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SUGAR PRICES FOR MONTH ENDING OCTOBER 11, 1907.

<table>
<thead>
<tr>
<th>Date</th>
<th>Centrifugals</th>
<th>Beets</th>
</tr>
</thead>
<tbody>
<tr>
<td>September 13</td>
<td>3.95c</td>
<td>9s 10½d</td>
</tr>
<tr>
<td>September 20</td>
<td>3.95c</td>
<td>9s 10½d</td>
</tr>
<tr>
<td>September 27</td>
<td>3.95c</td>
<td>9s 9d</td>
</tr>
<tr>
<td>October 4</td>
<td>3.95c</td>
<td>9s 8½d</td>
</tr>
<tr>
<td>October 11</td>
<td>3.94c</td>
<td>9s 7½d</td>
</tr>
</tbody>
</table>

Willett & Gray in their Weekly Statistical of October 3 report:

RAWs.—The moderate business of the week has been on the previous basis of 3.05c. per lb. duty paid for 96° test Centrifugals. Unsold stocks of Cuba and Porto Rico sugars are very small, and are firmly held.

Java sugars afloat are the only ones that show any depreciation in sellers’ views, these now being offered at 10s. 4½d. c., f. & i., 96° test, equal to 3.05c. landed, against 3.08c. last price paid.

Europe made its usual weather fluctuations from 10s. to 9s. 7½d. to 9s. 9d. for prompt Beet, closing firm and rather dearer, with May contracts 10s. od. after 9s. 11½d. during the week.

These contracts look promising whenever below 10s.

The notable feature of the week is the completion of the Cuba crop, and the final outturn of same given by Messrs. Guma & Mejor as 1,427,673 tons, against 1,178,749 tons in previous year.

In our issue of June 13th we made our final estimate of 1,425,000 tons, and added:

“The long continued favorable weather enabled those estates still having cane to grind to remain at work and produce a surplus of crop beyond recent expectations.

“The record of the Cuba crop as it progressed through this season is a confirmation of the frequently expressed opinion that it is extremely difficult to make close crop calculations regarding Cuba until after the first of May. The weather conditions appear to influence crops in Cuba more than elsewhere, probably for the reason that more cane is left in the fields unground at the usual normal closing of the crop than could have been ground by the
Centrals, and when, as this year, the weather conditions were abnormal and scarcely a day of work lost during the entire campaign, and with a sufficient supply of laborers working under improved political conditions, the final outturn reaches a high point that could not possibly be anticipated early in the season."

These unusually favorable conditions for grinding have left in the fields no surplus cane for early grinding of the coming crop, which will be a later crop than usual, and this absence of surplus cane, in connection with several other disadvantageous conditions, will result in less production than last season. The decrease cannot be closely estimated now.

For several weeks past the weather conditions in Europe have been favorable for the maturing beet crops, which indicates an outturn safely above the minimum estimate given by Mr. Licht, although, perhaps, not up to his maximum.

At the close, a sale is reported of 6,000 tons Javas, per steamer "Miguel de Larrinaga," due to arrive here in three weeks, at 10s. 4½d. c., f. & i., equal to 3.95c. landed for 96° test.

Messrs. Czarnikow, MacDougall & Co. report under date of October 4 as follows:

During the early days of the week the advices of easier markets in Europe made buyers here even more indifferent to offerings of raws than they had been, and, for a time, last prices were unobtainable. Later, however, Europe displayed some strength and a recovery which brought Beet quotations above the closing prices of last week, whereupon one of our buyers came into the market and took about 2,600 tons Cubas and Porto Ricos in store at last week's spot price, 3.95c., basis 96°.

The above sale reduces the Importers' stocks in store to 13,000 tons, all of which are held for a slight advance on ruling quotations.

Another Java cargo has been ordered to U. K., making five (5) cargoes in all, say 30,000 tons, which have been diverted to that market. A cargo of about 6,100 tons, due end of this month, has been sold this week to buyers here at the equivalent of our spot market.

As will be seen below, three-fourths of this week's receipts were made up of Javas. During the next fortnight receipts are likely to show a marked reduction, as only two Java cargoes will come into them, namely, a cargo already arrived and one now due. A Java cargo due end of this month is offered at 10s. 6d. c.i.f., but cargoes for later arrival are, as a rule, held for higher prices.

The market for the time being is a waiting one. There is no excess of supplies and no pressure to sell, but on the other hand there is little inclination on the part of refiners to anticipate their wants further than they have already done. Demerara, which usually supplies some of refiners' requirements during the closing months of the year, and which gave us 20,000 tons in November-
December last year, cannot be counted on this year. It is going to have a very short Fall crop, owing to a prolonged dry spell having made the condition of the canes the poorest in a long series of years.

Messrs. Guma-Mejer have issued their statement of the Cuban crop for the past season (1906-07), of which the following is a summary:

<table>
<thead>
<tr>
<th></th>
<th>Centrals</th>
<th>Bags (2240 lbs.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Havana</td>
<td>29</td>
<td>1,545,989</td>
</tr>
<tr>
<td>Matanzas</td>
<td>33</td>
<td>1,533,420</td>
</tr>
<tr>
<td>Cardenas</td>
<td>27</td>
<td>1,433,592</td>
</tr>
<tr>
<td>Cienfuegos</td>
<td>27</td>
<td>1,731,184</td>
</tr>
<tr>
<td>Sagua</td>
<td>22</td>
<td>734,423</td>
</tr>
<tr>
<td>Caibarien</td>
<td>13</td>
<td>726,833</td>
</tr>
<tr>
<td><strong>Six Principal Ports</strong></td>
<td><strong>151</strong></td>
<td><strong>7,705,441</strong></td>
</tr>
<tr>
<td><strong>Minor Ports</strong></td>
<td><strong>35</strong></td>
<td><strong>2,288,270</strong></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>186</strong></td>
<td><strong>9,993,711</strong></td>
</tr>
</tbody>
</table>

The crop of 1905-06 was 1,178,749 tons.

European Beet markets were dull and lower in the middle of the week, but subsequently recovered and close at a slight advance over last week. Today's f. o. b. quotations are: October, 9s. 9d.; November, 9s. 9d.; January-March, 9s. 10½d.; May, ros. 0½d.

Mr. F. O. Licht in his monthly report of September 18 sets forth with his usual caution an estimate of the coming sugar production. He says:

As in the preceding years, it has been differently attempted for some time already to give estimates of the coming sugar production, though last autumn the weather in some parts made quite considerable changes of the stated figures necessary. We deem it, therefore, needless to point out again, that at the present moment, when real crop yields are not yet to hand, while at the same time no one is capable of predicting the further run of the weather during the next six weeks to come, on which almost everything depends, such like figures are neither exact nor reliable. The figures given to us, for which, of course, we cannot accept any responsibility, are moving within the following limits:

<table>
<thead>
<tr>
<th></th>
<th>Tons</th>
</tr>
</thead>
<tbody>
<tr>
<td>Germany</td>
<td>2,100,000</td>
</tr>
<tr>
<td>Austria</td>
<td>1,300,000</td>
</tr>
<tr>
<td>France</td>
<td>775,000</td>
</tr>
<tr>
<td>Belgium</td>
<td>225,000</td>
</tr>
<tr>
<td>Belgium</td>
<td>225,000</td>
</tr>
<tr>
<td>Holland</td>
<td>160,000</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>4,450,000</td>
</tr>
<tr>
<td>Russia</td>
<td>1,250,000</td>
</tr>
<tr>
<td>Other countries</td>
<td>420,000</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>6,230,000</td>
</tr>
</tbody>
</table>
One may see from this, that in the interested circle a decrease of about 250,000 tons of Beet Sugar is expected, while the visible stocks on September 1st, without the floating cargoes are likely to show a decrease of about 215,000 tons. At the same time we have also seen calculations of the coming Cane Sugar production, which nearly approach the last years. That, at the present moment, these are merely suppositions, it is scarcely necessary to say.

NOTES.

SEED SELECTION. Mr. F. Kamf in the Java Archief voor de Suckerindustrie (1907, No. 6) gives an interesting account of the results yielded by his experiments in testing top seed by selection of seed cane by density.

The method of planting which Mr. Kamf advocates as a result of his tests does not aim at increasing the sugar content of the cane by planting the richest cane, but has for its object the rejection of such cuttings as are liable to produce weakly plants. Not only is top seed of low density discarded (and this is insisted upon), but likewise that of very high density, for the following reasons:

1. Tops of highest density are the ripest and sweetest.
2. Such cuttings require a longer time to germinate than those of less density.
3. Canes from seed of high density are the weakest and most susceptible to disease.
4. Canes derived from tops of highest density flower late, or very little, and take longer to become ripe than cane derived from tops of low density.

