THE

PLANTERS' MONTHLY.

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OF THE HAWAIIAN ISLANDS.

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The latest quotations for sugar in New York was $7.73 for Cuban centrifugals of 96 test.

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From the agent of the Risdon Iron Works we have received a beautifully illustrated pamphlet, descriptive of some of the sugar machinery manufactured by this firm. Both the printing and engraving are done in the highest style of the art.

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The total exports of sugar from these islands for the first seven months of this year amount to 210,591,417 pounds, or upwards of 105,000 tons. The remaining crop will not exceed 20,000 tons, as most of the mills have shut down for the season.

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Mr. W. G. Walker, for ten years past head overseer on the Spreckelsville Plantation on Maui, has been appointed manager of the Ookala Plantation on Hawaii. The prospect is said to be very good for a paying crop for the coming year at Ookala.

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Mr. Frank Dunn, for many years engineer and mill superintendent of the Pioneer Mill, Lahaina, has removed to Hilo, and is now engineer of the Papaikou Mill. We learn that the capacity of this mill is to be enlarged during the fall, to meet the increased requirements for the crop of 1890.

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The Hilo sugar mills have done well this season, Waiakea having turned out about 4,000 tons of sugar, Wainaku (not yet finished grinding,) promises nearly 5,000, and Papaikou (not yet finished,) over 5,000 tons. Compared with former years, this is a large advance and augurs well for the future.

The Oahu Railway & Land Company have issued a circular to the owners of land requesting samples of soil and sugarcane to make complete analyses. In this plan they intend to include the entire Hawaiian group, and to do the work thoroughly. They state that this knowledge will be of inestimable value to these islands, both from a scientific and practical point, and will lead to the cultivation of thousands of acres now lying idle. In connection with these samples, they call for statistics of rainfall, winds, temperature, etc. All of which will be very valuable. The Company's circular will be found in the Gazette.

WITH OUR READERS.

The continuation of the chemist's report of sugar manufacture in Louisiana will be found on page 345.

With the view of encouraging a new industry, a very full account is republished from our Ceylon contemporary, commencing on page 354, of the details for the successful cultivation of pepper, the production of which is now confined to the East Indies, South America and some few other localities. We are not aware that the black pepper vine has ever been cultivated here, but there can be no question about its thriving in such localities as Kona and Hamakua on Hawaii. The varied experiences of the Ceylon planter will be read with interest.

The European Beet Sugar Convention has so far accomplished nothing in its efforts to abolish the bounties now paid by every beet sugar government, to maintain the industry. The chief points in the discussion are well set forth in an article by the Duke of Argyll, copied from *Sugar Cane.* The Duke favors free trade in sugar as in everything else.

One of the best articles on the improvement of the sugarcane that we have seen is found on page 372, which gives a review of the recent discussions on seed cane. Careful selection of seed is undoubtedly the best plan that can be adopted, and will give the surest returns.

Another tropical industry which might be indroduced here is that of the orchilla vine, (see page 375) which grows in Mexico, and is said to be very profitable. It was discovered there by one of the Nantucket whalemen visiting the Lower California coast for whales in years past, who had seen it growing in the Cape de Verde Islands, and at once recognized it as one of the valuable dye-stuffs. It is a pity he did not introduce it into these islands, as the whaleships always called here after their winter cruises off the California coast. If so, we might have had it growing now in abundance. But perhaps we should have called it a weed and a nuisance, as we did the indigo, and exterminate it.

On page 381, Mr. A. F. Cooke presents some figures showing an increase in the consumption of imported fertilizers, which

will surprise most people. He states that the Custom House records show over $100,000 worth imported, mostly from California. The weight is nearly three thousand tons. The consumption is said to be rapidly increasing. Most certainly a portion of this large demand can and ought to be supplied from fertilizers made on the spot, if as good can be made here.

Some valuable hints on transplanting trees will be found on page 382. We may add our own experience, that trees transplanted in the afternoon or evening are more likely to live than when transplanted in the morning or forenoon. The reason is, because in the latter case they are exposed to the scorching rays of the sun at a time when they cannot bear them, while in the former they escape till after the roots and limbs receive the invigorating night air. Of course this does not apply to trees transplanted in wet or rainy weather, which is always the best time for such work.

The sugar situation for the next few months is vividly set forth by the latest publication of one of the best informed of the European reporters. It looks very much as though high or perhaps higher prices than now exist must rule for some time.

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CANE JUICES AND MOLASSES.

HONOLULU, August 6, 1889.

EDITOR PLANTERS' MONTHLY:

Dear Sir:—I shall be obliged if you would insert the following in your edition for August;

DEFECATION OF CANE JUICES:—It is known that many of the cane juices are very impure and contain substances which, render the defecation by lime alone imperfect and cause during the process of sugar manufacture, a continual loss of crystalizable sugar by inversion and fermentation. The removal of these substances have the effect that

1. The quotient of purity is raised, and consequently more sugar is obtained.
2. The juices become more bright and durable with no inclination to ferment.
3. The boiling of the juices is carried on far more easily, and consequently less fuel is consumed.
4. The scums can be filtered quickly, and the juices are clear and the cakes hard and nearly free of sugar.

Even the best cane juices may be ameliorated by this process. For impure juices, however, no matter whether diffusion or press juices, the treatment by this process may be considered as a large progress of sugar manufacture in these islands. The prices of the substauces employed are moderate, and are no obstacle to its use.

References of the good effect of the process may be obtained from the sugar-boilers on the plantations of Waianae, Koloa and Kekaha.

TREATMENT OF MOLASSES :—The molasses from the sugars of the islands often contain a considerable quantity of crystalizable sugar, mostly between thirty and forty per cent. Twenty-five per cent of this quantity can be extracted by a process which decreases the percentage of salts and organic matter; in other words, raises the quotient of purity. This process to treat the molasses does not require extra machinery, and may be conducted during the sugar season, or any other time without the help of skilled labor. To know whether molasses is fit for extracting sugar, it is necessary to know :

1st. The percentage of crystalizable sugar.
2d. The percentage of ashes.
3d. The quotient of purity of the molasses.

Knowing these points, it may be very closely calculated how much sugar may be extracted by the treatment. The time the treatment requires is about a fortnight, during which all the impurities are allowed to settle, and a syrup much improved in color and taste is obtained. The settlings of the molasses containing much of the potash, salts and nitrogen compounds are an excellent fertilizer.

Analyses of molasses for planters which intend to try the above mentioned process, will be made by the undersigned at moderate charges. Full particulars of the process and chemicals may be obtained from Messrs. Benson, Smith & Co., or the undersigned. DR. G. MARTIN.

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A BERLIN VIEW OF SUGAR SUBSIDIES.

The labors of the International Commission, which has been held in London, charged with the examination of the measures proposed by the several interested governments for the abolition of the sugar bounties, came to an end on June 1st, the representatives separating with the expression of the hope that their efforts may attain the desired result. "This hope," says Kuhlows, "may only be realized when the whole of the sugar-exporting countries are induced to come to an agreement, for it is not to be concealed that should one country raise objections the rest will withdraw. It is simply a question of whether the governments are prepared to abolish the sugar bounties, and only to grant as a drawback the actual amount of tax paid. The German Government is willing to revert to the system by which the bare amount paid is refunded—that is to say, only to tax the sugar manufactured in the country when it is consumed here, and to leave it duty-free when it is intended for abroad, and as then there is hardly any tax paid there will be nothing to refund. The history of sugar bounties

has a serio-comic character. A government is desirous of doing something for an industry which it regards with particular favor. And it therefore offers a premium, by which means a splendid opportunity for doing an export trade is afforded, and this is soon called into life. It is an expensive business for the State, but it has, ostensibly, advantages for the industry concerned, which enable it to obtain a dominant position in international markets. Things go on merrily so long as this government remains the sole one pursuing that course. It, however, requires no demonstration to prove that the manufacturers in the same line in the other countries will demand—and from their point of view with justice—that their respective governments place them in a similar position to meet international competition. Finally, all the governments see themselves compelled to accord the same protection to the manufacturers. The advantages enjoyed by the manufacturers of one country are, therefore, equal to those enjoyed by the manufacturers of the others, and hence, according to the principles of the multiplication table, it means that one is no better off than the rest, and that in the international market all are exactly in the position as if no premium had been granted. The result is that each government is by degrees compelled to withdraw huge sums from the State Treasury, no longer to give an advantage to its manufacturers, but only to prevent the latter from being injured by their foreign competitors. The industry itself has neither advantage nor disadvantage, the state suffers a huge loss, the sole advantage in the affair is reaped by the sugar consumers in the world market, and the English consumer in the first rank, all the countries in Europe striving to outbid one another in order to supply England with cheap sugar."—*Bradstreet's.*

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SUGARCANE INDUSTRY OF THE HAWAIIAN ISLANDS A SUCCESS.

EDITOR PLANTERS' MONTHLY:

Dear Sir:—There is a very perceptable improvement seen in the sugarcane industry of these islands. Evidence of this is seen on every hand, and nothing speaks louder than the vast fields of cane now to be seen in every district, on every island. It stands proudly waving its leaves in every fertile valley, on every alluvial plain, on the hillsides and in some places up to the very base of the mountains. We see on almost all the plantations evidences of improvement, enterprise and progress, and they stand on a better and safer footing to-day than they have done for years, and everyone rejoices to see this industry surmounting the waves of adversity which had so long threat-

ened to engulph it. There are a few plantations still struggling under heavy debts; but it is hoped that even they will eventually weather the storm, and come out safe, if carefully and judiciously managed.

There are not only more acres of cane under cultivation, but the land produces almost double the amount it formerly did; and the cane yields more sugar to the ton. These encouraging results have been brought about by a number of causes, chief of which must be placed the gain direct by adopting improved machinery, better methods of manufacture, cultivation and more judicious management. The gain derived by the introduction of improved machinery is very great, and cannot, in my estimation be less than 25 to 30 per cent.

Mr. Alex. Young is entitled to more credit for this introduction than any other man that I know of. He has made a comprehensive study of the whole business, and has set his inventive faculties to work to devise all kinds of machinery for the various needs and wants of sugar mills, and he has done this with such success that his mills are now considered by many as the most perfect and complete in use. These improvements, not only place Mr. Young in the first rank of inventors of sugar mill machinery, but they branch out in directions that were never before thought of, and accomplish results never even dreamed of.

His superheater alone is proof of this, and was a genuine surprise to every one. Even engineers were incredulous at first, but now that the principle is understood, every one sees the advantage of it. There is no question that this is the greatest invention ever made in this direction, and it will save more heat than any device of the kind that has been introduced into sugar mills since this industry was started.

These inventions need no recommendation here, as some of them are found in almost every mill on the islands, but in justice to the inventor and for the information of those abroad, I will say that after trying all other makers, I find these to surpass all others of whatever kind or make, both for strength, durability and efficiency. In grinding, they have secured the highest extraction known to these islands, Waiakea extracting 85 per cent the last season, the juice being diluted 40 per cent. This is possibly the highest extraction ever secured by roller pressure. These improvements not only give better extraction but the juice gives a greater percentage of sugar; their greatest utility, however, is to save heat or steam and labor, and this they do in a high degree.

The improvement in the sugar industry is not confined to the machinery, but extends to cultivation and to everything pertaining to it. We see change, enterprise and better methods carried into effect almost everywhere. The value of

experience, that best of all guides and teachers, is now being seen and felt in every mill and plantation, so that now they are worked to the best advantage and at the least cost and expense. Much care and judgment have been shown in perfecting this department, and giving it the prominence that its importance demands, and these noble efforts have, we are happy to say, been crowned with success; so that the yield has increased two, and in some instances five fold over what was formerly raised. Great efforts have been made to create interest in this department, and it has been done in such a friendly manner that now the combined experience of these planters is open to anyone who cares to learn it.

Of the changes and improvements it would be impossible to mention all in this paper, but the advantages have been of such a nature as to lift the debt of some plantations, and start them on the road to wealth and prosperity. The greatest gain resulting from these improvements is found to be in adopting irrigation.

In places where there is a scarcity of rain, or where the fields are subject to drought, and rain is at all uncertain, irrigation is the thing needed, and if at all practicable, it will do more good than all other methods combined to insure heavy crops. By making this simple change, the yield has been known to have been increased from two and a-half to five and a-half tons per acre, and this has been done in almost every place where it has been tried.

Another important thing in connection with irrigation is the fact that the cane rows may be much closer and the quantity of seed increased to almost double what was usually planted. This method is found to give a much greater stand of cane, and although the stalks are smaller in size they are greater in number, and give a far greater yield of sugar per acre, and to such an extent as to appear almost incredible to those who have not seen it tested. Greater care is also now taken in preparing the soil, and still more in selecting the seed for planting. The importance of this is appreciated and well understood, or ought to be by this time, for to neglect this point will entail more loss than can be gained by adopting all of the known improvements.

