the better management of the forests was thus summarized:—

(a). "Preventing the felling of forests and the clearing of forest lands.

(b). The redemption by exchange, or otherwise, of such land as is selected for planting with forest trees.

(c). The survey and demarcation of such crown forest lands as are still undetermined, and the preparation of good and reliable maps showing the forests and the topographical features of the various lands throughout the settlements. This is a desideratum that should be looked upon as a first duty of the Survey Department.

(d). The formation of local forest reserves for the supply of wood for general purposes; and mountain and river reserves for protection where necessary.

(e). The establishment of a forest department to take charge of all Crown Forests, whether proclaimed as reserves or otherwise.
(f). The marking of certain blocks of forest near the chief towns of each settlement of a sufficient size to serve as reserves for the supply of fuel and small building wood.

(g). The appointment of a body of forest police for protective purposes, to be quartered in the country districts throughout the settlements.

(h). The immediate collection of seeds of the best indigenous timber trees, and the formation of nurseries for the propagation of such seeds.

(i). The introduction of an ordinance for the better conservation of the crown lands."

This experiment by the Straits Settlements has, we understand, proved very successful, and we have no doubt but that efforts by other countries on similar lines, have also been of great benefit for the preservation and replanting of their forests. We, therefore, see no reason why similar work cannot be undertaken by the present authorities, with a view to protecting what remaining forest lands we have on these islands, and the planting of others.

Respectfully submitted,
A. Moore,
W. M. Giffard.
John Hind.

REPORT OF COMMITTEE ON TOBACCO.


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

SIR:—As a member of the Committee on Tobacco, I beg to present the following report:

Tobacco culture as an industry has not up to the present time become established on the Hawaiian Islands. Many experiments have been made in various parts of the Islands which have proved that the soil and climate of this country is admirably adapted to the growth of the tobacco plant. These experiments have also proved that while the plant grows luxuriantly there are elements in the soil that unfit
the tobacco for use in the pipe or for manufacturing into cigars.

All tobacco grown on Hawaiian soil shows a strong, harsh, pungent quality without any of the aroma so much desired in all smoking tobaccos. It is true that chemical processes are used that are effective in eliminating much of the harshness and pungency of strong tobaccos, but all tobaccos so treated are only fit for manufacturing into the cheapest grades of cigars, and are without any of the aroma that is found in the fine grades of cigars, especially those from the Island of Cuba.

It would appear from this that it would seem hopeless for any one to engage in tobacco culture on these Islands with the expectation of producing a tobacco that would find a ready sale in the markets of the world. And so far as regards the production of tobacco for cigars and the pipe, success would be impossible, as all experiments in tobacco growing in all parts of Islands with many varieties of seed have shown that all the tobacco has the same objectionable qualities. But there is another phase of the question, and it is the purpose of this paper to endeavor to show in what manner, under certain conditions, tobacco culture may become an important industry in this country.

In a former report on tobacco by the writer, it was shown that the Island of Sumatra, where the finest cigar wrapper in the world is grown, has a soil very similar to that of Hawaii, a vegetable loam on a volcanic base. The climate of Sumatra is somewhat warmer, the thermometer ranging from 70 deg. fahrenheit at sunrise to 94 deg. fahrenheit at 2 p.m.

While Sumatra produces the finest quality of cigar wrapper, it is a well known fact that no smoking tobacco is grown in that country. Many experiments have been made with all varieties of seed with the result that all the tobacco has shown the same strong, harsh quality and destitute of aroma that is so characteristic of Hawaiian tobacco.

The attention of the planters in Sumatra has been devoted entirely to the production of a special variety of tobacco for cigar wrappers, and their product commands the highest price in all the markets of the world. The Planters' Labor and Supply Company procured through the writer a supply
of the best variety of seed direct from Sumatra, over sixty portions of this seed were distributed to different persons throughout the Islands, with printed instructions for the propagation, culture and curing of the crop. Many persons never took the trouble to even plant the seed, those that did plant reported the tobacco as growing strong and well, but in only one instance did any of them take sufficient interest to cultivate the crop to maturity.