In Mr. Kamf's method of selection three solutions are used, of the following densities: 14° Brix, 12° Brix, and 6° Brix. All cuttings floating in the solution of 6° Brix are rejected; those that sink in 6° Brix and float in 12° Brix are kept; those that sink in 12° Brix and float in 14° Brix are used, if necessary, and if still more tops are required, those that float in 14° Brix are saved. The figures representing the densities of the various solutions are arbitrary, and may be altered to suit the amount of seed cane available and required.

RESOURCES OF PORTO RICO. Special Agent Arthur B. Butman, in writing upon the commercial and industrial resources of Porto Rico, states that the fertility of the soil renders the island particularly adaptable to agricultural pursuits, especially where the rainfall is abundant. In those portions where there is a lack of rain a system of scientific irrigation is now under investigation by an official of the United States Reclamation Service.
The three great productive crops of Porto Rico are sugar, tobacco and coffee. Sugar is now the principal product, amounting in 1906 to 205,000 tons, an increase of 200 per cent. in the past five years. In fact, the land suitable for sugar cane is practically all under cultivation at the present time, giving employment to a great many people and representing an investment of many millions of dollars for the “centrals,” which grind the sugar and prepare it for shipment. This development was made possible by the abolition of the tariff on Porto Rican sugar by the United States.

The exports of sugar are naturally principally to the United States. In 1906 the total quantity exported was 410,553,706 pounds, of which amount the United States took 410,544,618 pounds.

Sugar Exports from Mauritius. Vice-Consul R. E. Sneed-en, of Port Louis, has compiled the statistics of the exports of sugar from the island of Mauritius. Of the last crop 203,140,518 kilos (kilo 21.5 pounds) were shipped up to June 30, 1907, against 182,345,000 kilos the previous year and 127,671,440 kilos in 1904-5. India is the best customer for the sugar of Mauritius, increasing its purchases from 69,911,289 kilos in 1904-5 to 106,073,912 kilos in 1905-6 and to 130,285,708 kilos in 1906-7.

Sugar Cane and Rum Production in Jamaica. Under sugar-cane cultivation there are at the present time 26,838 acres, Westmoreland, Hanover, St. James, Trelawny, and the southern portion of Clarendon being the principal sugar-growing districts. Cane cultivation is increasing, and the introduction of improved machinery is gradually tending to lessen the cost of production. Cooperation of planters has resulted in the bringing in of capital and the erection of new centrals. I am informed that in one parish nearly $200,000 worth of new machinery has been imported during the past four years. American manufacturers and exporters of the classes of machinery required for this industry would do well to keep in close touch with the demands of Jamaica’s markets.

It is claimed that in certain districts here sugar cane may be grown at a cost of from $1 to $1.35 a ton, and that with the use of modern methods and machinery a ton of sugar may be made from 8 to 9 tons of cane, while under the old mill system 11 to 18 tons of cane were required. For 1906 238,690 hundredweight of sugar, valued at $595,448, were exported, the principal quantities being taken by British possessions and the United Kingdom. For the fiscal year 1907 exportations of sugar amounted to 278,000 hundred weight, Canada purchasing 219,000 and the United Kingdom 44,000. The outlook of the sugar situation in relation to the “Jamaica rum” industry is said to be promising, and in a way made up for the loss in the manufacture of sugar by those
planters forced to crush their product in the old-style mill. Earnest efforts have been made to protect the genuine article from imitation. Scientific instructions for the benefit of rum distillers is furnished by the local government at the sugar experiment station, and the formation is recorded of a $500,000 syndicate in London for exploiting Jamaica rum. With a certain number of $5 shares allotted to local producers, it has tended to increase the price and protect the genuine article. Accordingly, although a decrease of 103,808 gallons was shown in exportations for 1906 as compared with the previous year, the valuation was increased something like $30,000. The value of the 1,130,549 gallons exported, of which by far the larger amount went to the United Kingdom, was $481,359. The value of rum exported for the year 1907 was $650,000, most of which went to the United Kingdom.

The Immigrant has a Mind of His Own. The Secretary of Commerce and Labor has opened at Washington a bureau of information on the relative opportunities in the various sections of the country, and this information will be provided to prospective immigrants in Europe, as well as to those who land in this country. In this connection it is, however, a mistake to suppose that the majority, or even a large part, of the aliens landing on our shores have but vague and hazy ideas of where they want to go and what they want to do. Some weeks ago a body of delegates from a Southern immigration society called upon the Commissioner at Ellis Island. Said the spokesman: "All we need to get the immigrants to come to the South is to get in touch with them." The Commissioner replied: "Now is the time and here is the place! I will devote the rest of the day to putting you into touch with them." Accordingly, Commissioner, interpreters and delegates, before the day was over, had interviewed some hundreds of immigrants. The delegates laid before them their arguments, and used upon them their powers of persuasion. The Commissioner aided by offering to have their tickets changed for points in the South if they wished to change their destinations. And of all this effort in many tongues what was the result? One man consented conditionally to consider their offer—took their address and promised to let them know after he had had time thoroughly to consider the matter. Sadder and wiser, the tired delegates took the 5 o'clock boat back to Manhattan.—From "The Silver Lining of the Immigration Cloud," by Lyman Beecher Stowe, in The Circle for October.

Six Months of Free Denatured Alcohol. Figures prepared by the Internal Revenue Bureau, covering the first half of the calendar year 1907, indicate that the consumption of denatured alcohol during the first year of operation of the free alcohol law, which went into effect on January 1, 1907, will be at least 3,500,000 gallons. The total figures of denatured alcohol production
for the six months are 1,774,272 gallons, and there is reason to believe that the figures for the second half of the year will equal, if they do not considerably exceed, those for the first six months.

The figures for June report a total output of 138,856 gallons of completely denatured alcohol and 80,965 gallons of specially denatured alcohol during the month, a gain of more than 48,000 gallons over the output for May. This increase was considerably larger than was anticipated and indicates conditions which make it extremely difficult to forecast the consumption of this product during the next few months.

Since the beginning of the year the cost of wood alcohol has dropped from 60 to 30 cents, and the introduction of the free spirit has also had its influence on the prices of the various forms of petroleum for which it may be substituted. These changes and other similar ones involved in the introduction of cheap alcohol, make the exact degree of the product's success a matter of some uncertainty, but it seems to be pretty clearly demonstrated that the success will be very marked.

Formosa. The sugar company which has its quarters at Yensui, in Formosa, is on the point of receiving from England machinery which will enable it to turn out 1,000 tons sugar daily. The machinery has been ordered from a Glasgow firm at a cost of yen 900,000 ($450,000), and it is stated that Messieurs Samuel Samuel & Co., in Japan and England, have provided funds, one-half at the rate of 6 per cent. and the other half at 7 per cent. interest.—From the Japan Mail.

Cuban Immigration.

During the first six months of 1907 there were but 9,266 immigrants to Cuba, as against 14,044 during the same period in 1906 and 18,192 in 1905. These figures we get from the Havana Post and they are very significant of the diminishing interest in Spain in the advantages of migrating to Cuba. For many years there has been a constant flow of emigrants from Spain to Cuba and years ago, while visiting Cuba, we were told that all Spain would come to Cuba were it not for the prevalence of yellow fever. With the yellow fever practically extirpated in Cuba there would be every reason to anticipate a constantly increasing emigration from Spain to Cuba. From this point of view, the figures given above are decidedly startling, the movement having fallen off one-half in two years.

In Cuba there are certain restrictive conditions which will apparently hold down the labor supply and prevent that rapid and extraordinary expansion of the sugar industry there which has seemed probable during the last year or two. The migrations of
Spanish laborers from Spain to Cuba in the past year have been largely for the temporary purpose of working during the harvest season and upon its conclusion the laborers return to Spain with but a fraction of their total earnings in Cuba, these having been largely exhausted by the cost of transportation out from Spain to Cuba and again from Cuba back to Spain. If there were other industries in Cuba that would employ these immigrants during the present idle half of the year, Cuba would become a far more favorable ground for Spanish emigration than it now is. The Cuban government has been disposed to recognize this, and has recently been negotiating large public works in the way of road building, etc., with the view of employing therein as many people as possible and thus relieve the labor market, which is over-supplied during the last half of the calendar year.

Before the development of the harvesting machines, in the Western states, there was an annual migration of harvest laborers from the towns to the country, where these laborers were royally treated during the few days of the wheat harvest, and paid wages double and triple the standard wages of the country. The great scarcity of labor in the Western states in 1905, reaching all the way from Oklahoma to the Canada line, was such that the local authorities in the cities interested were advertising everywhere for laborers to take off the wheat harvest, promising employment at high wages. It is stated that some laborers went into this wheat harvest, beginning in June in Oklahoma and winding up in the Dakotas in August, having constant work for about two calendar months and getting from $2 to $3 per day, passing along from locality to locality, further and further north as the wheat fields gradually ripened. This exodus from the cities will now only occur under the attraction of very high wages and the inducement of more continuous employment than that of a few days in any one locality.