Efforts are also made to properly mature the cane, and there is good reason for this, as there is nothing that pays so well, or that gives so much satisfaction as to see the cane come to the mill in a perfectly healthy and matured condition. It is not only profitable, but it affords pleasure to the mill-men to work the juice, as well as to see the sugar product of perfectly ripe cane. To thoroughly mature the cane it is not only necessary to trash it, or to take the dead leaves off, two or three times, but it must stand a sufficient length of time after it has flowered

or tasseled. Many a man has been kept poor solely by overlooking this little point, for I do not consider it too much to say that twenty per cent of the entire crop has often been lost, besides giving an immense amount of trouble, where the cane was not fully matured. This practice, like many others, of grinding unripe cane, I am glad to say, is going into disuse, and will soon entirely disappear.

Some of the plantations have increased their yield and improved their soil by practicing a system of fertilization, but unfortunately some fertilizers are not always what they are represented to be, and so are not quite so popular as they otherwise would be. Fertilizers are undoubtedly good for most soils, but they are not used here so much, nor are they so necessary as they are in colder climates, where the seasons are shorter. Here, where the cane has eighteen months to mature, and where the climatic changes are all favorable, with plenty of sunshine, and rich, deep soils, fertilizers, except on wornout land, are not often used.

From this slight review of the sugarcane industry of these islands, it is apparent that great progress has been made in all directions, and this has happily created confidence with all engaged in the business. Success is believed to be within the reach of all, obstacles and difficulties are only incentives for greater exertions. It is true that misfortune has in some instances followed our best endeavors, but they have only succeeded in strengthening the determination to succeed, and in bringing out all the resources available. Success is a grand thing, and it is well worth working for, and can be secured here just in proportion to the energy and intelligence displayed.

There is nothing that succeeds like hard work, when backed by intelligence and good judgment, and it is mainly through these qualities possessed by our planters, managers, engineers, sugar-boilers and overseers, that prosperity has been achieved. The man who is a worker is bound to succeed. He may make some mistakes, but if he has push and energy, he is sure to carry everything before him. Good judgment has been displayed in the management of most of our plantations, and there have been fewer mistakes and less parsimony and pinching at one end and waste at the other. Courage has been displayed also in getting what was necessary, and caution in rejecting what was superfluous.

In conclusion I think I can safely say, that although perfection has not been reached yet, by any means, still, many steps have been made in that direction, which has put Hawaiian planters and plantations well abreast of the times.

INVESTIGATOR.

CORRESPONDENCE AND SELECTIONS.

REPORT ON THE MANUFACTURE OF SUGAR AT THE EVAN HALL, BELLE ALLIANCE AND SOUVENIR SUGAR-HOUSES, LOUISIANA.

BY L. A. BECNEL, CHEMIST.

To the McCall Bros.' Planting and Manufacturing Co. (Limited), Messrs. E. & J. Kock and Leon Godchaux:

[*Continued from July Number.*]

DRY SUGAR.

The average polarization of the different grades of sugar was as follows:

	E. H.	B. A.	SVN'R.
Granulated	99.75	none.	none.
Soft white	99.28	98.80	98.69
Yellow clarified	97.50	97.71	97.53
Total first sugar	97.65	97.83	98.01
Fancy yellow, seconds	92.74	91.00	92.70
" " thirds	92.13	87.50	none.
Total first, second and third sugars	96.85	96.03	96.98

The actual number of pounds of commercial sugar made and having the composition given in the above table are as follows:

	E. H.	B. A.	SVN'R.
Granulated	30,504	.....	.....
Soft white	173,348	181,090	406,215
Yellow clarified	2,402,270	1,782,284	561,867
Total first sugar	2,606,122	1,963,374	968,082
Fancy yellow, seconds	459,411	495,797	233,360
" " thirds	39,608	116,859	.....
Total first, second and third sugars	3,105,141	2,576,030	1,201,442

The proportional quantities of the different grades of sugar to the total sugar made and of total sugar to the weight of cane, juice, etc., are as follows:

	E. H.	B. A.	SVN'R.
Granulated	0.98	none.	none.
Soft white	5.58	7.03	33.81
Yellow clarified	77.36	69.19	46.76
Total first sugar	83.92	76.22	80.57
Fancy yellow, seconds	14.80	19.24	19.43
Fancy yellow, thirds	1.28	4.54	none.
Total first, second, third sugars	100.00	100.00	100.00
" " " " from cane	7.22	8.21	6.50
" " " " " juice	9.59	11.26	9.43
" " " " " syrup	33.35	36.93	37.68
" " " " " 1st masse cuite	60.68	60.75	63.85

From data collected by Prof. Stubbs, and some results which we have obtained ourselves on the analysis of certain samples of final molasses, in which the percentage of glucose, determined by the Fehling solution, was greater than that of the

sucrose determined by rotation, it is quite evident that but little reliance can be put in the method of estimating the available sugar by deducting 1½ times the glucose from the sucrose. In order to make a thorough analysis of the results in dry sugar obtained on each of the above places, we prefer to deal with the sugar in terms of the 100 per cent polarizing sugar contained in each of the different grades of sugar manufactured. In order to place ourselves beyond the disturbing elements of the losses by inversion and of manufacture by washing out, etc., between syrups and first masse cuite, we will in the following table base our comparisons on the total 100 per cent sugar contained in our first masse cuites:

	E. H.	B. A.	SVN'R.
Per cent of sucrose in total first sugar	70.01	66.80	69.53
" " " 2d "	11.72	17.79	15.76
" " " 1 and 2 "	81.73	84.59	85.29
" " " 3 "	1.04	3.56	none.
" " " 1, 2, 3 "	82.77	88.15	85.29

Thus we see that at Evan Hall a greater proportion of the original sucrose was recorded as first sugar than on either of the other places, the excess being 0.97 per cent over Souvenir and 4.58 per cent over Belle Alliance.

Judging from the above it would naturally be supposed that both Belle Alliance and Souvenir would make or rather recover more sucrose in the seconds than was done at Evan Hall. A mere glance at our table will show this to have been the case, but we are not inclined to think that, solely because Evan Hall recovers more sucrose in its first sugars, its whole work is superior to that of the other places. We find that in the sum of first and second sugars Souvenir has apparently done the best work, having extracted 4.35 per cent more sucrose in its first and second sugars than was done at Evan Hall, and 0.83 per cent more than Belle Alliance. We do not think, however, that either of the places has made as much commercial sugar as it might have made, and we will make this theoretic or probable yield the subject of a special paragraph before completing our report.

Before going on to the subject of the molasses of commerce we will give the proportional results in dry commercial sugars, both per ton and per acre of cane ground, commencing by the percentages by weight from cane, juice, syrup, etc. Regardless of the actual sucrose in the commercial sugar these quantities are as follows:

COMMERCIAL SUGAR.	E. H.	B. A.	SVN'R.
Per cent from cane	7.22	8.21	6.50
" " mill juice	9.59	11.26	9.43
" " syrup	33.35	36.93	37.68
" " first masse cuite	60.68	67.07	63.85
No. lbs. total sugar per ton cane	144.32	164.27	130.13
" " " " acre cane	3378.72	2776.09	2820.29

These results are indicative of the differences which exist between the results of the three houses, but they are not sufficiently accurate to enable us to make a correct comparison of the work done on each place, there being too many disturbing elements which would vitiate our judgment. These disturbing elements are: 1. The differences in the quantities extracted by the mills. 2. The polarization of the commercial sugar. 3. The percentage of sucrose contained in the original mill juices. In addition to the above we have the proportion of sucrose lost by inversion and by washing out between the points of mill juice and dry sugar. As the latter are elements which if they existed in a greater or less degree, would affect these results in a way that could have been remedied, we will not take them into account, and base our comparison of the relative excellency of the work as performed on each of the places on the quantities of actual sucrose (100 per cent sugar) contained in the commercial sugar in terms of the per cent of the original sucrose in the mill juice.

Thus we find the sucrose accounted for as commercial sugar to be:

For Evan Hall.....78.73 per cent.
For Belle Alliance.....81.15 per cent.
For Souvenir.....73.14 per cent.

As will be shown later, the losses by inversion and by washing out were about the same for both Evan Hall and Belle Alliance. We therefore conclude that the work at Belle Alliance was superior to that at Evan Hall by 3.07 per cent, since the former place accounts for that much more sucrose in its commercial sugar than is accounted for in the latter place. Had the conditions in the sugar-house been such as to allow Evan Hall to make a larger proportion of third sugars than was actually made we believe that the same results could have been obtained.

In a preceding table we saw that in the first and second sugars Bell Alliance recovered more sucrose than Evan Hall; it therefore appears to us that this result could have been easily obtained if the second products of the latter place had been more judiciously handled, say either by allowing them to remain in the hot-room during a longer period of time, or by a greater concentration.

In point of view of the amount of sucrose accounted for in the first and second products from masse cuite we have already called attention to the superiority of the results at Souvenir; but, on the other hand, the table that we have just given shows that if the Souvenir juices had been handled as economically as those of Belle Alliance, even if, as on the latter place, but a small proportion of the second molasses had been boiled

into thirds, this plantation would to-day have at its credit an additional quantity of commercial sugar, which would represent, in terms of the sucrose in the mill juice, 10.95 per cent more actual sucrose than is now contained in its 1,201,442 pounds of dry sugar.

COMMERCIAL MOLASSES.

The quantities of final, or commercial molasses made, were as follows:

	E. H.	B. A.	SVN'R.
Total number of gallons	159,098	92,651	50,445
" " pounds	1,875,765	1,099,766	594,747
Percentage by weight from cane	4.36	3.51	3.23
" " " juice	5.79	4.81	4.69
" " " syrup	20.14	15.77	18.72
By weight from 1st masse cuite	36.67	28.68	32.59
Number of pounds per ton of cane	87.18	70.13	64.41
" " " acre of cane	2041.20	1295.01	1396.12

The composition of the above molasses is as follows:

	E. H.	B. A.	SVN'R.
Specific gravity	1.215	1.425	1.415
Degrees Beaume	42.20	42.90	42.20
Percentage of total solids	79.91	81.34	79.90
" water	20.09	18.66	20.10
" sucrose	29.59	30.80	32.27
" glucose	27.19	30.68	30.76
Percentage of solids not sugar	23.13	19.86	16.87
Ratio of glucose to sucrose	92.56	99.62	95.32
Purity co-efficient	37.03	37.87	40.39

A mere glance at the ratio of glucose to sucrose of the molasses corroborates what we have already said with regard to the quantities of sucrose extracted in the commercial sugar. There has, of course, been some little inversion between the points of first masse cuite and that of the final molasses. This we have found by calculating the total number of pounds of sucrose and glucose to be found in our first masse cuites. After deducting the total sucrose accounted for in the commercial sugar from that contained in the original first masse cuite, we have calculated the theoretical glucose to sucrose ratio, which, compared with that of the commercial molasses found by actual test, gave the difference which enabled us to calculate the proportion of sucrose which had been inverted between the first masse cuite and commercial molasses. This is the same thing as that inverted between first and commercial masse cuites, and which will be mentioned under the latter heading.

From a manufacturing standpoint we do not think that the molasses of either place was sufficiently impoverished. We base this opinion upon the results of the analysis of several

samples of commercial molasses, in which the glucose determined by the Fehling solution exceeded the sucrose, giving a ratio of glucose to sucrose ranging from 100 to 150 per cent. Having had several of these ratios ranging from 140 to 150 per cent, we do not think it impossible that if properly handled an entire crop could be reduced to that point which would mean a great deal more dry sugar from the same amount of juice.

In order to work in that way we think it necessary that the hot-room capacity of each of the three places should be very much increased in order to enable us to keep our low products in that place during a greater length of time than is now done. We also think that the introduction of an osmosis plant would be very beneficial, but we have not as yet carried our investigations as to the advantages which are to be derived from the use of this process, to a sufficient point to enable us to say more about it for the present. Suffice it to say, however, that thus far they are of a very promising character, and bid fair to enable us, at a probably not very distant date to make some interesting disclosures.

COMMERCIAL MASSE CUITE.