Mr. Chas. Wilcox on his place at Ulupalakua on Maui, raised a patch of tobacco from the Sumatra seed furnished him. The tobacco grew well but was cut before it was quite ripe. Last year a patch from Sumatra seed was grown at the Government nursery and cured but not fermented; fermentation is absolutely necessary in order to bring out the true color and elasticity of the leaf, and it was found impossible to ferment the small quantity grown, about fifty pounds. This tobacco has been examined by a tobacco planter from Sumatra and pronounced by him to be as good as the average of Sumatra tobacco before being fermented.

Samples have been sent abroad and one manufacturer thought so highly of the tobacco as to request that ten pounds be sent, so that he could work it up into a marketable lot. The ten pounds have been furnished and a reply is expected at an early date. There is every reason to believe that these Islands can produce a fair quality of cigar wrapper and with a few years of experience, perhaps rival the Sumatra product; but in order to fully demonstrate this, an enterprise will have to be started on a large scale involving an outlay of from 20 to 25 thousand dollars. In order to create a bulk for the fermentation so necessary to bring the tobacco to a marketable condition, at least seventy-five acres of land would have to be planted. In Sumatra there are some small growers who cultivate from ten to fifty acres, but in every case the tobacco is sent to a central factory or to a larger grower to be fermented. The large outlay mentioned is caused by the large number of drying sheds needed for the crop. Each eight acres of tobacco requires a drying shed ninety feet long by sixty feet wide. The sheds can be constructed of the cheapest lumber with thatched roof and walls, but at the cheapest rate that they can be con-
tracted for they will form a large item in the outlay for the first crop; in most cases they will serve for the second and even a third crop. One of the sheds can be made to serve for a fermenting house. As to the cultivation, one Chinaman can plant, cultivate and cut the tobacco on an acre and a half of land. Other expenses such as plowing, curing, fermenting, sorting and baling would bring up the outlay to the sum mentioned. The crop would probably be about 500 pounds of cured tobacco to the acre.

The highest grades of Sumatra wrapper are worth from $1.25 to $1.75 per pound, while the prices realized for all grades is about 60 cents per pound. If we could be certain of producing a tobacco equal to the Sumatra article, the prices realized would yield a profit on the first crop which would be largely increased on the second and third crops, but some years would certainly elapse before we should gain the skill and experience to compete with Sumatra in the markets of the world.

It is extremely improbable that Sumatra prices could be realized for our tobacco, and unless we gain some decided advantage over Sumatra it will be difficult to enlist capital in an enterprise which is so uncertain as to results. But should the Hawaiian Islands be annexed to the United States or a free trade treaty be ratified, or our present treaty be so amended as to admit Hawaiian tobacco free of duty into the United States, then we should have such an advantage over Sumatra or any other country, that tobacco culture would offer such tempting prospects that many would be eager to engage in the business.

A Sumatra planter informed the writer that if ever Hawaiian tobacco was admitted free into the United States many of the Sumatra planters would come to these islands and engage in the culture of tobacco. The duty on tobacco leaf for wrapper by the Wilson bill is $1.50 per pound, and with such an advantage over other countries the culture of tobacco on these islands would speedily become a leading industry.

J. Marsden.

On page 552 will be found a correction of a statement made in the Labor report.
REPORT OF COMMITTEE ON FIBER PLANTS.

[COMMITTEE—J. MARSDEN, H. M. WHITNEY, G. N. WILCOX.]

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

Sir—I beg to present the following report on fiber plants:

The list of fiber plants from which commercial fibres are obtained is very extensive and nearly every country in the world has its own particular fiber plants, but the greater part of the world's supply of fibers is supplied from tropical and semi-tropical countries.

Many fiber plants will grow and do well in this country, and some varieties can be cultivated with almost certain prospects of success, while others for the want of suitable machinery to prepare them for market offer no inducements for any one to engage in this culture. Ramie, without doubt the finest of all the vegetable fibers, is still waiting the inventive genius to produce the machine that will clean the fiber cheaply enough to enable the growers to obtain a profit by its cultivation. Tempting rewards have been offered by the British Government for such a machine, and a late number of the Planters' Monthly states that the Chinese Government has offered the large sum of $125,000 to the inventor of a successful machine. The inventive talent of the world has for years been engaged on the problem, but up to the present time it has not been solved.