It has been stated that in England aid has come over to the mainland from Ireland for centuries in the way of harvest laborers, for whom the transportation was but a very small matter and the harvest seasons of the two countries adapting themselves to the two countries' needs.

In Louisiana a still different condition prevails in the sugar section. Here, while plantation labor is continually growing scarcer and scarcer, the work for such laborers is comparatively constant. The planting of sugar cane in the spring requires quite a large force, general repairs and improvements require the help of a great many men when the planting is completed; then the cultivation of the cane until it is laid by in the summer requires a large number, and during the summer the rice harvest utilizes all the available labor. In the early autumn hay-making and fall cane planting demand a very large force, and the year closes with the grinding season, which takes up every available man, including a large amount of expert labor from the cities.
From an emigrant’s point of view, southern Louisiana, today, probably offers greater inducements than any other section of the world. Continuous employment at fair wages and opportunities for individual effort as proprietors or tenants, abound in every direction, and the conviction is rapidly spreading among our people that it is only by securing such immigrants that the sugar industry in this state can be maintained.—Louisiana Planter.

**PHILIPPINE SUGAR COMPROMISE MEASURE.**

The "Far Eastern Review" finds much consolation in a speech made by Secretary Taft while in the Philippines. The Secretary stated that the administration expects to secure a compromise measure at the next session of Congress in the form of a limited free entry of Philippine sugar and tobacco into the United States. This declaration was made in his message to the delegates at the opening of the Philippine Assembly, and follows:

"Another difficulty * * * in preventing material progress has been the failure of Congress to open the markets of the United States to the free admission of Philippine sugar and tobacco. In every other way Congress has shown its entire and generous sympathy with the policy of the administration, and in this matter, the popular branch of that body has passed the requisite bill for the purpose, by a large majority. Certain tobacco and sugar interests of the United States, however, succeeded in strangling the measure in the Senate Committee. I have good reason for hope that in the next Congress, we may be able to secure a compromise measure which should restore the sugar and tobacco agriculture of the Islands to its former prosperity, and at the same time by limitations upon the amounts of importation allay the fears of injury on the part of the opponents of the measure. Still the delay in this much needed relief has greatly retarded the coming of prosperous times and has much discouraged supporters of our policy in America who have thought this indicated a lack of national purpose to make the present altruistic policy a success."

In commenting upon this the Review says:

In the August number of The Far Eastern Review, we drew attention to the advisability of such a course on the part of the friends of the island industries in order to disarm the sugar trust and remove all cause for alarm on the part of those who were being misled into the belief that Philippine sugar would prove a menace to the home industry. The following is an excerpt from the editorial referred to:

"Even with the tariff removed it would be impossible for the Philippines to supply the United States with the necessary quantity of sugar to make up the annual shortage within the next fifty
years, if indeed the industry in the islands could ever be relied upon for half that amount.

"When the Philippines sugar bill was relegated to its living tomb in the committee room the opponents of the measure had practically admitted all the points in the arguments of the Philippine delegation with the exception of the impossibility of the Philippines flooding the United States with sugar should free entry be granted. It might have been an easy matter to arrange a compromise on a basis of the removal of the duty on a limited amount of sugar annually at that time, but the administration, believing that the fight was won, refused to consider such a proposal, and when the Trust discovered how very easy it was to smother all legislation in committee later, refused to discuss the subject further.

"While it may be natural to a large constituency in the United States to believe that the Philippines would flood the American market with sugar and destroy the home industry those familiar with conditions in the islands are satisfied that such a fear is groundless. However, it may be that in order to allay the suspicion that the friends of Philippine sugar are conspiring to ruin the industry in the United States, a compromise may be effected at the next session of Congress.

"There is reason to believe that in the coming battle the sugar trust will find the manufacturing interests arrayed with the friends of Philippine sugar. This was not the case during the former engagement. During the last year the attention of the manufacturers has been directed to the promising market in the Philippines under more favorable tariff regulations governing the importation of Philippine products, and from all reports they have expressed themselves in favor of removing the barriers altogether or on a limited quantity to a degree consistent with the preservation of the industry in the homeland."

FERTILIZER EXPERIMENTS IN THE LEEWARD ISLANDS.

The Imperial Department of Agriculture has recently issued a Report on Sugar Cane Experiments in the Leeward Islands, especially relating to fertilizers. The report states:

"The experiments with plant canes again clearly show that the use of artificial manures is unnecessary and unremunerative, provided that the canes are grown upon land that has been thoroughly tilled and has received, in the usual course, an application of about 20 tons of good pen manure, or its equivalent, per acre. The results of the past six years appear to be so definite and conclusive that it has been decided to bring this series of experiments
to a close. It is now affirmed that, as far as the Leeward Islands are concerned, it is unnecessary and unremunerative to modify the present local practice by applying artificial manures in addition to pen manure to plant canes. Attention will now be devoted to manuring ratoon canes and other lines of investigation.

The experiments with ratoon canes have been divided into two series: (1) Experiments with ratoon canes which had already received an application of artificial manures as plant canes, known as the ‘old series’; and (2) the ‘new series,’ with ratoons which had not received any artificial manures as plants.

The ‘old series’ of experiments with ratoon canes, as previously mentioned, have now been carried on for five consecutive years, and have shown that nitrogenous manures are essential for, and remunerative in, the successful growing of ratoon canes. Nitrogen is best applied in a quick-acting form, such as nitrate of soda or sulphate of ammonia, and should be given alone, in one dose, at a fairly early stage of the cane’s growth, rather than as a slow-acting form, such as dried blood and guano, or in conjunction with potash and phosphate. How far the effect of artificial manures with ratoon canes in this series may be due to the manures applied to the canes as plants cannot be answered definitely at present, and, therefore, it is proposed to continue the ‘old series’ of experiments for one year longer at St. Kitt’s; and to give increased attention to the ‘new series’ of manural experiments with ratoon canes, using for the purpose fields on which no artificial manures were applied as plant canes.

This new series of experiments was started at Friar’s Hill estate in Antigua and Pond Estate in St. Kitt’s in 1904-5; and during the season under review was considerably extended. Experiments were laid out at five stations in Antigua and one at St. Kitt’s. It is to be regretted that the work during the season (1905-6) was greatly interfered with by drought, with the result that, so far, every application of artificial manures has resulted in monetary loss. Great importance cannot be attached to the results of this single season as guides to agricultural practice, for it cannot be doubted that the severe climatic conditions under which the canes have been grown have prevented the manures from producing their full effect.

The chief result of the experiments so far has been that, on the average, in every case the application of artificial manures to ratoon canes (which have not received artificial manure as plants) has resulted in monetary losses. That this result would hold good in seasons of average rainfall we regard as improbable, since it is in direct contradiction not only to the agricultural practice of the country, but also to our own experience with ratoon canes in past years.

It cannot be doubted that the severe climatic conditions under which the canes have been grown have prevented the manures from exercising their full effect, and it must be left for future ex-
experiments under better conditions to be added to the experience we have already obtained before any definite pronouncement can be made as to the effect of the manures.

PEN MANURE AND ALLIED MANURES.

"The foregoing conclusions having emphasized the importance of pen manure in the preparation of the land for plant canes and having moreover shown that without artificial manure, pen manure is sufficient for the growth of plant canes, it is worth while to devote a little space to the consideration of pen manure and allied substances.

"Pen manure consists of the excreta of farm animals mingled with the bedding or litter of the animals, the whole being in a more or less rotted or decomposed condition. A curious fallacy exists in the minds of our older planters, that manure contains more plant food material than the food and bedding from which it is derived; in other words, that the animals contribute something which makes the manure more valuable. It is not difficult to demonstrate that the manure really contains less plant food material than the food supplied to the animals, some portion being retained by the animal in building up its body while other portions are lost or dissipated.

"This being so, it holds good that the same amount of plant food material may be conveyed to the soil by burying the grass, cane tops and other substances directly in the soil without submitting them to the action of the animal. But there is, after all, something in the above contention of the planter that the animal contributes in some way to the efficiency of manure. What is contributed is the modification of its condition, so that it becomes more readily combined with the soil and available to the growing plant in a much shorter space of time—an item of considerable importance in practice.

"The function of the animal is therefore evident. It is, however, worth while noting that the usefulness of the animal extends beyond the food actually eaten and voided. If, as is the custom here and elsewhere, animals are allowed to stand upon accumulations of litter and bedding until a thick layer of manure accumulates under them, the excreta of the animals hasten the decay of the litter and uneaten grass and bush, and bring the whole mass into condition as manure. This hastening of the decay is due in part to the moisture voided by the animals, in part to the alkalinity induced, and perhaps more particularly in part to bacteria from the intestinal tracts of the animals.