By the term commercial massecuite we mean the total number of pounds of dry sugar and commercial molasses made. We give this total weight, as well as the proportion that it bears to the cane, juice, syrup, etc.:

	E. H.	B. A.	SVN'R.
Total number of pounds made	4,980,906	3,605,796	1,796,189
Percentage by weight from cane	11.58	11.72	9.73
" " " juice	15.39	16.07	14.12
" " " syrup	53.49	52.65	56.41
" " " 1st m. cuite	97.34	95.75	95.58
Number of pounds per ton of cane	231.50	234.40	194.54
" " " acre of cane	5419.92	4171.00	4216.41
Per cent of dry sugar in above	62.34	70.08	66.89
Per cent of molasses in above	37.66	29.92	33.11

Throwing out of our count the quantities of commercial masse cuite which in each case were lost by washing out, etc., we find said masse cuite to have the following composition, after accounting for the inversion between the first masse cuite and the final products of sugar and molasses.

	E. H.	B. A.	SVN'R.
Specific gravity	1.493	1.503	1.485
Percentage of total solids	92.01	92.59	90.84
" water	7.09	7.41	9.16
" sucrose	71.52	76.51	73.14
" glucose	10.79	10.98	10.66
Solids not sugar	9.70	5.10	7.04
Ratio of sucrose to glucose	15.09	14.36	14.57
Purity co-efficient	77.73	82.63	80.52

From the foregoing tables we see that Belle Alliance recovered more commercial masse cuite than either of the other places, from both the cane ground or the amount of juice extracted therefrom. Compared with Evan Hall this is, we think, principally due to the greater density of the original mill juice, for, as will be shown in another paragraph, the losses of these two sugar-houses are approximately the same. With regard to Souvenir we think the shortage due principally to more wasteful methods of manufacture.

Compared with 1887, we find that at Evan Hall, on an inferior mill extraction and a mill juice but very little better in composition, the results of commercial masse cuite on the cane ground are superior (in 1888) by 12.34 per cent. In the case of Belle Alliance the differences which exist between the data for 1887 and 1888 are so great that we do not think that a good rough comparison like the above can be made, and prefer to leave this for a more fitting place—viz.: the comparison of the losses of manufacture, which will be the subject matter of our next paragraph. Before dismissing the subject of commercial masse cuites we must take notice of what the inversion was between the points of first masse cuites and final products. A comparison of the ratios of glucose to sucrose of our commercial masse cuites with those of their corresponding first masse cuites indicates that a certain amount of inversion has taken place during the process of manufacturing the lower grades of sugar.

According to the same method of calculation which we used in estimating the amounts of sugar inverted between other stages of the process, we find that at this point the inversion amounts in terms of the original sucrose in the mill juice to the following proportions:

For Evan Hall	0.31	per cent.
" Belle Alliance	0.24	"
" Souvenir	0.26	"

It is here noticeable that notwithstanding the fact that a greater proportion of thirds was made at Belle Alliance, the inversion between first masse cuite and final products was much less than at Evan Hall, where some thirds were made, and at Souvenir, where none were made. Granting that the temperatures at which the hot-rooms were kept during granulation was the same on the three places, it is to be supposed that Belle Alliance should have inverted more than either of the others from the fact of keeping its second and third masse cuites during a greater length of time at a comparatively high temperature. This we, however, find is not the case in actual practice, which leads us to suppose that the difference is probably due to the use of their low pressure pan. If this surmise

be correct it strengthens our belief that there was an outside cause which produced the greater inversion in the Belle Alliance first products.

Summarizing our inversion data, we see that in terms of the original sucrose in the mill juice the total inversion during the process of manufacture amounted to:

For Evan Hall	2.27	per cent.
" Belle Alliance	3.36	"
" Souvenir	2.93	"

Compared with each other it will be seen that the total loss by inversion of Souvenir sugar-house was 29.07 per cent greater than that of Evan Hall; Belle Alliance's 48.00 per cent greater than Evan Hall's and 14.68 per cent greater than Souvenir's. This shows that at Belle Alliance and Souvenir especially, there is room for improvement on this score, and this improvement can, we believe, be made by a more careful manipulation of the juices. Wherever we could, in the foregoing pages, we have pointed out what were the apparent causes of inversion at each of the stages of the process, and as a general rule to be adhered to in the future on each of the three places, we would suggest that, as much as circumstances will permit, we should refrain from all practices which, according to generally accepted theories, tend to produce an inversion of part of the sucrose. We must, however, be guided by judgment, for under certain conditions it might pay to submit to a small inversion, providing that by this means the quality of our products can be so much improved as to more than compensate us for the loss sustained.

To more thoroughly exemplify our meaning we will say that both on Evan Hall and Belle Alliance, from the beginning of the manufacturing season of 1888 we kept the above general principle in view, and we find it to have operated quite successfully. To the best of our knowledge and belief, in point of quality, the commercial products of these two places were equal to those of 1887, and by reference to the data of that year, we find a decreased inversion during the process of manfacture. By taking the results of 1887 as a basis of comparison, this decrease amounts to 32.44 per cent for Evan Hall and 20.00 per cent for Belle Alliance.

SUGAR ACCOUNTED FOR AND LOSSES OF MANUFACTURE OTHER THAN BY INVERSION.

From the statistics which we have given in the preceding pages we are enabled to make the following table of the distribution of the sucrose originally contained in the mill juice, viz:

SUGAR ACCOUNTED FOR.	E. H.	B. A.	SVN'R.
Total sucrose in the—			
Mill juice extracted	3,819,896	3,048,326	1,593,213
Syrup made	3,664,133	2,914,893	1,394,949

First masse cuite made	3,634,724	2,873,228	1,379,095
" granulated sugar	30,428	.....	.....
" soft white	172,100	178,926	400,894
" yellow clarified	2,342,213	1,741,459	547,989
Second sugar	426,058	451,175	216,325
Third sugar	36,491	102,252	.....
First, second and third sugars	3,007,290	2,473,812	1,165,208
Commercial molasses	555,039	338,728	191,025
" masse cuite	3,562,329	2,812,540	1,357,133
Sucrose to be accounted for or total losses—			
Between mill juice and syrup	155,763	133,433	198,264
" syrup and first masse cuite	29,409	41,665	15,854
" first and commercial masse cuite	72,395	60,688	21,962
Total	257,567	235,786	236,080

Of these quantities of unaccounted for sucrose we find from our foregoing data concerning the inversion between the different stages of the process that the following quantities were inverted:

	E. H.	B. A.	SVN'R.
Between mill juice and syrup	61,500	66,149	33,139
" syrup and first masse cuite	13,370	28,959	9,400
" first and commercial masse cuite	11,842	7,316	4,142
Total	86,712	102,424	46,681

By estimating the weight of the pile of filter-press cake from its cubical contents, we find that Evan Hall made about 540,000 pounds of filter-cake, and Belle Alliance 373,000 pounds. From a few experiments made we find that the above filter-press cake contained about 7.50 per cent of sucrose; this enables us to further divide out our losses. Subtracting our losses by inversion from the total losses between each of the different stages of the process, and making an allowance for the sucrose remaining in the filter-press cake as per the above, our losses other than by inversion are as follows:

	E. H.	B. A.	SVN'R.
In filter-press cake	40,500	27,975	none.
By washing out skim-tanks	53,763	39,309	165,125
" " syrup-tanks	16,039	12,706	6,454
" " cars, blowups, etc	60,553	53,372	17,820
Total	170,855	133,662	189,399

In terms of the sucrose in the mill juice these quantities bear the following percentage relationship:

SUGAR ACCOUNTED FOR.	E. H.	B. A.	SVN'R.
In the mill juice	100.00	100.00	100.00
In the syrups	95.92	95.63	87.56
In the first masse cuite	95.15	94.26	86.56
In the total commercial sugars	78.73	81.15	73.13
" " molasses	14.53	11.13	12.05
" " masse cuite	93.26	92.28	85.18

LOSSES.

By inversion between mill juice and syrup	1.61	2.17	2.08
In filter-press cake	1.06	0.91	none.
By washing out skim-tanks	1.41	1.29	10.36
Total loss in filter-casks and skim-tanks	2.47	2.20	10-37
By inversion between syrup and first masse cuite	0.35	0.95	0.59
By washing out syrup tanks	0.42	0.42	0.41
By inversion between first and com'cial masse cuite	0.31	0.24	0.26
By washing out cars, vacuum pan blowups, etc	1.58	1.74	1.12
Total loss by inversion	2.27	3.36	2.93
Total loss by washing out tanks, etc	4.74	4.36	11,89
Total loss by manufacturing and inversion	6.74	7.72	14.82

By the percentages of sucrose accounted for in the syrup our table shows that the most economical work was done at Evan Hall. Belle Alliance at this point accounts for very little less sugar, the shortage being principally due to the greater inversion already spoken of, and which appears in our table. At Souvenir, however, as evidenced by our table, the case is much worse. In this case the shortage is nearly entirely due to the large quantities of skimmings which were washed out of the sugar-house. Both at Belle Alliance and Evan Hall great care was taken to prevent any unnecessary washing out of skimmings, settlings, etc., except through the regular channels, the filter-presses. By some the advisability of this method was doubted, but when we see that, exclusive of inversion, the loss between mill juice and syrup was greater at Souvenir by 319.43 per cent, as compared with Evan Hall, and 370.91 per cent, compared with Belle Alliance, there remains but little doubt of the advisability of using every precaution against the usual wasteful methods of handling the scums of the average Louisiana sugar-house.

On this question of losses by the washing out of the skim-tanks, with which we include the occasional imperfect filter-cake, it is well to note that owing to the better handling of the filter-presses, and the greater care which was used in order to prevent loss, this loss by washing out is much smaller than it was in 1887. We find that on the recent crop this loss is 81.23 per cent less than it was in 1887 for Evan Hall, and 74.77 per cent for Belle Alliance, which shows a very marked improvement.

For 1887, our records do not show what the loss was between syrup and first masse cuite, because we did not test this last product. Our figures for 1888, however, show that the loss was practically the same on the three places. As to the loss which occurred between the first and commercial masse cuites our table shows that Souvenir has lost less than either of the other two places. A comparison of these factors shows that Belle Alliance's loss exceeds Souvenir's by 55.35 per cent, and Evan Hall's excess to be 41.07 per cent. According to these differ-

ences it would appear that in filling the molasses barrels a greater amount of waste had taken place at Belle Alliance and at Evan Hall, as we have no special reason to believe that the cooperage of these places was any worse than that of Souvenir; nor are we justified in assuming that the New Orleans gauge of the Evan Hall and Belle Alliance molasses was any shorter than that of Souvenir.

(*To be continued.*)

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CULTIVATION OF PEPPER AT 1,400 FEET ALTITUDE IN CEYLON.

BY A PRACTICAL CEYLON PLANTER.

Matale East, the district of my residence since 1879, I always thought to be about the best for the cultivation of pepper, seeing how freely it grew in the villages round about; but I could not make a beginning till 1884, when the management of Crystal Hill estate was handed over to me. Before my time pepper had been planted on the place by the proprietor, Mr. A. G. K. Borron, and by my time many of the vines were in full bearing. These were all under shade tress among the cacao; and encouraged by the progress they had made, it was resolved to plant pepper under all other trees, especially arecanuts, with which we had about thirty acres planted ten x ten feet and six to eight years old. The S. W. monsoon was then just setting in and a start had to be made at once. This gave us no time to consider about raising plants in a nursery; in fact, we attached no importance to such considerations, as cuttings from old vines were supposed to be all that was required, and these could have been got in any quantity from the immediate neighborhood. Accordingly, as was the custom in the country (a practice evidently introduced by some planters) coolies were sent to purchase cuttings. These were usually eighteen inches in length and cost from five to ten rupees per 1000; and anything that came to hand in the shape of a pepper cutting was readily dibbled into the ground. About 20,000 plants were put out in this manner, and the weather being all that could be desired, these were all, of course, expected to grow up satisfactorily. About a month elapsed and we were still being favored with occasional showers; but what was my disappointment to find, after all that trouble and expense, about fifty per cent of my plants completely destroyed—some rotted and some dried—and even out of those that were still keeping fresh only a few growing. A week or so after this the weather had changed to a series of dry hot days, and fancy the magnitude of my horror when I beheld day after day that even those that were growing

succumb to what we thought to be the effect of the rays of the sun. As the only remedy to save even those that were still remaining, resort was at once had to shading the plants with leaves. To a certain extent this proved to be successful. But notwithstanding all that shade and constant looking after, I made out about eighty per cent of my plants to have failed before the next rainy season had set in.

It is not necessary to dwell on the various theories that had been advanced to account for the failures of our first attempt as the facts connected with our second attempt to supply those failures will show what they were.