Ramie grows luxuriantly on these Islands and will yield several crops per annum, but until a machine is invented that will economically prepare the fiber for market it is useless for any person to engage in its culture.

The Agave Sisalana or Sisal hemp plant is admirably suited for industrial culture in this country; unlike the Ramie, which has a wide habitu and will grow perhaps as well in California as here, the Agave Sisalana is a purely tropical plant, and moreover will flourish in the poorest of soils, in fact it will grow and flourish where nothing else will grow.

In appearance it is not unlike the Aloe that grows wild in many parts of the group, but it yields a much better and stronger fiber, which finds a ready market both in the
United States and in Europe. The writer has, during the past year imported for different persons, over 70,000 plants which have been sent to all parts of the Islands. Reports have come to hand that all the plants are growing well and in the course of time when the plants pole and produce thousands of young plants we may expect that plantations will be started and the industry fairly inaugurated.

The sisal hemp is not an industry for small farmers. I mean those who own or control from twenty to fifty acres; there are better uses for most of the homesteads and kuleanas which are invariably situated in rich arable land. The yield of fibre per acre from the Agave Sisalana is stated to be from 1,400 to 2,000 pounds per acre, worth from four to five cents per pound, and from all I can gather it seems that a plantation of less than 500 acres would not justify the purchase of improved machinery. The larger the plantation the more certain the enterprise proving profitable. Small farming in the sense of a number of small growers of say 100 acres each and delivering the leaves to be cleaned at a central factory, is quite possible. Improved machinery that will produce from 1,000 to 7,000 pounds of clean fiber per day can be procured at a cost of from $1,000 to $4,000.

The chief value of the Agave Sisalana lies in the fact that it will put to profitable use tens of thousands of acres of land that are utterly valueless for any other purpose; it is true that the return from each acre is small compared with other products on rich moist lands. But the expense of cultivation is but a trifle and the outlay for buildings and machinery would only require a moderate sum. Without going into details it is quite safe to say that 1,000 acres of sisal would yield a certain profit of twenty dollars per acre for fifteen years without replanting.

The drawback in the way of starting this industry is the cost of procuring the plants which have at present to be imported from Florida at a cost of about $32 per 1,000. Six hundred and forty plants are required for an acre, and to plant 1,000 acres would require 640,000 plants which would cost over $20,000.

When the plant is seven or eight years old, (provided the leaves are not cut for fiber,) it sends up a pole which bears
from 1,000 to 2,500 young plants; these are planted in a nursery and when six to eight inches high can be planted out in the field. In three to three and a half years from planting out the leaves are long enough to cut for fiber, each plant will then yield forty leaves each year for fifteen or twenty years. It is hardly probable that any one will import a sufficient number of plants at one time to start a plantation, but it would be a wise course for any one owning or controlling suitable land to import a few thousand of the plants and set them out. In the course of two years they will treble in number from the young suckers that spring up around the parent plant, and in from six to eight years the older plants will pole, giving an abundant supply of young plants sufficient to plant thousands of acres of land.

Another fiber plant of totally different nature is the sansevieria or bowstring hemp. This plant, unlike the sisal, requires a rich moist land in order to produce the best results. The yield of fiber per acre is also much larger. In the report of the Secretary of the United States for 1892, there is an article on sansevieria by Dr. Harris of Florida, who says that when the plant is well established which will be some time in the second year after planting, the yield of fiber can be safely placed at five tons of clean fiber per acre. The plant will then continue to give a crop every year for ten years without replanting. Many persons are convinced of the merits of this plant, and are setting out all the plants they can get. In Olaa the planters are giving particular attention to this plant. Sansevieria is spoken of in all reports as being the most valuable of all the leaf fibers and one of the easiest to clean by machinery. Samples of the fiber grown in Honolulu have through the kindness of one of our principal business houses, been sent to England for an estimate of its value. A reply stated that the fiber was of good quality and worth from twenty-two to twenty-five pounds sterling per ton, at that time the fiber market was very low, sisal hemp being quoted at £16 per ton.