"There is a tendency on the part of the planters to keep animals for the sake of ‘making manure.’ This is sound in principle, in that a certain number of animals are desirable for bringing the manure into good condition without loss of time, but it may be carried to an excess; a limited number of animals will hasten the
decay of much more material than they eat, and thus may be employed to prepare large quantities of manure. One point has to be guarded against in practice: the attendants are disposed to give to the animals only as much as will serve as food, whereas every effort should be made to give a very large excess, part to be eaten and the remainder to be rotted. In this way animals may be carefully kept 'to make manure.'

"In procuring manure for sugar estates, the greatest care should be taken to accumulate all available grass, bush, cane tops, and vegetable matter of all descriptions, which should be piled into compost heaps. In the absence of animals, this material, in process of time, will rot down and form useful manure, equal in value to pen manure. Its decay may be promoted by judicious watering. It is advantageous to spread layers of earth at intervals through the compost heaps, for the earth absorbs valuable constituents which might otherwise be lost, and at the same time promotes decay.

If animals are available, the best results are obtained by combining the method of the compost heap with the feeding of the animals. This indeed is the local practice, though there may be some small misconception as to the function of the animals. If the part played by the animals is correctly understood and appreciated, it is probable that a larger quantity of manure will be produced under conditions of greater economy.

"A number of analyses of local pen manures have recently been made in order to ascertain what amount of plant food is conveyed to the soil by the usual application given in practice. From the figures given below it is readily seen that 20 tons of pen manure per acre will more than supply the quantities of potash, phosphate, and nitrogen required for a crop of 40-50 tons of canes per acre, taking the amounts required at: potash 60 pounds, phosphoric acid 30 pounds, and nitrogen 70 pounds, as given by 120 pounds sulphate of potash, 200 pounds basic slag, and 350 pounds sulphate of ammonia."

SUGAR CANE EXPERIMENTS IN BARBADOS.

The sugar cane experiments in Barbados have now reached a stage in which the seedling canes raised by the Imperial Department of Agriculture are coming into comparison with the standard varieties upon which the great majority of planters rely for their crops. The time is therefore opportune for a review of the methods pursued during an experimental period of some nine years, in order, if possible, to bring them into touch with the wishes of the practical agriculturists who rely upon the sugar cane as their staple crop.

One of the great difficulties of the research, the object of which is the improvement of the sugar-cane, is the long period
that must necessarily elapse between the time when a cane is raised from seed and the time when it is possible to pass judgment upon its merits. Thus it happens that it is only at the end of nine years' work of a very laborious character, that canes, which, it is believed, will prove important acquisitions to the planter, come forward, as the product of the Imperial Department of Agriculture, for practical trial upon the sugar estates in the West Indies.

It takes nearly a year and a half to raise a stool of canes from seed, and with the employment of irrigation and every other possible means of expedition consistent with thorough and cautious trial, it is some nine years before a new sugar cane variety can come to a planting test.

It has been the constant and anxious wish of the department to make these trials and tests as convincing as possible to practical planters, and with that end in view an annual summary of results has been presented to the Barbados Agricultural Society with the invitation to criticise the work done and to suggest new lines upon which improvement might be inaugurated.

A single stool of cane is the result, after eighteen months of care and waiting, of sowing a cane seed, and if this proves satisfactory as regards the number and size of the canes, it is cut, weighed and crushed, and the juice analysed. If the analysis is favorable, the stool is irrigated to induce a spring of ratoons, from which a supply of "plants" is procured with which to propagate the variety. Plots of ten to fifty holes are planted from the stool, and after a few years of trial, the variety, if good enough, is adopted as a "select variety" grown in duplicate plots of 100 stools in each of the typical soils of the island. Each year the variety is reaped and weighed and analysed in comparison with the standard variety of the district grown in the same field, and this serves to test the numerous field and factory characteristics of the new seedling. There is first and foremost the tonnage of the cane, and the richness and purity of the juice; then come the germinating power of the plant, and the ratooning power of the stool. The resistance to fungoid and insect attacks, the recumbent or erect habit of the cane, the behavior in specially wet or dry districts, the behavior in the crushing mill, and the fuel value of the residue or megass all claim the consideration of the planter.

A careful comparison of the results of the small duplicate plots of one hundred stools, planted in several typical districts, with the results of fairly large estate trials has shown that these small plots give a reliable indication of the potentialities of a new variety, and the results of the small experimental plots may be used as a valuable guide in selecting new varieties for estate trial. Planters have constantly, and
for many years, made such use of the results of these plots, and we have the varieties B. 147 and B. 208 as testimony to the practical value of this work.

Amongst the many valuable suggestions that have resulted from the public discussion, at the Agricultural Societies, of the annual results, is the suggestion of plots intermediate between the small experimental plots and the estate fields of canes; and this suggestion has ripened into estate plots of the area of an acre or thereabout. Such a plot permits a number of promising varieties being grown in comparison in the same field without risk of serious loss, and such a plot is large enough to be separately crushed at the estate mill, the juice being measured and analysed. This is very convincing to the practical mind, and as it is the practical man for whom the Imperial Department of Agriculture does its work, any suggestion is gladly welcomed if it helps to bring the work into touch with those for whose benefit the department was brought into existence.

Acre plots have formed part of the method of the department for the past three years, and following the latest suggestions, are now about to receive an important extension. It is proposed to invite a considerable number of estates in each district to plant acre plots of a few of the varieties that, in the same district, have shown exceptional value in one-hundred-hole plots. Each plot will be crushed separately, the juice measured, and an average sample sent to the Government Laboratory for analysis. Data will thus be available for ascertaining the sugar yield, and at the same time the other qualities of the variety will come under practical estate observation, on a scale which will appeal more strongly to the practical mind than the smaller plot grown under the same estate conditions.

The soils of Barbados divide themselves into three classes, namely, black soil, red soil, and "Scotland" soils. Each of these, as well as the question of ratooning, will receive careful attention, and the confidence which the department has secured is shown by the ready and cordial cooperation which the planter has offered in the prosecution of this work. It is pleasing to be able to record that, of the many offers, some thirty estates will be carefully selected for these acre plots. They represent every locality in the island as regards soils, height above the sea level, and rainfall, and the plots growing in these different districts will serve not only as an object-lesson of the quality of the best varieties, but also as distributing centers for those that stand the result of planter test and planter scrutiny. This is as it should be. The ultimate judge of the value of a cane variety is the planter, and the wishes of the planters will always receive the careful attention of all the workers in this department.
Partial... as to the amounts of cane sugar produced each year, from 1900 to 1905, in the several British West India Islands and British Guiana, the sugar exports from the West Indies during the same period, and the quantities of these exports taken by the United Kingdom, United States, and Canada respectively, form the subject of a return issued by the Board of Trade, and reproduced in the West India Committee Circular of September 3 last.

The total sugar production (including that of British Guiana) was 4,756,000 cwt. in 1900, increasing to 5,679,000 cwt. in 1901, and reaching high-water mark with a yield of 6,031,000 cwt. in 1902—the year in which the Brussels Convention was signed. The total sugar yield decreased each year from 1902 to 1905, falling to 5,113,000 cwt. in the last-named year, this representing a decline of nearly a million cwt. as compared with the return of three years previous. The short crop of 1905 must, however, be partly attributed to the drought experienced during the growing season of the sugar-cane. The sugar yield of 1906, it is satisfactory to note, again shows a good increase, being given as 5,521,000 cwt., or over 400,000 cwt. in advance of the previous year's crop.

What has been said above of the West Indies in general practically applies to each of the chief sugar-producing islands, taken separately. Jamaica, Barbados, St. Kitt's-Nevis, Trinidad, Antigua, all show an increase in amount of sugar produced from 1900 to 1902 or 1903, and an annual decline in the returns since then down to 1905. Antigua, however, had a bad year in 1901, when the yield fell below normal, and Trinidad had a good year in 1904, the sugar yield being 1,015,000 cwt. as compared with 956,000 cwt. in 1903. But in 1905 the Trinidad crop fell to 764,000 cwt. The last Annual Report on Jamaica points out that the area devoted to cane cultivation during 1905-6, as well as the amount of sugar exported, shows an increase in comparison with the previous year, so that low-water mark was probably reached in that island in 1905.

The steady decline in sugar production seen in Barbados, St. Vincent, and Montserrat, during the past few years however, indicates the replacement of the crop by cotton, and it is unlikely that the sugar-cane will recover the lost area.