Long before the N. E. monsoon set in arrangements were made to get cuttings and have them kept in a nursery so as to be in readiness for planting out with the first rains. Nursery beds were prepared where water was easily accessible, and cuttings obtained from the villages as before. But in obtaining these cuttings this time I had to be more cautious, for I found only when it was too late that a good many of the plants of my first planting were of a kind what we call wild pepper which used to grow in the jungles. The best method of detecting these whenever an attempt is made to palm them off as genuine, is to compare the leaves of both species; the leaf of the wild one is somewhat pubescent, while the other is glossy. By this means the best cuttings were collected, but a difficulty arose when they were to be put in the nursery. Which is the best way to place the cuttings in the bed? No one could say exactly, but still the differences of opinions on the subject were many. The inexhaustible *Tropical Agriculturist*, which I consulted first, could not help me at all. My native neighbors could tell me only how they planted a vine long ago, but did not know how to raise a nursery as they never heard of one. At last common sense had to be relied upon, and one of our theories was (1) that, as they grew from every joint, the longer cuttings should be bent into a bow and both ends buried in the ground at least six inches deep; another (2) was to bury the middle of the cutting and have both ends jutting out a few inches above the ground; (3) cuttings which were shorter than twelve inches were put about three inches apart in the ordinary way six inches deep. All the beds were shaded with branches of trees, except one bed which was sown with seeds, and were watered as was found to be necessary. But, alas, what was the result? When the time came for planting them out, hardly one-half of the cuttings were alive! Theory No. 1 was a complete failure, No. 2 partly so, but No. 3 so far a success, at least not so disappointing. On the whole, as the saying is, after many failures comes success. I was not discouraged by the failure of this experiment, for herein I conceived the idea how to raise a

pepper nursery with any description of cuttings successfully. Here I must remark that by whomsoever the system had been introduced, a great blunder had been committed in regard to the manner pepper cuttings are bought and sold now-a-days. As the branch cuttings when grown do not prove to be good climbers, but rather inclined to grow into a bush for some time and then die off, the cuttings from the root, or shoots growing out from the parent vine and creep on the ground, are always preferred for raising plants. These shoots are usually several yards in length with roots hanging down from from almost every joint. The native style of planting was to pull out the whole of one of these shoots and bury it round a tree in two or three coils; they must, therefore count each shoot as a plant. But according to the rule in vogue at present, a shoot will be cut into a dozen lengths and sold as a dozen plants. It does not concern us as to whether it is the practice in India or in the Straits Settlements; we should adhere to the rule which was in force here from time immemorial.

But to return to my cultivation. As might be expected we planted out all the surviving plants and made up the difference for supplying our failures by buying fresh lots of cuttings from the villages, but this time I insisted on getting and planting only the cuttings that had plenty of roots in them, as I found these to grow better than those without roots. The cuttings that came without roots, I cut into pieces of nine inches in length, so as to have three or more joints in each piece, and put them into a nursery over which I had a thatched roof six feet high, so as to prevent the rays of the sun falling on its beds, but which at the same time give it plenty of airy room and plenty of light. I felt that these two conditions were absolutely necessary for raising pepper plants in a nursery, either from seed or cuttings. These plants I expected to leave in the nursery for at least six months before the next planting season. I am now of opinion that to leave them in the nursery for a whole year, six months under shade and six months exposed to the sun by removing the roof, would be so much the better for them, as the sequel will show. The supplying of my first season's failures having been done during the first week of the regular N.E. rains, the plants I put out from the nursery, as well as the rooted cuttings I so carefully selected and planted, had plenty of time to grow. The rains that year continued from October to January, and so far as my observation went, I found not a single failure for four months among any of my second season's planting. The dry season began in February and the heat was intense in March, and although I took the precaution to have all my plants shaded in good time, the drought, at an elevation of 1,400 feet above the mean sea level, was too much for even the growing plants to withstand, and consequently a large per-

centage died out again. It was very strange to observe the different conditions in which the plants that survived the drought had been placed; and when I compare them with the conditions of those that had succumbed were placed, my bewilderment became still greater. If one were to suppose that sufficient shade would keep a pepper plant alive in any dry weather, here then is an instance to prove the contrary, for I could have counted hundreds of them under trees with abundance of foliage which afforded them the best natural shelter, all dead, while in another more open situation hundreds might be seen to be growing satisfactorily. Here again is an open patch where the best plants had been put out, but now hardly one to be seen; while a few yards farther is a clump of shady trees under whose sombre foliage they are growing like common ferns. This strange anomaly, as might be expected, led me to the conclusion that there were different varieties of pepper growing in the island, and that of these some grew under shade and some exposed. If this was the case, surely cuttings can be chosen and planted according to the suitability of each locality. But the theory does not reconcile with the results of my nursery experiments where, under a given condition, all the plants thrive, till they are removed and planted out. If any of these plants had been of the variety that did not grow under shade, there would have been a perceptible number of failures. But such was not the case, and so the failures outside could not be attributed to such a cause. Being then but a beginner as I was, my next impression was that the soil, which had been an abandoned field of coffee, was old and exhausted, and though some old vines growing thereon were growing luxuriantly and bear good crops, they had been planted when the soil was still fertile and new, but now the plants would not grow as the soil had lost its fertility. But I do not believe in this theory with the experience I have gained up to the present day, as I have reason to believe that pepper could be cultivated in any poor soil, provided only, the rules necessary to encourage its propensities be strictly observed; that is to say, we must allow the plant to grow as it will, when it will grow as we want.

Since beginning the cultivation I had two seasons for planting, both of which were taken advantage of as already stated. The survivors of the first season were now twelve months old, while those of the second were six months. The scarcity of rain still continued, and by about the middle of April the drought had done its worst. What with soil, climate and elevation, here was the saddest picture to behold! So much money and labor absorbed, and not a single plant of either the first or the second season to be seen alive! All hopes blasted and gone! Even the older vines that looked so lovely with their rich foliage and promising crop, were now quite bare and

looked as if they were about to go off. This afforded me an opportunity to observe the influence which the trees on which the vines grew exercised over the vines. Those that grew on any deciduous trees, as the Inga Saman, dadap or erabodda, kapok, etc., were the worse for it; while those which grew on juk, arecanut, kekuna and such other trees which were not deciduous, were still holding on. Even these latter would doubtless have passed off like their companions of the vegetable world, but for the timely rains of the month of May, and once more the drooping hearts of the poor Matale planters were cheered! June followed with more rain. and the ravages of the drought were to a considerable extent repaired. And it was then that I found out the advantage of having a plethora of roots in the pepper cutting or plant, before it is planted out and allowed to take care of itself; for wherever this had been the case, I found the plant which was given up for dead during the drought, immediately after the rains, spring up in beautiful suckers, and those that sprang up in this manner were not a few, but thousands. Here then, is one of the secrets of the pepper plant—if cuttings without roots are planted out, they die immediately, those with a little root hold on for some time, and rot in the ground, but those with more root grow during the rains, and though a drought may follow and destroy all there is of the plant above, they keep alive under the surface, and spring up again. The advantage of planting well rooted plants will now be quite obvious; and to get plants of this description, as I have said before, it would be necessary to allow them to remain in the nursery for twelve months, treated in the same way as we did with cinchona under thatched roofs. These hints apply only to plants raised from cuttings. Where plants have been raised from seed (sown when fresh and ripe five or six inches apart) they should be kept in the nursery for at least eighteen months, and then put out. I do not think there is any difference in longevity between plants raised from seed and plants from cuttings, and neither do I believe as to there being any difference in their fecundity or crop-producing powers. In fact, from thousands of old vines now flourishing in the district, I cannot get anyone to point out which one has been grown from a cutting and which from a seed. It is said that seed plants take longer to bear; but I have not yet found an example, and neither an authority for supposing that it is true. I have already mentioned that branch cuttings are not much sought after for raising plants, as they do not grow up the tree as a climber, but rather grow into a bush and soon die off. I have some plants of this description, now four years old, with a few bunches of crop on each. One of these is just beginning to throw out shoots which are all climbing up an arecanut palm! So it would appear that after a time branch

cuttings do grow up a tree. But, from this would again appear that its power of producing foliage and gaining new roots is really very slow, and that this is the cause of its short existence. The slightest drought deprives it of its nourishment, owing to the paucity of its feeding roots. I do not, therefore, think that it is quite safe to try the experiment of growing pepper gooseberry fashion, into small bushes, by plants raised from branch cuttings, as has been suggested by some correspondents in the local newspapers recently. Hitherto it was thought sufficient simply to dibble the ground with a fork and put in a cutting. But since it is of paramount importance to afford the plant every facility for the development of its roots within the shortest space of time, I think the holes should be made large and freed from stones and other roots. For putting twelve months' old nursery plants the holes should be at least nine by twelve inches. When planting out care will have to be taken not to allow the roots to bend upward; it would therefore, be more advisable not to pull out the plant from the nursery with a ball of earth, but rather to thoroughly loosen the bed and then pick up the plants one by one, doing as little injury to the small rootlets as possible, and avoiding all chances of crushing or breaking the tender leaf-bud of the growing shoot.

The preceding remarks, whether or not of practical interest to those who are about to embark in the cultivation of pepper under circumstances similar to those in which I was placed, refer only to experiences gained during a period of two successive planting seasons; and it must be mentioned that were I to enter into the details of going over more ground, as the cultivation was extended during several seasons, it would be simply repeating the same story again. But it would be expected from me to place on record any observations I may have made during my progres for the last five years; but in this, I fear I would only qualify myself very poorly. Two years back, when my oldest plant may be said to have been three years of age, and was only from twelve to eighteen inches from the ground, where it happened to creep in a single shoot over an arecanut or jak tree, or where it was spreading on the ground in several shoots round the trees, it was supposed that a top dressing or pruning would induce it to throw out more shoots and grow more vigorously, and this was accordingly done over a small area. But it may be remarked that the experiment was not a success, for about twelve months after, when I expected to see them greatly improved, they were no better than they were before, It is, therefore, conclusive that the system is unsuitable to this climate. Instead of pruning, I have so found out that it is a greater help to the plant to train it up the tree by tying it with some bark of trees or soft

strings, as soon as the plants begin to grow, and great care should be taken to leave them unmolested till they have thrown out tendrils and taken hold of the tree. But there are great drawbacks to this being achieved. Jak trees bear fruit and the coolies are apt to climb upon them to pick, and thereby trample or otherwise injure the vine by breaking the shoots, which retard its growth materially. Those growing on arecanut trees also share the same fate: it is, however, not the case with vines growing on other jungle trees. I have already stated that pepper can be grown on any poor soil, and will now go a step further and add that it can also be grown in any kind of climate within the tropics. When my oldest plants were four years old (an age at which pepper usually begins to crop) the bulk of them were only from two to three feet from the ground, while the others had grown up from ten to fifteen feet high. At first it was supposed that the latter grew on richer soil than the former; but having found some of them to be growing on comparatively poor soil as well, the secret of their success still remained a mystery. Just about this time there appeared a notice in the local papers advertising pepper plants for sale at Lower Haloya estate, near Peradeniya, the property of Mr. R. J. Farquharson, and it being desirable to try a change of cuttings, as agriculturists always try a change of seed, I visited that place about twenty months ago, and endeavored to obtain some cuttings from some of the best pepper vines that I have seen growing in the Central Province. These I have now in a nursery which, of itself, is a thing of beauty to see. What impressed my mind most at Haloya, was to see the ground shoots of the vines growing on rocks and bearing crop; and then the parent vines, which were twelve months old would beat any of eight years of age in Matale. With an elevation of 2,000 feet, the climate more moist, the pepper seems to have here just what it wants. But when Mr. Farquharson told me that he got his cuttings originally from Negombo, in the Western Province, I had to look more about me to know the secrets of his success. I must, therefore, leave climate and elevation aside and look elsewhere for its cause; and I think I have got it—a secret which is very little thought of in this country, although the greatest importance is attached to it by cultivators in the Straits Settlements and countries about it. For growing pepper the Chinese and Malays always select a piece of land which faces the east and is sheltered from the west. If there was any virtue in this selection, it must be, I suspect, that the morning sun is more essential to the plant than the hot afternoons. The situation of Haloya favors this idea; and when I say that most of the best growing plants on Crystal Hill are also to be found in situations facing the east, it would appear that there is some truth in the theory. On a

recent visit to Cotta, near Colombo, I was greatly interested with a pepper vine, shown to me in his garden, by Mr. John Garth, which was then only eighteen months old, but in height ten feet from the ground, with a fair promise of crop. The climate of Cotta, with an elevation of perhaps 100 feet above the mean sea level is, I think, more moist than it is in Matele, and its proximity to the sea in the west, which is only five miles distant, always brings to it the frequent showers of rain which arise from the sea, but which, as they reach higher regions are dispersed and carried away by different currents of wind. The soil of Cotta is the same as what may be seen in all parts of Colombo—cabook and red clay, and as Mr. Garth's property must have been cleared and planted with cocoanuts more than fifteen years ago, I should think the best of its good qualities must by this time have been exhausted, and I cannot, therefore, admit that any special richness of the soil, combined with its more favorable rainfall, to be the cause of the wonderful growth of the vine I had seen, with hardly any attention paid to it, than the full exposure of the field where it grew to the morning sun, and its protection from the heat of the rest of the day. Now compare these facts with what has been said of pepper grown successfully at one time in Batticaloa, in the Eastern Province, and the conclusion will be irresistible that it was chiefly due to its exposure to the east and shelter from the west. By advancing this theory of an "eastern situation," I do not mean to say that pepper would not grow in any other aspect of land, for I have seen vines growing without any trouble at all, in diverse positions, in native villages, as well as in cultivated estates. But even then these are only few and far between, and should be considered as exceptions. But then these exceptions will not fail to strike even a casual observer, as to there being a certain tendency in the smallest plant, as well as in the largest vine, to incline all its growing powers to a point from whence it gets the most light, and a further glance will show that this light, which exercises such a great influence over it, is not of the afternoon, but of the morning. The best specimen of a vine might be seen to be growing over a half-decayed jak tree, which is fully exposed to the sun blazing from the west; but if one would only examine as to which was the side it had originally struck root, creeped along its support and covered itself with the richest foliage, it would invariably be seen that all this was done from the first of the four cardinal points. Now having said this much to the point under discussion, I arrive at the conclusion that where the plant is not afforded natural shelter, it would be always of some advantage to provide artificial shade from the side it gets the afternoon sun. This could always be obtained by putting out the plant always to the eastern side of the tree on which

it is intended to grow, but where it could not be had other remedies will have to be adopted.