There is no doubt but that in a few years' time fibers will begin to figure in our exports, and it is to be hoped that all persons owning suitable land will turn their attention to this plant.
The plant is found growing in many gardens in Honolulu where it has been cultivated as an ornamental plant. The plant is propagated by pieces of the rhizomes or underground stems and by sections of the leaves three inches long, these are planted close together one-half their depth in sandy soil, and in eight or nine weeks they will send out fine roots from the lower ends, and soon after send up young leaves. They can then be planted in a nursery ten inches apart, and when they are a foot high they should be set out in the field two by two. In two years the ground will be fully occupied and the leaves three feet six inches or four feet high ready to cut for fiber. When the crop is cut the young leaves will at once start up and in less than a year again be ready to cut, and the same thing can go on for ten years, and the only expense will be the cutting of the crop and cleaning the fiber.

The first two years are the most expensive, as constant weeding is required in order to keep the ground clean until the plants have entirely filled up the land when no further weeding is required, the plants crowding out every other species of vegetation.

Respectfully submitted,

J. Marsden, Chairman.

Mr. Jos. Marsden, Chairman of Committee on Fiber Plants:

Dear Sir:—I have lately received from Mr. Wm. Fawcett, editor of the Jamaica Bulletin, a copy of his report on Ramie or China Grass. It covers twenty-four octavo pages, and is probably the most recent and complete statement of this valuable plant, including its history, methods of cultivation, harvesting, uses and value as a commercial product, that has appeared in print. It seems to furnish all the information regarding ramie that can be desired, and I hope to be able to insert portions of it in a future number of the Planters' Monthly.

Mr. Fawcett's report calls attention to a new machine for decorticating ramie that has recently been perfected in England, and says: "The Committee considers it desirable that, before making any recommendations as to the propriety of encouraging planters and others to adopt the
cultivation of ramie, or as to the formation of a company to work the Allison Machine,—the results of the tests to which the Agricultural Department of the United States proposes to subject the Allison in the coming autumn, should be awaited."

The report of the trial of this machine at Washington will no doubt be published soon after it has been made, and will be awaited with interest.

One or two points in Mr. Fawcett's report may be referred to here, as being of general interest. It is stated that "a low estimate gives 20,000 pounds of green stalks with leaves, or 5,000 pounds of dry retted stalks as the yield per acre. The minimum product of the dry retted stalks is 15 per cent or 750 pounds of raw merchantable fiber. Assuming it to be 800 pounds, per acre, it is then four per cent of the green plants."

"The following are the various stages in the manufacture of ramie: 1 Green stalks. 2 Retted stalks. 3 Decorticated ribbon. 4 Degummed fiber. 5 Bleached fiber. 6 Corded fiber."

"The best market for ramie appears to be France. What little is imported into England in the form of China grass or Rhea, is bought up for the French market. China grass is quoted, March 15, at 288 to 30s., per cwt., and Rhea 15s."

Mr. Morris, assistant director at Kew Gardens, gives as his general conclusion, "It is quite possible that some machine or process will eventually solve the problem of cleaning ramie, but at present, in spite of years of labor, and the expenditure of large sums of money, it cannot be said to have yet emerged from the experimental stage."

November 1, 1894. 

H. M. Whitney.

REPORT OF COMMITTEE ON COFFEE AND TEA.

COMMITTEE—C. D. MILLER, J. M. HORSER, E. W. BARNARD.

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

SIR:—Your committee appointed to report upon the Coffee and Tea industry of Hawaii, hereby endeavor to comply.

Mr. C. D. Miller our chairman could not serve owing to a
press of business, and the duty of reporting has fallen upon us. Not feeling competent to report without more information than we possessed, we journeyed around the island of Hawaii and visited all the coffee districts, not as experts but to obtain information to report on. We were kindly received, and talked freely with many of the coffee planters. All seemed enthusiastic and willing to communicate. We observed their methods of clearing and preparing lands for planting; also methods of trimming, picking, pulping, washing, and preparation for market, also the different machines used in these processes.

We left Laupahoehoe on the 11th of September on our way to Hilo, visiting Mr. Kinney's coffee field at Honomu en route. This place seemed decidedly too wet at the time of our visit for coffee. The subsoil was of a clayey nature and apparently retained too much moisture about the roots, and the trees seemed too much shaded to produce a profitable crop. Twenty acres were said to be three years old, and twenty acres only planted a few months. Mr. Kinney was away, but we were informed he intended planting a hundred acres more in a more favorable locality.