The sugar production of British Guiana represents about two-fifths of the total yield of the British possessions in this part of the world. As the figures of the annual production are not available, the return in question gives the domestic exports of sugar from 1901 to 1906, from which it would appear that the yield of sugar increased steadily each year from 1900 to 1903, dropping considerably in 1904, but nearly recovering itself in 1905. The domestic export of sugar from Brit-
ish Guiana for the year ending March 31, 1901, was 1,895,000 cwt. By the end of the year 1903-4, this had increased to 2,519,000 cwt., while the domestic export of sugar for 1905-6 was 2,331,000 cwt.

The total quantity of sugar exported from the British West Indies and British Guiana was 4,315,000 cwt. in 1900, reaching a maximum of 5,401,000 in 1902, while in 1905 it amounted to 4,642,000 cwt. During this period the shipments to the United Kingdom have increased by half of what they were in 1900; the exports of sugar to the Dominion of Canada have almost doubled; but the quantity of West Indian sugar shipped to the United States in 1905 was very little more than one-third the amount sent in 1900. The United Kingdom took 855,000 cwt. in 1900 and 1,225,000 cwt. in 1905. Canada, which took no more than 16,000 cwt. of West Indian sugar in 1900, imported the enormous quantity of 2,246,000 cwt. in 1905. On the other hand, the exports of sugar from these colonies to the United States of America, which in 1901 totalled no less than 3,860,000 cwt., had by 1905, declined to 1,123,000 cwt.

Apart from the above three countries, an average quantity of about 50,000 cwt. of sugar is reported as being annually exported from the British West Indies to countries which are not named.

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**CENTRAL SUGAR MILLS IN QUEENSLAND.**

We are in receipt of Doctor Walter Maxwell’s Report upon the Government Central Sugar Mills, and extract therefrom the following paragraphs:

The introduction of new varieties of cane into the localities of the mills is definitely raising the quality of the crops. These varieties were obtained from the Mackay Experiment Station, where their values are ascertained before they are distributed. Each of the mills has procured promising varieties, and is having them grown for distribution amongst the canegrowers.

The removal of colored labor, and the substitution of white labor, has notably changed the conditions not only in the mills, but also in respect of the outdoor part of the work. This relates particularly to the matter of procuring firewood. Formerly cordwood was cut by the kanaka, and at very considerably less than the present cost. The fuel has now to be provided by the use of white labor. This has largely discouraged the farmers, and held them from contracting to deliver wood, on account of the greater cost. The farmers, moreover, are more wholly engaged in personally taking care of their crops on account of the greater cost of doing the work by hired white labor. As a consequence of the changed situation, the mills are having to arrange directly for
cutting and haulage of the firewood by white labor. This results,
first, in the employment of large numbers of white men during the
off season; and this further results in holding the workmen in the
district ready for the next crushing season; and it will finally re-
sult in the more or less permanent settlement of numbers of men,
with homes and allotment areas, around each mill as "regular
hands." In proportion as this transpires will the labor question
become further assisted in its solution, and the agricultural situ-
a
tion will also be rendered more permanent and secure.

MANUFACTURE.

Each year renewed attention is given to the governing factor
of clarification. The Comptroller wants steam power ample for
all other purposes, and also to be able to macerate with cold water.
Tests conducted personally some time ago showed that the ex-
traction co-efficient of cold water is almost equal to that of hot
water; and that cold water extracts a less proportion of impuri-
ties relative to the sugar extracted, which factor determines the
proportion of recoverable sugar. With cane of relatively low
purity, which obtains at most of the mills under the Control, this
is a matter of high importance.

Also, in the clarification the practice is being adopted, where
practicable, of taking the limed juice into the clarifiers in its cold
state. The results of tests made some long time ago, it was
demonstrated that the best clarification, especially of relatively low
purity juices, is obtained by bringing the cold juices gradually to
a high temperature, and finally to a boil in the clarifiers. The
undisturbed state of the juice, as it rises to the high temperature,
allows the impurities to rise in a more solid blanket to the top,
and to be swept off without breaking, leaving a clear juice be-

Then the juice goes first into and through the "heater,"
in which course the heat is enough to coagulate certain of the im-
purities, and is then violently discharged into the clarifiers, a
visibly more imperfect clarification results. Unfortunately, the
equipment at some of the mills is not adequate to allow of this
practice being followed. At the Gin Gin Mill, the manager, Mr.
Desplace, reports: "Your instructions respecting the taking of
the juice cold into the clarifiers were fully carried out. The re-
sults were excellent. Unfortunately, we cannot dispense with the
heater until more clarifier capacity is put in." The changes in
methods of treating the juices are pointing out the further additions
to the mill equipment that are required in order that the best
work can be done. In the report of last year, the Comptroller re-
marked upon the "high loss of sugar due to preventible causes"
in the Mount Bauple Mill. Those causes received the Com-
troller's very close attention during the last crushing. As a re-

These "preventible causes" have, doubtless, operated ever since the
mill began operations, and have only been located since the Control has checked the mill operations by the laboratory. There is yet room for some further improvement with the aid of additional crushing power.

During the period from December, 1903, to June, 1907, white labor has taken the place completely of colored labor, which had previously been employed upon given kinds of work. Also, during this period the wages of white labor have been increased fully 20 per cent. at the mills in which the Treasurer is in possession; and the living conditions of the workmen have been wholly reorganized at a very considerable cost. On another hand, the prices paid for cane during this period have been higher than at any other time in the history of the mills under consideration. All these several considerations, however, must not be allowed to conceal the fact that what has been accomplished at the mills under the Control during the period specified has been due in a very notable measure to the favorable seasons that have obtained. Even with a continuance of good climatic conditions, it appears certain that the same high measure of success cannot continue, by reason of fiscal and economic changes that are now transpiring, and which are lessening and must continue to lessen the margin of gain. Should unfavorable climatic conditions recur, then nothing can prevent less favorable and, in fact, serious financial results following. These considerations have emphasized the efforts made, on the one hand, to get the mills put into a thoroughly efficient working condition; and, on another hand, to encourage the placing of more producing settlers upon the land in order to secure an increased supply of cane. The situation, present and prospective, requires the exercise of the most careful device and economy if a measure of the recent success is to be maintained.

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**DISEASES IN LOUISIANA SUGAR CANE.**

(A paper by Prof. H. R. Fulton read before the Louisiana Sugar Planters' Association.)

The diseases of sugar cane are yearly attracting more and more attention in the cane-producing countries of the world, and the problem of reducing losses occasioned by them is one of increasing importance to the grower.

The major diseases of sugar cane are four in number, root disease, rind disease, pineapple disease and screech. Of these the root disease is to be considered the most important, both because of its wide distribution and because of the serious losses it occasions. Insofar as the speaker knows, it is the only one with which we in Louisiana are intimately concerned; and he hopes that he will be pardoned for devoting himself rather exclusively to it.
A few words about the growth of knowledge regarding the root
disease will clear the way for a more detailed account of the dis­
disease in Louisiana.

The root disease was described first from Java in 1895 by Dr.
J. H. Wakker, who demonstrated that the causative organism is
*Marausmius sacchari*. Several years later Mr. A. Howard began
an extensive study of the disease in Barbados, publishing his com­
plete results in 1903. He attributes the disease to Wakker's
species of *Marausmius*, but in a letter recently received from Mr.
F. A. Stockdale, mycologist to the Imperial Department of Agri­
culture for the West Indies, the opinion is expressed that prob­
cably more than one species of *Marausmius* attack sugar cane in the
West Indies.

In 1905 Mr. Lewton-Brain published a preliminary account of
the disease in the Hawaiian Islands, and in 1906 there followed
a more complete account by Dr. N. A. Cobb. According to these
writer a certain amount of the root disease occurring in the Ha­
waiian Islands is due to a species of *Marausmius* which differs from
Wakker's species in minor characters, and which is accordingly
proposed as a new variety, *Marausmius sacchari* variety *hawaien­
sis*. But Dr. Cobb also attributes a considerable amount of the root
disease to a fungus of a very different type, *Ithyphallus coral­
loides*, one of the so-called stink-horn group of fungi. He ex­
presses the belief that further study will show that still other
fungi, having the same general mode of living, play a part in
causing root disease.

By these successive steps we come to regard the root disease
of sugar cane as one presenting a definite group of symptoms
which follow the impairment of the root system of the cane plant,
resulting from attacks by some one of several fungi which differ
much in their taxonomic relations but have the same general life
habits.

The appearances which indicate root disease are these: Few
normal roots; canes, especially in the stubble crops, reduced in
size and weight; leaf system reduced; death accompanied by
symptoms of water starvation under conditions that do not pro­
duce a similar effect in normal cane; the lower leaf sheaths ce­
mented by *fungus mycelium*; fructifications of certain species of
fungi in connection with the *mycelium*.