Unlike some other products of agriculture, I think we must pay more attention to *change of seed* in pepper cultivation than to anything else. This should not be understood as if I am recommending the adoption of any distinct variety of pepper; in fact, I do not believe that even where one could be distinguished from the other, any one variety would grow and bear better than another. If, however, any of my brother planters prefer the "Malabar variety," bought at such exorbitant prices as those recently advertised in the local newspapers, over what could be obtained in the country, they would do well to first see what has been the result of similar experiments with other products, and satisfied that the money thus given away would be returned by larger crops than the native indigenous variety is capable of producing. In my humble opinion any variety would grow in this country only if it could be made to grow, and be it exotic or indigenous, under careful cultivation it would bear crops as good as those of any other parts of the world. It should also be carefully noted that cuttings, plants or seeds for planting should always be procured from a district whose elevation is either higher or lower than that of the district in which it is intended to be planter. There is also another point which should not be lost sight of. History tells us that pepper was an item of fiscal revenue of the island more than four hundred yeas ago, and if we only consider the length of time the indigenous variety had been growing, multiplying its species up to this day throughout the island, the fact must be patent to every one, that by this time it must have greatly degenerated, and that it does not produce so much crop now as it did before. This is supposed to be also the case with paddy and other grains, which in former times turned out from the same extent of land, from sixty to seventy fold more crop than they do at the present day. With regard to the latter product, we know that several attempts had been made to introduce seed paddy from foreign countries; but the results obtained when compared with those of the native sort, there was hardly any encouraging difference to be found. I think it was the same with coffee. Now all these facts tend to show that it is very unlikely that any foreign variety of pepper would ever supersede the native product; but at the same time I am inclined to believe in the theory that the introduction of a more robust stranger into the existing native family, would improve the blood and give new vigor to the latter; and on that consideration only, would I recommend any of the so-called new varieties of pepper, but not as producers of larger crops, in which I do not believe. At the Agri-Horticultural Show in Kegalla last year, I saw some pepper-corns of the Malabar

variety exhibited, each grain about the size of a seed of the *Jalapa Merabilles* (four o'clock flower.) To the taste it was not so strong as our puny little native grain. The Indian variety of the Long Pepper (Tippily) also produce beans three or four times larger than those produced by our native creeper; but for medicinal purposes the latter is more sought after than the former.

In conclusion, I must apologize for the disconnected style in which this essay is presented to the readers of "All About Pepper." A planter who is occupied with his work from the gray morn to the dewy eve can hardly be expected to give much time to writing—may therefore some indulgence be allowed him not as a privilege but as his right!—A. VAN STARREX, in *Tropical Agriculturist.*

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THE DUKE OF ARGYLL ON THE SUGAR CONVENTION BILL.

(*From The Sugar Cane.*)

The following letter from the Duke of Argyll on the Sugar Bill is taken from *The Times* of June 5th. It will be seen that the Duke is not in agreement either with Lord Bramwell or Sir Thomas H. Farrer on this question:

"Sir,—The Sugar Bounties Convention Bill is very far from being a measure of first-rate political importance; but the arguments used on both sides concerning it range over a very wide field indeed, and they do involve principles of the highest interest. They fall under two very different categories—one set of arguments resting on what are called the doctrines of free trade, and another set resting on the practical difficulties or risks arising out of our treaty relations with other Governments. I do not now address you for the purpose of expressing any decided opinion on this last class of arguments; they have been urged with conspicuous ability by Sir Thomas Farrer, as well as by many others. The inconveniences which may possibly arise from binding ourselves in any way whatever respecting our own fiscal policy by special engagements contracted with foreign Governments are so obvious that, in the abstract, they afford a strong ground for warning and a safe ground for objection. They applied to and were used against the Cobden commercial treaty with France; and I have a vivid recollection of the scorn with which old and staunch free traders treated the plea which some of us used at that time, that the great apostle of free trade was himself the negotiator of that treaty. In particular I remember the strong objections urged against it by the late Lord Taunton—one of those few men whose incorruptible integrity of mind made him instinct-

ively revolt against departures from what he accepted as a principle in deference to personal authority—or, still more, in deference to party convenience. There is no Vatican in politics. There is no authority in the interpretation of natural laws and of accepted truths; but the question may always be raised in such cases whether the assumed law has been accurately defined and properly understood. The antecedent objections which lie against all 'entangling engagements' with foreign States have no exclusive reference to fiscal policy. These objections apply equally to such engagements respecting territory, respecting armaments, respecting the protection of special religions, and respecting many other subjects which have often been made matters of international stipulation. Self-imposed restrictions or obligations of this kind touching fiscal policy may or may not be objectionable, according to the circumstances of each case, without the objections, real or alleged, being in the least degree affected by the true doctrine of free trade. That doctrine does not assert that all commodities shall be 'free' from duties; neither does it assert that no such duties can ever be regulated by mutual agreements. What it does assert is that duties on commodities should never be imposed for the purposes of 'protection.' What it does deny is that Governments should impose duties or expend taxes for the purpose of raising or lowering the value of particular commodities, or the produce of particular industries. In short, it asserts the general principle that Governments should never attempt to regulate the price of anything, and that all attempts to do so are mischievous delusions. If international agreements and stipulations, therefore, are aimed at the practical application of this general doctrine all over the world, they may be open to objections coming from another quarter, but they are certainly not under any ban from the principles of free trade. On the contrary, they are conceived in the spirit and in the interest of those principles. This was the instinct and the idea which inspired Cobden when he negotiated the French treaty. It was open to many objections. It bound our hands where it might be convenient they should be free. It put us in the position of helping a personal ruler to circumvent his own people and his own Parliament. It was unpleasant in several other ways; but such fiscal changes as it provided for were all in the direction of free trade. Cobden did not interpret that doctrine in a provincial spirit. He knew that it embraced the world. Nay, more, he knew that its blessings would never be secured until the world was actually embraced within its practical applications. The last speech I ever heard from John Bright—addressed to an American audience in London on a late celebration of the Fourth of July—was a speech full of the same spirit. It was in him, as in Cobden, truly cosmo-

politan. Everywhere, and in all lands, he wished and longed to see the abolition of all duties and fiscal regulations aimed at the restraint or at the inflation of trade by artificial interferences with price. Devotion to one idea may or may not be a safe thing in dealing with practical affairs; but at least we can recognize it and honor it when we see it. But not less securely ought we to recognize its counterfeits when we see them. The misconception, the misstatement, and the misapplication of a great principle is not only an obnoxious but a mischievous thing.

"Such, in my opinion, are those denunciations of the Sugar Convention which pretend to condemn it as contravening the doctrines of free trade. I can understand the line taken by Lord Bramwell. It has been explained and defended with characteristic force and clearness. His language has been something to this effect: 'It is true that bounties are bad policy; but the badness affects only those who give them. The French are great fools for giving bounties to their growers of beet. It is a policy which all free trade doctrines absolutely condemn. But what is that to us? They are given in France, not in England. The French people get all the loss, and we get all the benefit. Let us be free to benefit by these fallacious doctrines of protection. Cheapness is obtained by us—never mind by what means; that is not our business. Let us mind ourselves. Let us accept what is in itself a boon, and think nothing of the damage it may inflict on other people.' This is plain speaking; but the doctrine taught is not glorious. In so far as it represents anything of an idea at all, that idea seems to be that mere cheapness, wholly irrespective of its causes, is itself always a blessing. This is not an uncommon idea. With many people it represents all they think and all they care about in what they call free trade. It is an idea which is demonstrably erroneous. We are just emerging from a period of prolonged cheapness in almost everything. Yet all the world has been calling it a period of 'depression'—a period of wide-spread loss and suffering. The return of comparative dearness is universally hailed as the dawn of a returning day. This is a fact, whatever may be its explanation. And perhaps the only possible explanation might cast some light on certain fashionable tenets of political economy. But, whatever it be, the doctrines of free trade are not to be made responsible for so gross a fallacy. If it be true that some home industries are really resting on a cheapness of sugar artificially created by bounties, no genuine freetrader would encourage them to trust in that cheapness. He would tell them that they were building their house upon the sand; he would warn them that such cheapness must be essentially precarious—not only held at the mercy of foreign Governments, but the mercy of a continued

blindness on their part to their own interests, which some day is quite sure to be removed.

"But then comes (in a recent speech) Sir Thomas Farrer, mounted on a very high horse indeed. He leaves the humbler argument of practical difficulties, on which truth and soberness give him a good deal to say, and on which, perhaps, political antagonism suggests to him a good deal more. Not content with such objections, he ascends the heights of dogma, wields the language of authoritative orthodoxy, praises those who are 'thoroughly sound on the vital question of free trade,' and talks about 'real believers' in free trade principles, all of whom are warned against 'covert and insidious attacks' against the sacred doctrine. Under the threat of such formidable anathemas we look for samples that may furnish an explanation. Three such samples are given. They are: First, the Revenue Act; second, the Merchandise Marks Act; and third, the Cattle Plague Act. I am not sure of what is meant by the first of these; but the two remaining Acts give a very clear idea of the conception which is to be enforced as of Divine right in the science of economics. Cheapness of commodities, however obtained, however temporary, however dangerous, however precarious—this is the ideal we are to worship. Against this high ideal an Act to keep out disease is a deadly sin. An Act against fraudulent marks on goods is another unpardonable iniquity. I have heard Macaulay say: 'No man is in favor of free trade in cab fares.' Of this I am not quite sure. But the man who favors the free import of disease and the free passage of forgeries and of frauds must be a fanatic indeed. I agree with Sir Thomas Farrer that the real doctrines of free trade are not wholly safe. Almost all nations, except ourselves, disbelieve in them. The immediate and visible advantage of large bodies of men in all nations are in conflict with them. The limitations on the truth of them are near and obvious. The virtue of them lies in wide generalizations which it is not always easy to grasp, to explain, to enforce. Powerful classes are under continual temptation to revolt against them. The impression, widely prevalent, that the doctrines of protection have or ever had any special connection with the agricultural interest is a delusion born of a contest still recent, and comes as the echo of voices which are not yet forgotten; but it is a delusion none the less. Protection began among the commercial classes, and was enforced by them and for them with passionate conviction. There is hardly one single great industry in our country which has not been hatched and fledged in the nurseries of protection. The same thing is true of what are called the working classes. The genius of Watt would have been stifled if the 'hammermen' of Glasgow had had their way. Our cities and our boroughs have risen, and many of

them have thriven, on early systems of privilege and monopoly. In fact it may be said with truth that no great interest or class has ever seen the virtues of free trade until they had become quite obviously conducive to its own advantage. And now, even in our own country, wherever this advantage is not apparent, the sails of free trade may be seen flapping in the wind. Protection in its grossest form—the open attempt to regulate prices by the State—with all its train of logical fallacies and of mischievous effects, is the favorite resource of men who set up as the great authorities on the doctrines of free trade pure and undefiled. With such an example set before every interest and every class, protectionism will be in danger of rising again on every side, wherever some immediate profit is to be secured, either political or economic, and wherever accompanying evils, however certain and however great, are just a little more remote. Moreover this danger will be intensified unless the real doctrines of free trade are held and taught with circumspection and with care. If mere cheapness, whatever be its cause, and whatever be its incidents, is held up as the one sole aim and object of economic action—then adverse intellectual convictions will be as powerful against free trade as adverse special interests. Those doctrines will never stand discussion which denounce as "insidious schemes" against free trade measures taken to defend our herds from murrain and our merchants or our people from forgery and fraud.