We passed through Hilo, and noticed that several of the gardens contained a few coffee trees, the majority of which were doing well, although only a few feet above tide water. In some cases the trees were large enough to show a good deal of blossom and fruit. The old Sunter place, seven miles out on the volcano road, shows it has been neglected too long and is too much shaded for profit.

Mr. Rycroft's was the next place reached, and we were repaid for the laborious ride, in seeing his fine field of coffee, which is coming into bearing, and the prospect is that he will get about two tons of coffee this season. Mr. Rycroft has thirty-five acres three years old, and fifteen acres newly planted in the most approved style, that is in straight rows, and no shade whatever.

We only saw a small portion of Mr. R. A. Lyman's place, owing to lack of guide. The portion we saw looked well and was being kept clean with a cultivator and horse; the trees looked well and appeared about two years old. The mission lands were next visited. Here we found the Goudie Bros.
had a clearing of twenty-eight acres, which was being planted in the open, no shade at all, in rows six feet apart, their superintendent being a practical coffee planter from Ceylon. There is also some coffee planted here which belongs to the Mission, which is not doing very well owing to neglect, too much grass and too dense a shade. The trees are four years old, look healthy are topped at about from five to seven feet, but very few cherries on the trees.

We next reached Olaa where we found great activity in clearing and planting. Fully 300,000 plants are already out, and more are being put out, over a thousand pounds of seed is being planted, besides the large nurseries which are ready to plant out at the present time, and the future of this district seems very bright with its rich lands and abundant rainfall. The land appears to be an older formation than any we passed over after leaving Hilo. The coffee trees and young plants show a vigorous and healthy growth, no trees over two years old at present, and very few have yet attained that age. The soil formation is such that the rain immediately disappears, however fast it may come down, no streams form or puddles to sour the land. We believe the heavy rainfall will not interfere with the growth of the trees, but whether it will prevent the setting of the fruit as some allege, time will tell.

The volcano house was one of our stopping places, and it seemed a great pity that a few coffee trees are not planted and cared for at this place as an object lesson of coffee growing at a high altitude, that being a question of interest to all coffee growers at present.

Next in order came Kau, and although very little has been done thus far in coffee planting we were led to believe there are tracts of land suitable for producing this berry in the neighborhood of Kapapala, Hilea and Waiohinu. At the latter place we saw some fine healthy trees bearing well, and the remains of many native patches of coffee which were dying out through neglect and Hilo grass.

At J. M. Monsarrat's place we noticed a disc pulper which was doing good work and also an inexpensive drying house which is worthy of the attention of those who are trying to dry coffee in a wet climate.
At the Morgan, McStocker Co.'s place in Kona, we found Mr. J. M. Davis in charge. He informed us he expected 10,000 lbs. of coffee this season from the wild groves situated on his land. He was planting wild stumps ten feet apart and wanted no other plants.

We next called on Mr. Chas. Hooper who has the reputation of getting the highest price for coffee. We found that the higher price was secured just by a little more care in sorting for market.

Passing on we reached the Hawaiian Coffee & Tea Co.'s plantation above Kailua, and found Mr. Miller busily engaged with a gang of men weeding a field of coffee near his house. This coffee looked well, and was planted out in good shape a few months ago, no shade. We also visited the upper lands of this company's plantation and found the coffee planted in all kinds of places, and looking vigorous. At Mr. Miller's house we saw the first washed coffee since leaving our homes, a fine sample of several hundred pounds, pulped with a Gordon pulper, fermented and dried in the sun. Mr. Miller is now erecting a drying house and mill. The company has out 160 acres in coffee at present. One and a quarter acres are three years old, the rest ranges from one month to two years. The oldest trees, topped at four and a half feet and set six feet apart, are quite full of fruit and a considerable number in the large fields have quite a sprinkling of berries on them, and they promise well for the next crop. These are set wider apart, and will be topped higher.

Messrs. Scott, Bartels and others are planting with fair prospects of success in this neighborhood.

We found wild coffee growing in the forests and by the roadside, but it has been planted without order or regularity, yet producing considerable coffee, and it was being harvested and prepared in various and wonderful ways. It speaks well for the Kona bean, that it retains so much virtue after all the abuse it gets in the modes of preparation as generally practiced in this district.