These symptoms have been observed in the cane fields of Louisi­
an for some years, and when the Agricultural Experiment Sta­
tions, something more than a year ago, undertook detailed studies
of some of the diseases of the crops of the State, it was contem­
plated that this condition of the sugar cane should receive early
consideration.

The question of the identity of the fungus, and of its causative
role in bringing on the observed diseased conditions, were the first
to arise. The fructifications necessary for the accurate
identification of the fungus were not to be found
late in the season of 1906. However, material from affected canes was submitted to the agricultural stations of Java, the Hawaiian Islands and Barbados, and from each the information came that the appearances were those of root disease. Our attempts to secure fructifications in the laboratory from several strains of the fungus, under various conditions, did not meet with success. In June, however, there appeared a single, rather imperfect fructification on a cane plant grown in a tub from a naturally infected cutting. The plant had shown all along the symptoms of root disease. The fruit-cap evidently belonged to the genus Marasmius. In August fruit bodies began to be found in abundance in the fields, and until they could be referred to a proper authority for accurate identification, the name Marasmius sacchari was applied as a matter of convenience. Quite recently we have the valuable finding of Dr. W. G. Farlow, that the Louisiana specimens are not the Marasmius sacchari of Wakker, but are very close to, if not identical with, *Marasmius plicatus*, Wakker, a species described as saprophytic in habit.

The literature on the root disease everywhere has emphasized the point that the causative fungi are not strict parasites, but for the most part flourish on non-living parts of the cane, and only under special conditions and in particular situations can they directly attack living tissues. The Louisiana *Marasmius* bears a similar relation to the cane plant as its host. It is found constantly associated with growing cane or decaying cane parts. The canes on which it occurs show generally, though not invariably, a dwarfed growth, a reduced root system, and, during a period of drouth, are the first to show symptoms of water starvation, and are the ones to succumb most readily; canes without the fungus have nowhere been observed to show generally these symptoms. The mycelium has been observed in living and dead roots. Repeated inoculations with pure cultures have produced in living young cane the characteristic symptoms of root disease. The fungus has been recovered in pure culture from such artificially infected plants.

With these facts before us, it seems safe to conclude that the species of Marasmius found generally on sugar cane in Louisiana must be added to the list of fungi which have the ability to induce the so-called root disease of sugar cane. With regard to two species belonging to the stink-horn group, and found in some numbers in the cane fields, we can not as yet make definite statements.

The distribution of the fungus as observed by us, extends throughout the cane belt in the state. Local conditions influence the amount in particular localities. We have seen a certain amount of the fungus in every field examined, the range being all the way from a fraction of one per cent. to practically 100 per cent. of stalk infestation. Counts indicate that for purple plant cane probably three to five per cent., and for purple first year
stubble 10 to 15 per cent., are usual percentages of infestation. The amount of actual loss due to the fungus is another matter regarding which we are not now prepared to make a definite statement. Infected canes, while small and light and perhaps low in sugar content, are by no means a total loss; while, on the other hand, the poor stands, especially in the stubble crops, which result from the death of eyes and young suckers are not indicated by figures which take account of the presence of fungus on mature stalks only.

The root disease fungus works injury in two ways, by the destruction of roots, and by the smothering of germinating eyes. Affected stools, when compared with normal stools, show very markedly the reduction in root system. Such stools may be pulled up with comparative ease, and are the ones most frequently prostrated by storms. A close examination shows that many, frequently a majority of the roots, have died when less than one-half inch in length; the tips of these are blackened and shrunken. A microscopic examination shows the fungus mycelium in such stunted roots. Many of the roots that have attained a considerable length are seen to be decayed, but in the case of these, secondary organisms of decay are apt to be seen in greater abundance than the root disease fungus.

Within adequate root system the cane plant cannot secure from the soil the requisite water and food materials, even though these be present in sufficient quantity. From this partial starvation there result small and light canes and early death of suckers.

That many of the eyes of affected stools are prevented from making anything more than a beginning of growth is certain; but we are not in a position just now to make exact statements about the way in which this bud extinction is brought about. It is a commonly observed fact that many stubbles fail at times to send up sprouts, causing prominent gaps in the stand. Such gaps are most conspicuous in those areas where the root fungus is most abundantly present, and we venture the opinion that more exact investigation will show that the root disease is the main factor in causing this particular kind of damage, by killing the roots, or by killing the buds as they germinate, or in both ways.

It has already been stated that the root disease fungus is at the most a weak parasite. *Marasmius* is a genus of the mushroom or toadstool fungi, the great majority of which group have the saprophytic habit of living on decaying organic matter; those that are found on living plants have usually gained a foothold through some wound. The *Marasmius* of Louisiana sugar cane retains much of the saprophytic mode of living characteristic of the group. It is found in the field abundantly present on dead and rotting cane parts of a former season, as well as on dead parts still attached to living stools. It is apparently hard for the fungus to obtain a foothold upon living tissues; the emerging roots and the lower leaf sheaths seem to be the only points of entrance, and the
tissues of these can be overcome only when their vigor is impaired. And so we find that the amount of fungus present and the damage occasioned by it increase as the strength and vigor of the cane decrease—a very important point in connection with the control of the disease.

The root disease is much worse on stubble than on plant cane, and on second than on first year stubble. This results in all probability from the relative growth at the outset of roots and shoots from the stubble stumps; these fall a ready prey to the root disease fungus which has had a rich feeding ground in the old stumps, and is strongly entrenched in a position of decided advantage. To a less degree, but in a similar way, fall plant cane, as compared with spring plant, is at a relative disadvantage in the struggle with the fungus. At the Sugar Experiment Station it has been possible to make a comparison of first year stubble from spring and from fall plant cane of the season of 1906. The plot contained nine rows of each of four varieties in fall plant, and an equal quantity of spring plant from the same seed cane. The thirty-six rows of fall plant showed altogether 2,421 affected stalks, and the spring plant 1,898, a ratio of something like four to three.

The root disease fungus readily survives our winter temperature with the protection afforded by the windrows, the stubble stumps, and buried cane trash.

It is disseminated for the most part in three ways: by spores, by growth through the soil, and by the planting of infected canes. The spores are produced on the radiating gills of the under side of the fruit caps; these are produced rather infrequently, and we incline to the belief that spores play a minor part in the propagation of the fungus. The threads of the fungus mycelium frequently extend several inches from the source of nutriment, and when decaying organic matter is abundant in the soil it is possible for the fungus to spread very slowly from piece to piece until a considerable area is infested. In the fields we frequently find large areas that show more of the fungus than occurs elsewhere, and there is usually some condition, such as poor drainage or thin soil, or imperfect tillage, that would place the cane at a disadvantage in its growth, and explains the ascendancy of the fungus. But we also find smaller areas, not differing appreciably from the surrounding tract, in which the fungus is very abundant. Such areas probably result from the persistence of the fungus in, and slow spread through the soil.

The most rapid and far-reaching mode of distribution is through the agency of man—the use of infected canes for planting. A small test of efficiency of this mode of transmission of the fungus to the next generation of cane was made this season. Four short rows were planted with entire affected canes, and one row with the lower and worst affected portions only of such canes. In the four rows the fungus developed upon 89 per cent.
of the stools, and 61 per cent. of the individual canes; and in the single row, upon 100 per cent. of the stools and 91 per cent. of the canes. Control rows showed, with the exception of one stool, no fungus. The stand of plant cane from this affected seed appeared but little below normal.

It has been reported from the Hawaiian Islands and from Barbados that certain varieties of cane, especially the new seedling canes, show a resistance to the root disease. Our own field observations, which have been confined for the most part to D 74 and to Purple, indicate that D 74 has very constantly less of the root disease than the home variety. At Audubon Park it has been possible to examine comparative plantings of Stripes, Purple, D 95 and D 74. The following table gives the number of infested stalks, as determined in each case from counts of nine rows of first year stubble cane from fall and from spring plant:

<table>
<thead>
<tr>
<th></th>
<th>Striped</th>
<th>Purple</th>
<th>D 95</th>
<th>D 74</th>
</tr>
</thead>
<tbody>
<tr>
<td>First Year Stubble</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fall plant</td>
<td>870</td>
<td>654</td>
<td>531</td>
<td>366</td>
</tr>
<tr>
<td>Spring plant</td>
<td>609</td>
<td>528</td>
<td>429</td>
<td>332</td>
</tr>
</tbody>
</table>

And again, five rows each of second year stubble of the same varieties gives the following figures:

<table>
<thead>
<tr>
<th></th>
<th>Striped</th>
<th>Purple</th>
<th>D 95</th>
<th>D 74</th>
</tr>
</thead>
<tbody>
<tr>
<td>Second Year Stubble</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fall plant</td>
<td>337</td>
<td>239</td>
<td>221</td>
<td>182</td>
</tr>
</tbody>
</table>

There is indication from these figures that the seedling varieties of D 74 and D 95 are less susceptible than the home canes, and there is striking constancy in the rank which these varieties take in this regard. There is reason to believe that when these figures are reduced to a percentage basis the rank of no variety will be changed, but that the difference between D 74 and D 95 will be lessened, while the relative standing of both Purple and Striped as regards resistance will be lowered. Definite conclusions are not to be drawn hastily from the data of a single season, especially when nothing is known regarding the relative infestation of the cane used in planting these variety rows. And it is possible that the comparative freedom of D 74 from root fungus, as observed in the fields, results from the newness of this variety and its less exposure to the disease, rather than to an inherent power of resistance. We are now making plantings of the four varieties, which are as nearly as possible comparable as regards the amount of infestation, and which will give more conclusive data on the relative susceptibility, as well as on the effect of the root disease upon stand, weight of stalks and sugar content.