Your obedient servant, ARGYLL.

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ON SACCHARINE MATTER IN MORTAR, AND ON BUILDING IN FROST.

BY SAMUEL CROMPTON.

(*From The Sugar Cane.*)

In my communication printed on the 19th, I spoke of some building just done in sharp frost. The courses of brickwork set in the wall with sugared mortar are perfectly sound, and are untouched by the frost and by the thaw that followed it; whilst the work below it, and the work done on the same day that the sugared work was done, but done with unsugared mortar, has suffered severely. So that it is proved, that by using sugar in the mortar, building can be safely done in frost —and in sharp frost too. I have said already that the village sand is, in my opinion, not a good sand for use in frost.

If powdered flint, or if powdered limestone, or if a sand white and glistening and sharp had been used, I have no doubt that an equally good result would have been got with half the quantity of sugar, and probably with much less. But if the same amount of sugar had to be used that was used in this

case, would it be an expense worth regarding when we reckon against it the great misery and privation which occur in severe and long continued frosts, among all the people employed in the building trades? To this is to be added the great inconvenience felt by those who wish their buildings to be completed, and who are baffled by frost.

So far I have spoken only of the possibility of building in frost; but another great advantage of using saccharated mortar is that in all building done, say, from the end of October till May, all anxiety as to harm that may come from frost at any time is entirely removed, if certain conditions of a simple kind be observed. When the lady invited her friends to come and taste some of the first tea that had come into England, she did not proceed scientifically, for she threw away the liquor, that is, the tea, and treated her friends to the boiled leaves. It seems to me that most of the mortar made at the present time is as unwisely made as this lady cooked her tea. If the same insane plan of making it that is so largely adopted, be employed in frost, there will not be success except by using a larger amount of sugar. It is perfectly plain to me that one great cause of goodness of Roman mortar was that they slaked the lime in pits aud allowed it to remain there for two or three years before they used it. Here is the proof. I quote from Dr. Philemon Holland's translation of Pliny. Pliny was born in the year A.D. 23. He published his book in the year 77, that is, more than 1800 years ago. He says: "And, verily, the greatest reason that cities fall to decay and be so ruinat is this, that mortar the elder it is, the better it is found for building. Moreover, in the old laws which provide for the perpetuitie of houses in ancient time, we find expressly set down that the undertaker to build at a certain price shall use no mortar under three years of age; and this was the reason that in those daies a man should not see any roughcast or parget to rise or chawme so ill favoredly as now they do."

Philemon Holland made his translation in 1634; so that after knowing this for upwards of 250 years, we Englishmen, full of admiration of the wonderful mortar of the Romans have deluded ourselves into the belief that the Romans used hot lime. Pliny, like myself, was not a practical man, therefore he is, I think, to be understood to say that the lime was slaked and allowed to stand for three years to get it into a perfect state, but that the sand was not added except as and when that slaked lime was needed for building with. Herein is one of the great and one of the chief secrets of that old Roman mortar. In a field at Lincoln, not far from the Cathedral, I saw last year a mass of Roman masonry, mostly concrete, as hard to this day as possible; and likely to remain so for a thousand or two thousand years to come. I examined the

walls of the castle built by William the Conqueror, and here I found the mortar inferior. It will be said that his mortar had not had time to grow hard, but such an opinion is utterly groundless, as I hope to be able to convince the building world. The Conqueror's mortar had fallen out from the joints, but had evidently been pointed within the last few years. This plastering or pointing was so rotten that the point of a knife entered it as easily as it would have entered into, not a cheese, but the frailest confectionery. I have no doubt that whoever did this pointing, intended to do it well, and that either in the weather when he did it, or with our insane notions about hot lime, he was misled.

What a chorus of disapprobation there will be when what I have written is read! One will say, "Who does not know that lime, the fresher it is the better?" I answer that lime, the fresher it is, and the earlier it is dealt with after it leaves the kiln the better it is.

Another will say, "But if it be fresh, it will be hot when it is slaked; and the fresher, the hotter." I believe so too. I am sure it will.

Another will say, "I have been amongst mortar all my life; I have used thousands upon thousands of tons of it, and surely I ought to know something about mortar. He will never persuade me that mortar, that has been left in a pit slaked for three years can have any virtue left in it. No, no; this opinion of his is simply nonsense, sublimated nonsense. Besides, is the nation and all building to be kept at a standstil for three years, till we wait for the mortar to be Romanized? Tut, tut! mere moonshine."

My answer is that I made no such proposal, but that if engineers and architects also, had kept on the old lines, all the work that they did would have been perfect, so far as perfect work depends on lime only. But knowing that lime that had been slaked for three years could nowhere be found, I said that gound lime should be used, and I say that the more finely ground that lime is, and the better it will be. If newly-burnt lime be used at a building where a mortar mill is on the ground, that lime ought to be ground with water and not dry; and the longer the grinding goes on, the better and stronger the mortar will be that is made with it. But, observe carefully, that the sand should never be ground with it, but be added afterwards, when the mortar is made for each day's use; and that it will be found that the shorter the time that passes between the mixing and the using of the said lime—that is to say, of the mortar—the better it will be and will work; and with some sugar or treacle added to it, if the right sand, or what I propose as a substitute for sand, be added, it will, for plain mortar, be equal to every ordinary or common purpose.

The objector will say, "This man has sugar on the brain," and he will drop the *Engineer* upon his knee and say to his wife, "My dear, what do you say to this; here is a man wanting to persuade us that we ought to put sugar into our mortar." "Gracious!" she will say; "sugar into mortar? I never heard of anything so ridiculous." And he will answer, "Neither did I," and will add, "you had better lay in a few hogsheads of it before the price goes up." He will take up his *Engineer*, and go on reading, saying at the same time to himself, "I have begun this rubbish, and will read it through." If I were there I would say, "Don't be alarmed, madam, I will tell you a little story. Many years ago, there was a man they called a quack. His name was Solomon, who sold what he called 'Balm of Gilead.' Solomon was really a doctor of medicine, and had been educated at one of our universities, An old fellow-student, a physician, met Solomon in Cheapside, and drew him into a doorway and begged him to give up advertising and selling his Balm of Gilead. Solomon said, 'Look at all these people who are passing this door; how many of them, think you, are wise men?' I forget whether the physician said, 'Perhaps one in a hundred,' or 'one in a thousand,' the point of the story is this: that Solomon replied, 'Well, then, you take the wise one, and leave the others for me.' I am on the lookout for the wise man. It will be difficult to find him; so you may dismiss any fear that the price of sugar can rise by anything I say. Your husband, madam, has hot lime on the brain, as I have sugar. Once, I too, believed in hot lime; but now, if I possessed a limestone mountain or a chalk one, with coal at hand, and a valley of my own, I would make brick-pits and would shoot the hot lime into them and pour water upon it till it would take up no more, and till the water stood above it, upon which water I would pour either oil or tar, and would take care that the lime never got uncovered with a layer of water. If I wished to hasten the process, I would first grind the hot lime and then proceed as above, directing that a man should pass down into the mass an iron rod at intervals of a few inches and every few days, so that the water would penetrate thoroughly. Not sooner than three years would the former be fit for use, but the latter would be so in six months. Neither planting nor mining would pay so well as this. By my will and testament, madam, I would leave all to my widow. It would be a mine of wealth to her and her heirs. The longer it was kept the better it would be, if the covering of water and f oil or tar were kept upon it. The architects would fight for it. In their specifications they would say, 'Dash's Crompton lime, five years or ten years, etc.' The lady would quietly say, 'Well, your will would be a warm-hearted one, and your lime would be effectually cooled; but how about floods?' Oh! those

I would guard against in this way: I would get one opinion from a kid-gloved engineer and another from one who does not wear gloves. I would take the mean between the areas they reckoned sufficient for water contingency, and that number I would multiply by fourteen. The theological golden number is seven; but my mortar golden number is fourteen. Then I think I should be safe. A valley a few miles long of such a series of pits would be a mine of wealth indeed. 'But,' she will say, 'you forget that we are antiquity, and not the men of 2,000 years ago. You forget that my husband is a depository of the knowledge and experience of all past ages and must know that hot lime is the strongest and best.' Madam, your remark is a most sagacious one, and I can see plainly that you have solved many a difficulty in your husband's career. But the ancients made better ink than ours. I have seen documents written hundreds of years ago, where the ink remains perfect, and is as black as a raven. They are few, it is true. But in my examination of documents regarding inks, a deed written between thirty and forty years ago was shown to me, where the ink had almost perfectly faded. May it not be that we are wrong in our mortars? May not even the fancy mortars of this day begin to show shortly signs of decay? They do show it daily; and I believe it will come to pass that this period of building in England is not a creditable one—nay, rather a bad one; for where strength has been got it has been obtained at a needless and extravagant cost; and as Mr. Burrell says, or what he says amounts to, is that we are at sixes and sevens, and the prey of doubtful doctrines. I feel sure, madam, that if a lady had such an inheritance of a valley of several miles long of such lime, Mr. Beagle, her steward, would tell her that they could not supply it fast enough, and that as the lime came out of the vats it cut like brown soap, and that not a particle of grit could be seen or felt."

Dreams are things that we cannot order or anticipate. But we may imagine that madam dreamt that she saw her husband filling up the large artificial lake in their grounds, by a staff of a hundred men, with hot lime; and that she told her husband her dream, who said, on hearing it, "And what did you do, my dear? If I had dreamt that I was doing it, I should have looked over my shoulder from time to time to see that you were not watching me, or expected to see you come with your hair down, in your dressing-gown and without stockings; and then what a scene!" "No, my dear," she would say, "you are quite mistaken; I should have taken it quite calmly and composedly."

It seemed to me to be necessary, in preparation for what is to follow, to state my case as I have done. In my next communication I will state the scientific grounds on which my

opinion rests. I must warn practical jokers who use the sugared lime solution which I allowed to Mr. Faija for his mouth, that it would probably be dangerous to swallow much of it, or any but a very small quantity of it. In conclusion, I will ask all engineering and architectural pupils another question: Stir into a quart of water two or three ounces of quicklime. When the liquor is clear, pour it into two tumblers. Blow through a tube into one of them, and do so once or twice a day. Observe both. Taste both from time to time. What is the bearing on mortar of what you have seen? If education in England were what it ought to be, such questions would be childish. But I know what our education is; indeed I know it too well.—*Engineering.*

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CAN SUGARCANE BE IMPROVED BY SELECTION?

The importance of selecting the finest types of the various races of animals for breeding, and of selecting seed from the finest plants for planting, was recognized by ancient people, and is practiced by modern people. Celsus said: "We must select the best ears of grain for seed and keep it separately." Virgil spoke of yearly selecting the largest seeds. An ancient Chinese imperial edict requires the selection of the finest seeds. The rule that "like produces like" seems to be admitted by all except sugarcane growers. The rule that superior plants of any order produce superior plants, and that inferior plants of the same race produce inferior plants, seems to be admitted by all except cane growers. The law of inheritance seems to be admitted by all except sugarcane growers. It is an acknowledged rule that cultivated plants have improved mainly in those parts of the plant for which they are cultivated, and it is admitted that this is because plants have been selected for propagation mainly with reference to their superiority in those parts. For instance, the tubers of the potato have been improved, berries and fruits have been improved, the melon has been modified more than the melon vine or plant, cabbages have been modified chiefly in foliage and stems, flowers have greater beauty and better form, the sugar beet has increased its sugar, and all these numberless changes have been brought about mainly by selection of seed from the plant which had the most desirable qualities. The sugarcane stands pre-eminently alone in that it is considered useless to attempt to improve it by selection.

A veteran plaut grower said; "Any plant, a weed, an oak even, may be improved by selection if it is worth while to do so," But sugar planters, while they plow deeply, and cultivate thoroughly, and fertilize lavishly, and while they use every effort to extract the sugar which is in their canes, make no

effort to improve the plant itself by selection, by the method which has so greatly improved other plants. The cause of this neglect of the cardinal principle of plant and stock breeding, is found in the general belief that this principle does not apply to sugarcane. Dr. Morris, formerly director of the Jamaica Botanic Garden, and now assistant director of the royal gardens at Kew, says: "If it were possible to improve the sugarcane by experimental processes like those which have improved the sugar beet this would be one of the most effective means of benefiting the industry."