Leaving Kona we made for Hamakua where there are quite a number of Portuguese and others planting, but mostly in the shade and without much regularity or proper care. Reaching Kukaiau Plantation we found 65 acres set
at two different elevations, one part being 1,400 feet and the rest 2,000 feet, in both of which the coffee looked very well and compared favorably with any seen on our trip, both in growth and bearing, although a little wind-blown on the lower tract on the exposed ridges. This coffee is from two to three years old, planted seven by eight feet and is being topped at six feet in height, and is just coming into bearing, and will possibly yield two tons of coffee.

In North Hilo E. W. Barnard has thirty acres of coffee in various stages of growth and expects to get over a ton of coffee this year, there are about a dozen others planting, in this neighborhood who have in about thirty thousand plants, a small portion of which is commencing to bear. A number of other people are applying for land, and nurseries are being started, so that there will soon be quite a large area planted in this district.

We noticed on our trip that the Gordon pulpers are coming gradually into use, and wherever we found one of these the work was greatly improved. The Hawaiian Coffee and Tea Company are the only ones at present in Kona, who are preparing their coffee in a first class method, their parchment coffee affording a pleasure to look at. The general opinion of the old settlers seems to be that as the coffee will be sold on the local market, it is not worth while to go out of the old fashioned methods to improve the quality or grade.

The topping of trees is a subject which is beginning to interest all coffee planters, and is a point for discussion. All coffee books, and the practical coffee men from other countries, notably Ceylon, are in favor of low topping, that is about four feet from the ground, and we saw a fine field of 1,500 trees belonging to the H. C. & T. Co., all topped at 4½ feet, the trees were sturdy and full of fruit; but why should we not raise a tree six feet high, or at least as high, as laborers can pick without artificial aid?

The style of topping is another disputed question. The plan recommended by many is to cut so as to form a cross or bird claw top. This plan seems to be very popular in Ceylon; but so far here it has not given unqualified satisfaction. A method which is being adopted in some places is to make a diagonal cut taking off the top and one primary,
leaving the remaining primary to take all the virtue which reaches to the top of the tree, and as the cut soon heals up it makes a good finish to the top of a tree and protects the tree from splitting, which so often happens with the other method.

Distance apart seems a vexed question, and we saw planting being done from six to ten feet apart. Six feet seems a good distance in Kona, but in Puna, Hamakua and North Hilo, it did not seem far enough, although seven feet may do: wider than that gives too few trees to the acre and too much space for weeds.

Shade for growing coffee is another disputed question. In countries where the undimmed sun shines the whole day, and the thermometer ranges from 80 to 110 degrees, shade may prove beneficial to coffee, but on Hawaii where there is so much cloudy weather, no other shade is needed. We heard complaints of too little sun but never of too much sun, and were fully convinced that planting out in the open will prove most successful.

The question as to whether coffee can be profitably raised is not satisfactorily settled, although faith is developing with every step. Such an example as the following contributes to affirmatively settle the point. Mr. Miller informed us that the 1,500 trees previously referred to had cost him up to the present time three hundred dollars, and he assured us he had kept an accurate account of everything. He expects to get 1,500 pounds of coffee from this patch this season. If his estimate is correct, it will return the outlay and perhaps leave a small margin of profit, while the cost of caring for these same trees will be merely nominal in the future.

At the Hawaiian Coffee and Tea Company’s place we encountered our first and only tea growing and manufacturing. We were surprised at the development of this industry. The plants are two years old, and trimmed down to about two feet and a half in height. The company were actually producing a fair commercial article of tea, which your committee had the pleasure of seeing, handling and tasting. Our surprise was not so much in the growth, number of plants or quality of the tea, as in the methods of gathering and preparing it for market. We had been informed that the Chinese and Japanese teas
were all prepared by hand.  *Here it is all done by machinery,* and the human hand never has to touch it, which should be a recommendation.  Your committee cannot see why an article equalling the famous English breakfast tea may not be thus produced.  Mr. Miller believes this can be produced for ten cents per pound.  We were pleased with the ingenuity shown on this plantation; nothing was done by hand that could be as well done with a machine.

The picking of the tea by a machine that made no mistake was to be admired for its simplicity, cheapness and efficiency that it gathered by wholesale only young tender leaves, never old ones, although there were an abundance of the latter on the trees.