Procedures for the control of the root disease are at once suggested by an understanding of the manner of invasion and of dissemination of the fungus which is its causative agent. Briefly summarized, procedures for control must follow the lines of good cultural operations, and the use of good seed. Sanitary and preventive measures must be relied upon, not remedial ones.
Regarding the first, it is necessary but to mention in this gathering proper tillage, thorough cultivation, especially of the stubble crops, good drainage, rotation of crops, and destruction of infected trash. In fine, where root disease is to be combatted all care must be taken that the environmental conditions of the cane plant are such that it may maintain a healthy and vigorous condition, especially during the period of early growth.

For the securing of non-infected seed cane, two ways are open: (1) careful inspection of canes for planting, with the rejection of all suspected ones; (2) through disinfection with some good fungicide, such as Bordeaux mixture. Of these two methods the former is the less expensive, but is probably less effective, since there is always the chance that some very slightly affected canes will be overlooked. Both methods are tedious and costly when carried out on a plantation scale. By setting apart a tract of superior land for growing seed cane, and by careful selection and perhaps disinfection of the cane used for planting this area, it is believed that sound seed cane for the general planting can be obtained at a minimum cost. The relative immunity of plant cane of all varieties indicates that from the standpoint of reduction of root disease such cane is much inferior to stubble cane for planting purposes. It is likely that some tracts of land are so thoroughly infested with the root fungus that the measures mentioned will not afford all the relief desired. In such instances it may be found necessary to rest the lands from cane for a considerable period, and to plow as often as possible, with a view to exposing the fungus and killing it by drying.

Success has attended the use of such methods in other countries. A recent letter from Dr. Prinsen-Geerligs conveys the information that it is now difficult to find specimens of the root fungus in Java. The system of rotation practiced there, with the elimination of the stubble crops, and the great care taken with material for planting, have no doubt played an important part in bringing about the result. The work of eradication in the Hawaiian Islands has been begun too recently for definite results. Published accounts of very recent date from the British West Indies indicate that care in cultural operations, rotation of crops, and selection of sound seed cane are measures which are being used there with an encouraging degree of success.

**JAVA'S SUCCESS IN CANE SUGAR.**

The extraordinary development of the cane sugar industry in Java has been a surprise to the sugar world. When the Hawaiian reciprocity treaty was first negotiated some thirty-two years ago, it was said that the total product of Hawaii could probably never exceed, even if reach, 100,000 tons. During this generation,
however, the production of Hawaii has reached up to about 400,000 tons. Cuba reached a production of about a million tons before the Spanish war. During that war the production fell to almost nothing, and its rapid recovery under the Cuban Republic and American influence has been extraordinary, but hardly yet even exceeds, relatively, the development of the Java sugar industry.

In Java in 1896 the crop was about a half million tons and rose constantly until during recent years it seems to have struck its own natural equilibrium, at about a million tons. The exact figures are given as follows for the eleven years, 1896 to 1906 inclusive:

<table>
<thead>
<tr>
<th>Year</th>
<th>Production in tons.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1896</td>
<td>534,390</td>
</tr>
<tr>
<td>1897</td>
<td>586,299</td>
</tr>
<tr>
<td>1898</td>
<td>725,030</td>
</tr>
<tr>
<td>1899</td>
<td>762,447</td>
</tr>
<tr>
<td>1900</td>
<td>744,257</td>
</tr>
<tr>
<td>1901</td>
<td>803,735</td>
</tr>
<tr>
<td>1902</td>
<td>897,130</td>
</tr>
<tr>
<td>1903</td>
<td>931,286</td>
</tr>
<tr>
<td>1904</td>
<td>1,055,013</td>
</tr>
<tr>
<td>1905</td>
<td>1,039,178</td>
</tr>
<tr>
<td>1906</td>
<td>1,048,275</td>
</tr>
</tbody>
</table>

The area planted in sugar cane in Java reaches about 283,000 acres. There has been a slight increase during the last two or three years, but no increase of any great moment, all of which would indicate that the present production of sugar in Java of about a million tons, is about the limit of its successful production under the competitive conditions environing that colony.

It is a fact that the Javanese had the example of the Hawaiians in modern cane sugar manufacture and they had worked up to it most admirably. It is stated now that the production of cane sugar per acre in Java is about double the average beet sugar production per acre in Germany. Our readers are doubtless familiar with the fact that under the control of the Dutch government the sugar lands of Java are retained so far as their title is concerned, either in the Dutch government, or in the native landholders, and much of the land bears but one cane crop, and the following year goes into rice culture, which is the mainstay in the way of food supply, of the native Javanese. To whatever extent this is done, and as we understand it the greater part of the land is thus cultivated, the Dutch sugar planters in Java lose the advantage of ratooning. On the other hand, they get larger crops by having constant plant cane crops and by shifting the land annually they get some advantage in the way of greater fertility and the cost of labor is probably as low, or lower there than anywhere else in the cane sugar producing world.
The yield in sugar in Java on the weight of the cane during the last ten years has averaged about 10½ per cent. of the weight of the cane, or about 210 pounds per short ton. This is considerably below the yield of sugar from beets, which in Germany in the season of 1905-06 was 15.28 per cent.; that of Austria-Hungary, 15.27 per cent.; that of France, 13.19 per cent.; that of Holland, 14.47 per cent.; and that of Sweden, 15.02 per cent. Cuba is reported to have realized in sugar slightly under 10 per cent. of the weight of the cane.

ARTIFICIAL IRRIGATION IN FORMOSA.

Consul J. H. Arnold, of Tamsui, states that the Formosan government has recently created an irrigation section under the bureau of public works, and an engineer for the section is at present in the United States studying irrigation problems there. Mr. Arnold continues:

According to preliminary reports, the irrigation works to be undertaken will involve an expenditure of $15,000,000 gold, to be divided into annual expenditures of $750,000 gold. It is the intention of the government to issue bonds for this amount. There are in Formosa about 750,000 acres of land planted in rice, one-half of which is irrigated by a system of reservoirs and canals constructed during the Chinese régime. The other half is obliged to depend upon the rainfall. It is the intention to improve the present system and to extend it to embrace those fields now dependent upon the rainfall, thus insuring the growers a constant supply of water and also protecting them from inundations. About 40 per cent. of the land under cultivation in Formosa is planted in rice, the annual average crop of which nets 20,000,000 bushels. Sugar cane is another product which requires more water than is furnished by the ordinary rainfall. The native cane, grown entirely up to the time of the Japanese occupation, required no irrigation, but the improved Hawaiian and Java canes, which are rapidly replacing the native cane, requires more water, thus necessitating some system of irrigation. At present there are about 90,000 acres planted in cane. The irrigation works will provide water for this area, as well as for an area to be reclaimed for planting in sugar cane.

It is estimated that the system, which will be one of reservoirs and canals, when completed, will provide irrigation for 1,000,000 acres of cultivated lands. There are no arid lands in Formosa and the irrigation problem is one having to do with the control and distribution of a bounteous supply of water. A central ridge of mountains traverses the entire length of the island. Without some system of storage and distribution of waters, immense volumes incident to heavy rainfall are carried directly to the sea.
CONSUL GENERAL W. H. Michael, reporting from Calcutta, says that most of the sugar cane grown in India is converted into "gur" and "rab," which is a compound of sugar crystals and molasses, or, in other words, the juice of the cane boiled down to the consistency of sugar or molasses. He gives the following description of the process:

Rab is of thinner consistency than gur and is usually made into refined sugar, which is called by the natives khand or kachchi chini, whereas pakki chini is made from gur. The natives crush the cane with crude stone or wood rollers, which are moved by bullocks and do not express all of the juice from the cane. Some few sugar makers have modern iron rollers and appliances made in England or Germany. In making gur the juice which runs from the mill through a gunny filter into jars is carried by coolies and poured into a pan in which it is boiled. The scum that rises on the surface of the boiling juice is skimmed off with a perforated ladle. Milk orghi, crude carbonate of soda, infusion of castor seeds, or the roots of the bindi plant are used in clarifying the syrup. After being boiled sufficiently it is strained off into "nards," where it cools and solidifies. The manufacture of rab is similar, the boiling process being less prolonged. The process described is the one followed by perhaps 95 per cent. of the native manufacturers in India. The little mills are to be found wherever cane is grown, and as a rule they are of the most crude and primitive construction. There is great waste and cleanliness is not thought of.