In the *Argosy*, Demerara, it is said: "With natural generation there is variation, and in cultivated plants, by selection of the superior plants and the suppression of the inferior plants, improvement is made; but with the sugarcane, bunana, plaintain and breadfruit, which propagate by buds instead of seeds, neither progression nor retrogression is possible, for the plants vary only in relation to the conditions in which they are grown."

There are two methods of propagation—one is from seed. In this case there is true reproduction, and new individuals are formed. These new individuals vary; some are superior and some are inferior to the parent plant, and these new plants have a known tendency to transmit their superior or inferior qualities to their descendants.

The other method of propagation is by buds. In this case it is said that no new individual is formed and no new life is commenced. The development of a bud, it is said, gives us only a continuation of the individual plant which produced the bud; not a better or worse plant, but a part of the same plant. Consequently it is said improvement of cane by selection is impossible, for the condition of propagating cane by buds precludes our making any inherent improvement. Mr. Nevelle Lubbock remarks, in reference to such statements, that it is first assumed that selection is ineffective in producing variety when propagation is made by buds, and then it is claimed to have been proven to be ineffective. It is not proven that sugarcanes do not vary in quality when grown under similar conditions, nor is it proven that buds have no tendency to transmit their superior or inferior qualities. Darwin says: "It appears to be a highly important physiological law that the elements which go to the production of a new plant are not necessarily formed by the seeds alone. They are present in the cellular tissue in such state that they can unite directly and give rise to a new bud or germ." The bud then may be the germ of a new individual as well as the seed.

It is said that the buds in branches, stems or roots are liable to variation, just as seeds are liable to variation from the original plant. It is said that all the plants which have varied

by buds have also varied by seed, and that the plants which have varied by buds belong to so many orders that we may infer that almost all plants are liable to bud variation. It is also said that the varieties produced by bud variation and those produced by seed variation resemble each other so closely that they cannot be distinguished. It seems from these statements that there are variations in buds as well as in seeds, and the law of inheritance seems to be the same to variations produced from buds and from seeds.

In fact, an English horticulturist has greatly improved some plants by simply selecting buds for three or four seasons. This would seem to prove that slight variations in plants may be inherited through bud propagation.

There are considerable differences between sugarcanes grown under very similar conditions; no two canes are precisely similar; some are larger, some are smaller, some are richer and some are poorer in quality of juice. Dr. C. A. Crampton says: "Individual canes vary so greatly that it is exceedingly difficult to select a few canes which are an average sample." Prof. Harrison, of Barbados, found it impossible to compare varieties of sugarcane by an analysis or single canes of each variety, for the canes of each variety differed from each other in quality.

It is from just such differences in the qualities of sugar beets grown under similar conditions that the remarkable improvement in sugar beets has been made. It is known that new varieties of sugarcane have been produced by bud variation, and that these remarkable variations have been strictly permanent or inheritable. It is an error to suppose that the lesser variations in the characters and in the qualities of the canes and their buds also have a tendency to become fixed and permanent.

If it is not an error to suppose that "like produces like" among sugarcanes, then a strict selection of the best canes for planting would result in improved qualities of cane.

It would seem worth while to attempt to settle this question, for it may have an important bearing on the success of the industry. The ready prepared juice from a single joint from each of a thousand canes can be polarized in a day by one person. The canes produced by the remaining buds of thes canes might give some indication whether the law of inheritance includes or excepts sugarcane.

To show what may done by selection, the fact may be quoted that a single ear of wheat was selected as being the best in an entire field. From the plants produced by these seeds the best ear was again selected, and eventually a famous variety of wheat was produced, which is now grown in many countries.

To show what may be done by selection in sugar growing,

the fact may be quoted that ten years ago the average yield of sugar from German beets was 9.21 per cent. It then required 10.86 tons of beets to make a ton of sugar. In 1883-84 it had risen to 10.54 per cent, and only 9.49 tons of beets were required to make a ton of sugar. Last season the yield was 13.08 per cent, and only 7.65 tons of beets were required for a ton of sugar. This does not include the sugar made from the molasses by new processes and which brings up the total yield to 13.79 per cent, so that but 7.25 tons of beets were required for a ton of sugar. And it is claimed that still better varieties of the beet have already been created.

STERLING SYRUP WORKS.

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ORCHILLA GATHERING IN LOWER CALIFORNIA—IMMENSE PROFITS IN THE BUSINESS.

It was somewhere about the year 1871, that what was known as the California Colonization Company—of which General B. F. Butler was one of the leading spirits, in conjunction with several other prominent men of the East—took formal possession of 175 leagues of this peninsula, immediately adjoining Magdelena Bay. For this princely territory they paid to the Mexican Government $175,000 in solid cash.

A good many families came, with their goods and chattels, and for a time all went well with the "California Company." But when the French intervention distracted poor Mexico, the Government had more than it could do to protect its own, and Mr. Butler's colonists were compelled to flee for their lives, a number of them being killed.

For years there after nothing was heard from this company, and no further attempts were made at colonization. There appear now to be several claimants to a portion of this same territory, whose boundaries were never very clearly marked. The "International Company," of the northern half of the peninsula, included some of it within their jurisdiction, and have recently been warned by Butler *et al.* not to sell, settle or otherwise tamper with a foot of it, at their peril; a Mexican family assert that they own the whole thing, and show deeds and titles to prove it; while the great orchilla exporters, Messrs. Flores, Hale & Co., are in actual possession and mean to keep it. As possession is "nine points in law," and as the latter claimants have abundant means with which to support their pretensions, and the ear of the Government, through the Mexican half of the firm, it is safe to conclude that they will hold the fort for some time to come.

FLORES, HALE & CO.

Own (or claim) exactly 4,000,000 acres, extending 400 miles

along the Pacific coast of this peninsula, from the twenty-eighth parallel away down to Cape St. Lucas, with an average breadth of eighteen miles. The *quid nuncs* say that Mr. Flores is a mythical creature, like Mr. Harris, to whom Sairy Gamp so often alluded to add weight to her opinions; but he is popularly supposed to spend his time at the Mexican capital looking after the company's interests with the Government. J. B. Hale is an Irishman, now a millionaire twenty times over—a mild-eyed, thick-set and very gallant gentleman, just turned to the shady side of middle age, and of so retiring a disposition that newspaper items have to be fairly wrung out of him by main force. He has an elegant home and pleasant family in San Francisco, and has been in business on this peninsula for more than a quarter of a century—first in silver mining at San Antonio, and for the last fifteen years busily engaged gathering orchilla, and his millions, in the vicinity of Magdalena Bay.

The famous dye-stuff (pronounced orcheel-ya) was first discovered on this peninsula by a sailor from Nantucket, Mass., and is found nowhere else in North America. It is a parasite—a kind of air plant, second cousin to the orchid family—which here attaches itself to shrubs and trees up to a height of twelve feet, in such surprising profusion that the more is gathered the more seems to grow in its place. Doubtless it belongs to that genus of lichens known to commerce as the "archil plant," "white Swedish moss," "dyers' weed," "cudbear lichen," etc., which are collected from rocks near the sea in various parts of the world. That found in the Levant and on the Canary and Cape Verd Islands—whose botanical name is *Rocella tinctoria* or *fuciformis*—is supposed to be the very best for dyeing purposes, while a somewhat inferior variety (*Lecanora tartarea*) is found in Sweden and the south coast of England, and grows so abundantly along the Mediterranean and the coasts of Africa and Madagascar, as to form a thick turf on rocks near the sea. The Castilian name for it is *orciglia;* the French, *orseille.* When first picked it presents a soft, greenish-brown, mossy appearance. It is of a substance almost cartilaginous, branching out like tiny sponges covered with little black warts that are flat and powdery. The branches are commonly less than two inches long, and the size of an ordinary pin; but these of Lower California, as also some found on the west coast of South America, near Lima—sometimes grow six or eight inches long and as large as a goose-quill.

Orchilla is said to be the most valuable article known to dyers for adding luster to all fabrics, and the silks cannot be properly dyed without it, though when used by itself, uncombined with other dye, the color is not permanent. It is marketed chiefly in Europe, none of it being used on this continent in a raw state; but after having been sent to England and

France and manufactured into dye, considerable quantities of it are re-shipped to the silk manufactories of America. It is easy to see how Mr. Hale has made an enormous fortune out of this nasty-looking weed in a few years' time. He keeps more than five hundred men busily picking. They pack the moss into bales weighing 200 pounds each and send it by shiploads to England, where it sells for ten cents per pound, the average yearly profit amounting to more than $250,000.

The coloring substance is obtained from the moss by putrifaction and fermentation. The lichens are cleaned, ground to powder, placed in tanks, and covered with some ammoniacal liquid. After a time a violet-colored matter is generated, which gradually sinks to the bottom of the vat in the condition of moist paste. The liquid is then drawn off, and the paste mixed with chalk to give it consistence enough to handle. The moss itself is soluble in water or alcohol, to which it imparts a lovely hue of rosy violet. It is much used in dyeing lilac and lavender shades, and though it gives to silken fabric the richest and most delicate shades that can possibly be produced, it fades so quickly on exposure to the sun that the cloth is first colored lilac by some other process, and then passed through the archil or *orchilla* dye. It is seldom used in coloring cotton, but is in great demand, combined with indigo, for woolen goods.

The firm of Flores, Hale & Co., who enjoy the monopoly of every bit of this valuable material that exists on our continent, have already expended $1,500,000 in improvements on their territory, exclusive of the half million dollars or more used in buying up over one hundred land titles. All this

MAGDALENA BAY REGION

Is one of exceptional interest. In speaking of its possible products, Mr. Hale assured me that cotton, equaling the best in the world, has been raised on his tract, and may be produced five years in succession from one planting. Sugarcane also, has been successfully raised. But I have no wish to arouse anybody's desires or expectations—for not one foot of land can be bought at any price where *orchilla* grows.

Magdalena Bay is one of the safest and most spacious harbors on the globe, being fifteen miles long by twelve wide, its northwestern limits connecting with a series of lagoons that extend more than sixty miles, and its southern end connected by a vavigable channel with another bay—the Almejas—which, in its turn, is twelve miles long by eight miles wide. The salt lagoons are all connected with one another, separated from the ocean by a narrow strip of sand, and are used by all small-draught vessels in preference to the open sea. There are a number of entrances to this chain of lakes, and their shores are covered with a thick growth of stunted mangrove trees. There are barren islands scattered along, on some of which are springs, slightly sulphurous. The biggest snails I ever saw

abound hereabouts, their dead shells covering the ground like a thick layer of snow. On all the wave washed rocks are beautiful abalones (the edible mollusk); flocks of gray gulls cover the shell beaches; hawks build their high nests in the mangrove bushes, white pelicans and cormorants fill the air, enormous turtles bask in the sun, and cow-fish and porpoises tumble over each other in awkward play.

All this region was once a famous resort for whalemen, whose vessels have ascended the lagoon fully fifty miles above the bay, and the shores are strewn with bleaching bones, the relics of a former thriving business. Capt. Scammon says that in only two seasons, more than eight thousand barrels of oil were taken here by four ships, assisted by a small shore party; but the "grounds" soon gave out at that rate, and are no longer valuable.

Approaching Magdalena Bay by sea from the north, the coast grows more

BOLD AND PICTURESQUE.

High cliffs and detached masses of rock, alternating with stretches of glistening sand beach to Mount Ysabel, which guards its northern entrance—a tall sentinel, whose head is 1,500 feet above the water. The early Spaniards reported the existence just above here of extensive beds of asphaltum. The neighboring plains are a favorite resort for prong-horned antelope, great droves of which may be seen coming down to the lagoons. Near by, on the banks of a clear stream, some ten miles from the sea, is the old Mission of Purissima, now a village of about thirty houses and 250 people. Only a small portion of land adjacent to the village is under cultivation; but figs, dates, pomegranates, grapes, olives, oranges, wheat, corn, cotton, cane, pease and beans are raised, almost without labor, so rich is the soil wherever water is turned on.

The lomboi, a peculiar plant, found nearly the whole length of the peninsula, grows here to perfection. It is a small tree with soft, brittle wood, fine leaves, thick branches and clumsy twigs. On cutting a branch or twig, a thin, milky sap exudes abundantly; and this, on being exposed to the air, turns black as promptly as a solution of nitrate of silver, and is as indelible.