There were a number of people planting or preparing to plant coffee in the different districts, and they were, with but few exceptions, following the modes practiced by Mr. Miller, that is to clear all shade, and keep the land clear of all weeds the whole time.

Most respectfully submitted,

JNO. M. HORNER,
E. W. BARNARD.


*To the Committee appointed by the Planters' Labor and Supply Company, to report at their next meeting on the cultivation of coffee and tea:*

GENTLEMEN:—In answer to your request I will say, we commenced the cultivation of coffee in a small way about two years ago near Lahaina, Maui.  There were being cultivated a few coffee trees in Honokawai gulch and a large amount of volunteer coffee plants growing there.  We selected a tract of land in the woods near the gulch 2500 feet above sea level, and planted out 50 acres six by eight feet apart.  One-third of the trees were large, quarter to one and a half inches in diameter.  We cut back to about two feet, the balance were small plants, six or eight leaves.  They did well for six or eight months.  On the large trees shoots had grown eighteen or twenty inches in length; then commenced to die at the top of the shoots and lost their leaves.  We then suspended work
there. Now, after a year in this state, they are growing and appear to be getting in good shape, a few have died. We cannot account for this strange freak, have seen no blight of any kind on the trees. The soil for the first three or four inches is dark loam, then brownish red, changing very little for three or four feet. Water disappears in short time after a rain, but the soil is moist all the time. Some are exposed to the sun, some are in the shade; but those well shaded over have done best. We have grown on the spot about 10,000 plants in nursery, and when the size of a lead pencil set them out with the same result, small trees the worms bark and many die this way.

We are now operating in the gulches; have planted about 100 acres. Coffee does well in the gulches at an elevation of from 1000 to 2400 feet above sea level. It does well on lower levels, if shaded and irrigated. We have but few trees in bearing, and expect only a few hundred pounds of coffee this season. Top at about six feet high. Shade is a benefit to young trees. If there are too many trees on the land, we girdle about one-third of them. The leaves decay and fall first, the branches may stand a year, finally all decay and make manure. We may girdle another third when the coffee trees are two years old. One-third we will leave permanently. This course saves much labor, and so far as we can now see, works well.

Hereafter we will plant out no trees permanently, until they are eighteen or twenty inches high, the bark is then hard, and bugs and worms will not molest them.

Respectfully submitted,
Lahaina, Maui, October 4, 1894. W. Y. Horner.

REPORT ON FERTILIZERS.

To Geo. N. Wilcox, Chairman of Committee on Fertilizers:

Dear Sir:—Having been appointed one of the Committee on Fertilizers I beg to add my quota to their report. My remarks apply to the Maui soil and more particularly to that of Paia and Haiku Plantations. A few years ago no fertilizers
were required here, but the time has now come when they are necessary to procure a good crop. The last two years we imported fertilizer direct from Scotland, and the yield received (7½ tons per acre on old land) proves conclusively that it did good work. This year we do not expect so good a yield on account of being short of water. The analysis of the fertilizer is as follows:

<table>
<thead>
<tr>
<th></th>
<th>Phosphate</th>
<th>Ammonia</th>
<th>Sulphate of Potash</th>
</tr>
</thead>
<tbody>
<tr>
<td>Superphosphate of Lime (soluble)</td>
<td>39.94</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bone Meal (insoluble)</td>
<td>51.39</td>
<td>4.72</td>
<td></td>
</tr>
<tr>
<td>Sulphate of Ammonia</td>
<td></td>
<td></td>
<td>24.29</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>76.68</td>
</tr>
</tbody>
</table>

The mixture was as follows:

<table>
<thead>
<tr>
<th></th>
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<th>30 per cent.</th>
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</thead>
<tbody>
<tr>
<td>Superphosphate of Lime</td>
<td></td>
<td></td>
<td>30 &quot;</td>
</tr>
<tr>
<td>Bone Meal</td>
<td></td>
<td></td>
<td>30 &quot;</td>
</tr>
<tr>
<td>Sulphate of Ammonia</td>
<td></td>
<td></td>
<td>20 &quot;</td>
</tr>
<tr>
<td>Sulphate of Potash</td>
<td></td>
<td></td>
<td>20 &quot;</td>
</tr>
</tbody>
</table>