YIELD AND PROFITS.

On an average 8,200 pounds of gur will yield 2,700 pounds of chini and 3,690 pounds of molasses, and 8,200 pounds of rab will yield 2,542 pounds of chini and 4,264 pounds of molasses. The profits are not large, the expenses and net results figuring as follows:

2,700 pounds of pulka chini, at $3 per 82 pounds...................... $ 99.00
3,690 pounds of molasses, at $1.16 per 82 pounds....................... 25.77
Price of charcoal obtained from wood burned.......................... . . . $12.54

$125.43

8,200 pounds of gur, at $1 per 82 pounds.......................... $100.00
Cost of refining.......................................................... 18.33
Profits............................................................................. 7.10

$125.43
The profit on refining 2,760 pounds of rab is $8, or a little more than the profit on refining the same number of pounds of gur. In either case considering the number of hands employed and the length of time consumed, the profit is quite small. The hands employed receive not to exceed 4 or 5 cents a day for their labor, and generally this is paid them in sugar or molasses or some commodity other than money. It is not difficult to find laborers in the "mofussil" districts who never received a pice in cash for this toil during their entire lives.

ARGENTINE SUGAR SHORTAGE.

Vice-Consul General Otto Hollender, of Buenos Ayres, submits the following report on the sugar industry in Argentina, which he states might prove of some interest to exporters of sugar in the United States, inasmuch as there is now a considerable shortage of sugar in Argentina, which makes imports profitable:

Several years ago the Argentine Government afforded sugar planters every encouragement, such as export premiums, high protective tariff, etc. Thus encouraged the production gradually increased, until in the year 1901 it reached 165,341 tons, of which nearly 52,000 tons were exported, while only 307 tons were imported and 101,513 tons consumed in the country. A few years later the export premiums were abolished in accordance with the resolutions of the International Sugar Convention held in London, to which the Argentine Government adhered. Thereupon the exports gradually dropped, until in the year 1905 they amounted only to 2,129 tons, the total production for that year being 137,091 tons, while the home consumption increased to 120,921 tons. There was then a surplus of some 25,000 tons, and the sugar planters clamored for some legislation restricting production, which the Government complied with. Thus restricted the production amounted to only 118,817 tons in the year 1906, of which practically none was exported, while 3,218 tons were imported. The consumption having, however, increased to 126,133 tons, there was a considerable shortage which is now being covered by importation.

REDUCTION OF DUTY—PRICES AND PRODUCTION.

As the high import duties had been maintained until then, the price of sugar was very high, in fact, higher than at any other time during the last ten years, the Government issued a decree reducing the import duties from 7 to 6 cents Argentine
gold per kilo (2 1/5 pounds), which appears to have relieved the situation somewhat. During the first five months of this year the price of sugar has been as high as $4.20 Argentine paper per 10 kilos (equal to $1.79 American currency) (kilo = 2 1/5 pounds); and even at that rate it was difficult to purchase large quantities. I am informed from reliable sources that there will be a considerable shortage again next year, although the laws restricting production have now been abolished, and as there has been a good part of the sugar cane planted destroyed by insects.

There are at the present time 47 sugar refineries established in the Argentine Republic, of which 34 are in Tucuman, 1 in Santiago del Estero, 2 in Santa Fe, 1 in Corrientes, 2 in Salta, 3 in Jujuy, 1 in Formosa, and 3 in the Chaco. I furnish herewith a list of the refiners [filed for trade reference at the Bureau of Manufactures] and the following table showing the production, import, export, and consumption, and the average prices of sugar for the last nine years:

<table>
<thead>
<tr>
<th>Year</th>
<th>Production</th>
<th>Imports</th>
<th>Exports</th>
<th>Consumption</th>
<th>Average price per 10 kilos</th>
<th>Argentine paper</th>
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<tr>
<td>1898</td>
<td>79,431</td>
<td>664</td>
<td>21,398</td>
<td>84,741</td>
<td>$3.45</td>
<td>$1.79</td>
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<td>1899</td>
<td>103,339</td>
<td>428</td>
<td>26,384</td>
<td>89,572</td>
<td>3.70</td>
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<tr>
<td>1900</td>
<td>115,934</td>
<td>437</td>
<td>15,291</td>
<td>101,513</td>
<td>3.88</td>
<td></td>
</tr>
<tr>
<td>1901</td>
<td>165,341</td>
<td>307</td>
<td>51,945</td>
<td>230,286</td>
<td>3.63</td>
<td></td>
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<tr>
<td>1902</td>
<td>126,440</td>
<td>174</td>
<td>37,897</td>
<td>165,753</td>
<td>2.90</td>
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<tr>
<td>1903</td>
<td>141,284</td>
<td>121</td>
<td>30,136</td>
<td>100,265</td>
<td>2.82</td>
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<tr>
<td>1904</td>
<td>130,092</td>
<td>128</td>
<td>17,922</td>
<td>114,742</td>
<td>2.97</td>
<td></td>
</tr>
<tr>
<td>1905</td>
<td>137,091</td>
<td>394</td>
<td>2,129</td>
<td>120,212</td>
<td>3.21</td>
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<tr>
<td>1906</td>
<td>118,817</td>
<td>3,218</td>
<td>6</td>
<td>120,133</td>
<td>3.23</td>
<td></td>
</tr>
</tbody>
</table>

**SUGAR PROSPECTS IN DEMERARA.**

The Demerara Argosy of September 21 contained the following note on the prospects of the present season's sugar crop in the colony:

Canes of all ages are now suffering from the severe dry weather and growth is rapidly being checked. The fact that excessive rains prevailed during the first six months of the year renders the need for heavy showers all the more imperative now, as canes have not rooted deeply. The long dry season has, however, fairly set in, and under normal weather conditions, rains cannot be expected before late in November. Canes are thin, short, and lacking in juice. A few estates
grinding plant canes fourteen to fifteen months old, report high yields of sugar, but ratoon canes twelve months old are proving very disappointing. It is now certain that the average yield from October, November and December canes will be the poorest obtained for a long number of years. Cane juice is reported to be of good quality and this is some consolation, in view of the otherwise depressing outlook.
# THE PLANTERS' MONTHLY

## Sugar Plantations, Cane Growers and Sugar Mills

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<tr>
<th>ISLAND AND NAME</th>
<th>MANAGER</th>
<th>POSTOFFICE</th>
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<td>x* Andrew Adams</td>
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<td>** J. A. Law</td>
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<td>x* S. E. Woolsey</td>
<td>Lahaina</td>
</tr>
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<td>x*</td>
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<td><strong>MAUI</strong></td>
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<tr>
<td>Olowalu Co.</td>
<td>** Geo. Gibb</td>
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<tr>
<td>Pioneer Mill Co.</td>
<td>x L. Barkhausen</td>
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<tr>
<td>Wailuku Sugar Co.</td>
<td>**x C. B. Wells</td>
<td>Wailuku</td>
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<tr>
<td>Hawaiian Commercial &amp; Sugar Co.</td>
<td>x* H. P. Baldwin</td>
<td>Paunene</td>
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<tr>
<td>Maui Agricultural Co.</td>
<td>x H. A. Baldwin</td>
<td>Paia</td>
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<tr>
<td>Kipahulu Sugar Co.</td>
<td>x A. Gross</td>
<td>Kipahulu</td>
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<tr>
<td>Kilie Plantation Co.</td>
<td>x* James Scott</td>
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<td>Pa'auhau Sugar Plantation Co.</td>
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<td>**x Jas. Webster</td>
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<td>x C. C. Mead</td>
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<td>* Carl Wolter</td>
<td>Naalehu</td>
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<td>x J. Watt</td>
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<td>S. Kohala</td>
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<tr>
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<td>†† Robt. Hall</td>
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</tbody>
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## KEY

- **Castle & Cooke**
- **W. G. Irwin & Co.**
- **J. M. Dowsett**
- **H. Hackfeld & Co.**
- **E. T. Davies & Co.**
- **C. Brewer & Co.**
- **Alexander & Baldwin**
- **F. A. Schaefer & Co.**
- **H. Waterhouse & Frat Co.**
- **Hind, Rolph & Co.**
- **Bishop & Co.**