The principal occupation of the people of Purissima appears to be the manufacture (and consumption) of mescal from the maguey plant. This strong and highly alcoholic liquor contains more intoxication to the cubic inch than any other liquid known, but looks the most innocent, being limpid and colorless as water, but with a harsh and burning taste, compared to which new whiskey is mild as milk. It is made by cutting out the core of the giant plant immediately before its blossoming time, crushing out the sap, fermenting the latter and afterwards distilling it.

The captain's charts show many places along these shores marked "water," but many a poor seaman has found these alleged guides a grievous disappointment.

IN THE SUMMER SEASON

The only regular supply of fresh water that can be obtained anywhere near here is forty miles from the bay, near the northern end of one of the lagoons, and a small vessel is employed for the express purpose of bringing it to Magdalena settlement. Those delusive water-marks are merely casks which whalemen have sunk in the sand. That kind of a well is common all along these coasts, and is made by merely knocking the heads out of a cask and sinking it anywhere in the sand, working it down and removing the sand from the inside until a sufficient depth is reached for water to ooze in freely, but not too deep to be conveniently baled out. Strange to say, though close to the briny ocean, fresh water soon fills the casks—by no means good, but drinkable, having a milky-white appearance, and requiring several days to "settle."

On the south, Magdalena Bay is bounded by broken ridges of mountains that separate it from the ocean. On the north stretches a low, sandy country, dotted with scrubby bushes and patches of cacti, far as the eye can reach. Game of various kinds is abundant, and the waters are full of food in the shape of fish, oysters, mussels, edible abalones, etc. A remarkable phenomenon may often be witnessed of the water suddenly becoming blood red in streaks and patches—from vast numbers of shrimps, each an inch or two long, that appear in "schools." Receding tides leave the shores covered with millions of them, on which the birds feed; and sometimes the air is filled with an intolerable stench arising from their decomposition.

On the west side of a little cove in the bay named "Man-of-war," there are a few houses—one of which is a Custom House and the others are used by Mr. Hale's men in the storing and shipping of orchilla. From this point a rough trail leads through a barren and nearly level country to La Paz, the old capital, 115 miles distant.—*S. F. Call.*

THE LITTLE FARM WELL TILLED—THE OLIVE IN CALIFORNIA—CARE OF MILK, ETC.

A Sacramento county farmer writes as follows in regard to the past and future methods of farming in this State:

Slowly, but surely, the time is approaching when the farmer in this State, who wishes to succeed in wresting a living or a competency from the soil, must realize that the old wasteful and slipshod methods of "early days" must be abandoned, and the careful, economical methods of systematizing work that neces-

sity and competition, together with an increased value of lands, have forced upon theagriculturists of the older States and those of Europe, must be adopted. Steadily the conviction is growing in the minds of thoughtful men that "the little farm well tilled" is to be the basis of California's future prosperity, and that large ranches poorly cultivated and supporting a few transient laborers, must give way to smaller holdings with thorough cultivation and attention paid to the recuperation of the soil. To the "old timer," who has been accustomed to "cut and cover" his one or two hundred acres with an old gang plow, which left his field in ridges and insured the growth of a plentiful crop of weeds and wild oats to make his grain foul and sap the substance from the soil, which should have given him long heads of plump wheat, the change will seem an innovation productive of little good, but to the rising generation of young farmers, which is to take his place, the necessity must be speedily apparent.

In the days when land could be had at from $1.25 to $5 per acre, with labor commanding high prices, a man could perhaps afford to do slipshod work and receive fair returns for his work and the use of his land; but those conditions no longer exist. With land ranging from $30 to $300 per acre, and with, in most instances, a "poor man's plaster" upon it, the interest account speedily eats up the proceeds of careless farming and leaves the owner, in many cases, steadily sinking deeper into the quicksand of debt. The example of England furnishes us a criterion for judging on this point. There the careful farmer, whether he owns his small holding or pays rent for it, generally earns a living which gives him the comforts and even the luxuries of life. From this class we find only a small emigration, and that mainly from those who are ambitious to become landowners instead of continuing as tenants.

In France we have a still more striking instance of the advantage of small farms well cultivated. When, after the rash war into which Louis Napoleon precipitated her with Germany, the burden of so many milliards of francs was laid upon her, as an indemnity, that it seemed impossible that the next generation would be able to pay, by dividing the land into small holdings the people were enabled to pay it all off within a time far shorter than the specified limit. And the fact that the prosperity of a country depends largely on its agricultural interests was most strikingly exemplified in this case, for before the indemnity was fairly paid, most of it had been returned to France in exchange for her silks, velvets, wines and other products.

The increase of small farms means also the increase of independence in our people, the increase of our population, the increased home consumption of various articles that will be profitably manufactured here in the near future, increased

activity in various channels of trade and the diminution, if not the abolition of the "blanket brigade." In every community there will be found settled permanently, men who, although lacking capital necessary to enable them to become landowners, will earn a comfortable living for themselves and their families by labor on the farms of others. Such men are a necessary adjunct of a prosperous farming community, and in the East form a useful and desirable portion of every neighborhood, being self-respecting and reliable, and far preferable to a transient element which possesses no interest in the welfare of any particular community.

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PROTECT HOME INDUSTRY.

EDITOR PLANTERS' MONTHLY:

Sir:—Permit me to hand you a few facts concerning fertilizers used on these islands. Some who are identified with this country are interested in watching the developments in their lines of business, and the planter is as wide awake as any on this subject, watching as he does, every development in the sugar interest, whether at home or abroad, in machinery or in cultivation.

My attention of late has been drawn to the large, steady increase in the importations of foreign fertilizers, and I find by examining the yearly Custom House Reports for the last four years, the following recapitulation concerning the imports of bone meal and other fertilizers:

Year.	*Pounds.*	*Tons.*	*Value.*
1885	2,050,689	1,025	$ 30,568 92
1886	2,747,952	1,374	36,162 80
1887	4,140,297	2,070	52,302 76
1888	5,976,271	2,988	100,879 26

In looking over the long list of imports, few items have increased so rapidly as that of fertilizers, and as far as I can learn the importation for the first six months of 1889, have already been more than that of the whole year of 1888.

By way of comparison I give you the values of the imports of *grain and feed*, also *lumber of all kinds*, for the last four years:

Year.	*Grain and Feed.*	*Lumber, etc.*
1885	$259,897 97	$239,861 90
1886	289,096 57	270,268 84
1887	346,238 06	239,008 05
1888	258,798 95	224,578 84

The increased attention given by the planters during late years has shown the value of the quantities of material formerly thrown away, which they now collect and apply to their lands as manure.

If the increased use of fertilizers continue, (and I don't see

why they will not) this article will become one of the largest items of importation in the near future.

Without the intention of advertising my own fertilizers, I think the planters could materially assist the country and themselves, in obtaining good articles, in such quantities and at such rates as would pay them to unite in assisting a home industry for the manufacture of fertilizers suitable for *cane, rice*, etc.

Guano and other materials from the Pacific are shipped to Europe, passed through the regular treatment, and much of it is returned to this country, direct and via the United States. Much might be saved by treating the raw material at home, in the first place, and thus save the cost of double transportation.

The next Legislature should be asked to add a clause to the present law, allowing not only fertilizers, but all materials for the manufacture of the same, which are now dutiable, to come in free of duty.

Yours respectfully,

Honolulu, Aug. 7th, 1889. A. F. Cooke.

AN EXPERT ON TRANSPLANTING AND PRUNING TREES.

In my last I gave some examples of trees that were planted with, and without pruning; showing that the unpruned tree lived and grew finely, while the pruned tree died, or was almost a failure. I will now give the reasons why a newly transplanted tree should not be pruned. Says G. W. Varnum, M. D., in *Elsinore News:*

1. The tree is already mutilated enough, for in taking it up, rarely ever are half the roots left, and those cut off are the most inportant because the small fibrous roots are the ones which absorb the moisture, the old roots having lost that function or power.

2. If pruned, the cut extremities leave the albumen, or sap-carrying wood open, from which the sap that is left in the tree evaporates. The sap is carried up with great force by capillary attraction, and is pushed out of the cut extremities and lost.

3. The terminal buds are the first to start, and make a growth. The lateral buds in some trees lie dormant for years. The tree newly transplanted needs roots to supply the place of those cut off in taking it up, and as a tree cannot make much root without leaves, it has to wait for the dormant buds to start, and form leaves before the sap can be elaborated, and returned to the roots to form new rootlets. When the tree is not pruned, the terminal buds start very soon, and the sap left in the tree, and that absorbed by the remaining roots, is prepared, or assimilated in the leaves, and is returned by the cam-

bium layer, and back to the roots, and new rootlets start from the extremities of the cut roots, and grow rapidly, and they are soon able to supply the tree with sufficient sap to keep it alive and growing. In the pruned tree the dormant buds are a long time starting, and when they do start, they put out a few bunches of sickly leaves, and the tree, if it lives, makes very little growth until the next season, except under favorable circumstances. Let anyone try it; set out five pruned trees and five unpruned trees, and I will guarantee that after the trial, the one trying it will never prune another tree if he should plant a million. Another reason why a tree should not be pruned is, that it needs all the foliage it can make to protect the trunk from the sun. In its enfeebled condition, the languid sap sours, and the bark, where it is exposed to the sun is killed, and the tree bends away from the sun, exposing more surface to its rays. Then if there are any borer insects about, the sour sap attracts them, and they deposit their eggs in the cracked bark of the sick tree, and you have another trouble to contend with.

A young tree ought to be allowed to grow to suit itself for several years, until the bark begins to die on the outside, by which time it will be able to stand the sun's rays and then you can begin to trim up gradually, until you have the head as high as you want it. About the second year you can remove any crossing or interfering limbs.

Orange trees try to protect their trunks from the sun by throwing out many sprouts from the ground up, or the limbs will grow down like a cow's tail for the same purpose. Other trees do the same thing, and after the tree is old enough for the bark to protect it, the lower limbs generally die. The best time to transplant deciduous trees is in the fall, about the first of December, here. Carefully prune the bruised and broken roots, with a sharp knife so as to leave a smooth healing surface, and by spring the healed or calloused roots will be ready to throw out rootlets as soon as any leaves are formed, or sooner if an extra quantity of assimilated sap has been stored up the previous fall. If you mash a man's arm or leg off with a round shot, shell or car wheel, the wound might heal after a long time, but the man would be more apt to die nine times out of ten; but the surgeon, with his keen knife, makes a clean cut above the ragged wound, dresses it properly, and in a comparatively short time the wound is healed. It is the same with a tree; a bruised root will rot, and the dead portion remains attached with no fresh, healthy surface for new roots to start from. Evergreen trees are never pruned, and the same reason for not pruning them holds good with deciduous trees. The best time to transplant them, is about the last of June, or after they have made a foot or more of new growth. The roots

must be kept moist. If they dry through, you may as well throw the tree away, it will not live.

In my last I spoke of planting apple trees nearly on top of the ground. I now tell why. In cultivating my first orchard I turned the furrows to the tree for several years, and after a while the trees stopped growing; I then turned the furrows away until the ground was level, and the trees commenced growing finely again. This shows that apple trees ought not to be planted deep. A peach, pear, walnut and some other trees may be planted one, two or even three feet deeper than they were in the nursery, and they will do all the better for it. The roots of these trees go down, while the roots of the apple and American grape vine stay near the surface. These facts are valuable to the person who is about to plant trees.—*Florida Agriculturist.*

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SUGAR SITUATION.

The latest issue of Mr. Goerz' weekly report has the following:

There reached us to-day an English statistical report, from which we extract the following:

The world's visible supply is: 1889, 854,409 tons; 1888, 1,198,394 tons; 1887, 1,268,951 tons; or a minus of 343,985 and 416,542 respectively, as compared with 1888 and 1887. These deficits must be taken into serious consideration in connection with the consumption during the next five months, especially if the steady increase in consumption continues, and the deliveries from May 31 to November 1 are also considered.

	1889.	1888.	1887.
Stock, May 31	854,409	1,198,394	1,268,951
Stock, Nov. 1.	?	356,000	557,000
Difference	?	842,394	711,951

If the diminution of stocks this year is the same as last year little or nothing will be left of the 854,409 existing May 31.

We can say but little as to the correctness of these calculations, but only repeat that such showing should be taken to heart.

1. That consumption will be reduced to a minimum by the higher prices.

2. That the high prices will cause all factories to endeavor to finish and market its "third" sugars before the new campaign.

3. That for this reason stocks at beginning of new campaign will prove a trifle larger than can be forseen to-day.

But—4. The stocks in third and fourth hands will be reduced to a minimum hitherto unheard of.—*Louisiana Planter.*