These were shipped separately and mixed at the different mills. After being thoroughly mixed they were applied to the cane by hand at the rate of one ton to three acres, when it was about two or three feet high then immediately covered up and irrigated as soon as possible. (On poor soil I consider the above quantity too much to be put on at one application and find it more beneficial to divide it and apply half after an interval of say three months.) The ammonia quickly dissolves the insoluble bone meal so that the whole solution is absorbed by the cane rootlets in a very short time. In fact the addition of the fertilizer becomes perceptible in about three weeks. I think the above is the best we have tried, and seems to suit the Maui soil. The only difficulty is in the transportation of the ammonia and lime. By the time the vessel reached Honolulu the bags containing those were in a very rotten condition, and thus necessitated rebagging which considerably augmented the cost. The price landed at Paia was about $44 per ton of 2240 lbs.

We, of course, use all the stable manure made on the plantation, also the bagasse ashes and refuse from the mud presses, but prefer to put these on broadcast before second plowing. It thus becomes amalgamated with the soil and so strengthens it before planting.

Faithfully yours,

Paia, Maui, Nov. 2, 1894.

J. W. Colville.
EDITOR PLANTERS’ MONTHLY:—As all admit that entrainment does occur even in the best regulated sugar houses, the quantity of sugar lost by entrainment must vary according to the construction of the apparatus, and also in the manner by which it is controlled.

The addition of separators to the evaporating apparatus cannot be too strongly urged, and the different evaporating apparatuses now on the market should be carefully compared, in order to ensure a selection of the one that is best, both in evaporating capacity and in facilities for cleaning, and constructed in the best manner to avoid, in as great a measure as possible, entrainment.

The separators used should also be of the most improved construction, as recent experiments have shown that there are many inferior ones now on the market. From an account of some experiments made at Cornell University, I take the following: “Our investigations have led us to believe and the results when taken in connection clearly show that, although change of direction, reduced velocity and perhaps centrifugal force are necessary for good separation, still some means must be provided to lead the liquor out of the current of the steam. If such provision is not made, momentary separation may occur, but before the liquor can drop or run from any surface in the direct current it will be again taken up by the rapidly moving steam which continually surrounds it.”

*By delivering the liquor at the bottom of a vertical effect through a perforated pipe, too great an explosion at any one point will be prevented. The delivering pipe should be placed well away from the discharge pipe, and towards that portion of the effect where the steam is admitted. This will assist the circulation, (as the liquor always rises in the hottest portion of the apparatus and descends at the coldest. Through this process it will be found that the liquor coming from the first effect, and rising through the liquor in the second effect, will be reduced to about the same temperature, and instead of being violently flashed into spray, its evaporation would be accelerated and entrainment be in a great measure prevented.

* See Foster’s Evaporation by the Multiple System, p. 161.
It was apparent in the working of the Deming Superheater, that in order to prevent the spraying or vaporizing of the juice, which had been subjected to a high temperature under pressure, the temperature and pressure had to be reduced before the juice was discharged into a vessel under atmospheric pressure. The same principle is involved when liquor is admitted from any vessel having a greater temperature and pressure than the vessel into which the liquor is discharged.

As the amount invested in sugar machinery is large, the amount of income and its relation to expenditure should be more carefully studied.

Honolulu, H. I.

E. E. Olding

PLANTERS' COMMITTEES OF THE LABOR AND SUPPLY CO, 1895.

Labor.—F. M. Swanzy, P. C. Jones, C. Bolte.
Machinery.—J. A. Scott, G. F. Renton, A. Young.
Manufacture.—A. Moore, C. C. Kennedy, John Hind.
Fertilizers.—H. Morrison, Jas. Renton, L. Ahlborn.
Fruit Culture.—W. M. Giffard, J. G. Spencer, M. P. Robinson.

P. S.—In justice to the legal counsel referred to in this report, on page 498, it is the desire of the Labor Committee to state that that gentleman disavows the expressions therein ascribed to him, and repudiates the slightest intention to justify outrage. He further states that the remark, to which exception has been taken, was in the nature of an anticipatory apology for such laborers as might take the law into their own hands, on one of their number being maltreated by a luna.