THE

PLANTERS' MONTHLY,

PUBLISHED BY THE

Planters' Labor and Supply Company,

OF THE HAWAIIAN ISLANDS.

VOL. II] HONOLULU, AUGUST, 1883. [NO. 5

IS RATOONING PROFITABLE.

A diversity of opinions exist as to the profit of cultivating ratoons. The fact is that the profit depends on circumstances. From the time that the cultivation of sugar cane was first begun in these Islands until a few years ago, the ratoons were considered an important part of the plantation crop, and they are still so regarded in some places. But experience is demonstrating that unless under favorable circumstances they are not profitable. It may now be stated that in localities where crops depend on irrigation, and where the water supply is limited, it does not pay to cultivate them. And if to the limited supply of water be added a limited area of good cane land, the objections are increased.

Ratoons require as much water as plant cane during their growth; this has been proved beyond doubt, the only difference being that plant crops required a longer time to mature. Formerly it was believed that ratoons did not require as much water as plant cane, but experience has clearly proved that this is not only a mistake, but in many cases even more is required to produce the best results. With few exceptions ratoons do not yield as much sugar per acre as the plant crop, the usual product being one half the amount of the latter. And yet during the period of their growth they require as much care and labor.

While ratoons, with the best cultivation, sometimes yield more than half as much as plant cane, they much more frequently yield about one-fourth as much.

The strongest arguments in favor of ratooning are that the expense of plowing and preparing for planting, and of planting, is avoided, and that

an average of but twelve months' cultivation is required for them, while from fifteen to eighteen is required for plant. And further, that with very little cultivation some sugar is obtained, and the ratoons help to make up the crop. In places where there is no water for irrigation, and the rainfall is sufficient to produce crops, the question resolves itself to that of the area of land available and the labor supply. If the plantation has abundance of good land so that the area constantly occupied by ratoons does not interfere with the needed supply of good land for planting, then the only question may be in regard to whether there is labor enough to cultivate all thoroughly.

We would here emphasize the statement that under ordinary conditions poor ratoons are not profitable; only good ratoons pay. And it would seem to be a matter of doubt if they are profitable under any save the most favorable circumstances.

Of course there are cases where the results produced from ratoons pay well, but where the water supply is limited there can be no doubt that it is better to apply all of the water to plant cane; and where the area of land is limited it pays better not to ratoon, thus using less land to produce a given crop, and permitting part of the land to rest. If ratoons are attempted they should receive good cultivation, and as frequent irrigation as plant cane, or the best results will not be attained.

——o——

THE CANE BORER.

The generally accepted view in regard to the borer, is that burning the field after cutting is the most effective method of destroying the eggs, and thus modifying the effects of the borer. The following contrary opinion advanced by an old planter is worthy of attention. He says: "I never was troubled with the borer till the last year of my planting, when they made their appearance in one field. After it was cut I gave it to ——— to ratoon. He, to destroy the effects of the borer, thoroughly burnt it off, but was very much disgusted when he cut the ratoons to find that instead of being less affected it was much more so. Both of us came to the conclusion that burning was no improvement but rather the reverse. This we thought was caused by the fire destroying a large proportion of the small ants which devour the eggs and larvæ of the borer."

We think that the increase of the borer above mentioned must have been owing to other causes, as the long continued experience of planters on Maui and Kauai is almost universally in favor of burning as an antidote to the borer.

The experiment tried on the Koloa Plantation of burning off the growing cane to kill the borer, reported in our June number, is in point.

THE STOCK AND BOND EXCHANGE.

An exchange, under the title of "The Honolulu Stock and Bond Exchange," has been formed in Honolulu during the past month. The forming of incorporated joint stock companies has increased so rapidly of late, and the stock distributed among so many, that the organization of an Exchange seemed to be desirable.

The primary object of such an Exchange is to facilitate the negotiations and transactions in stocks. It forms a mart where persons who desire to buy and sell may meet at stated times, and under carefully considered regulations transact their business.

One advantage of such facilities for buying and selling stocks is, that it tends to distribute property among all classes, and strengthens the country. The more generally property is distributed the more there are who are interested in the prosperity of the country.

Another advantage is, that stated sales of a public character will tend to regulate the standards of value. Also, that under proper management the Exchange will tend to prevent the forming of unsound corporations. There is danger that the disposition in our community to incorporate will be carried to an unhealthy extreme, and that fictitious values be placed on property of this kind, and the public deceived.

The organization of the Honolulu Exchange is very similar to that of the Stock and Bond Exchange of San Francisco, the Constitution and By-Laws being nearly the same, a few changes only having been made.

The Exchange is not a partnership, nor is it a corporation, but a voluntary "Association of persons engaged in the same kind of business, who have organized together for the purpose of establishing certain rules by which each agrees to be governed in the conduct and management of his separate transactions or business."

The evils of so-called stock gambling were recognized by those who organized the Exchange, and the management of the association was placed in the control of men who will prevent so far as is possible tendencies in that direction. It is the determination of the members to countenance only fair dealing and legitimate business.

The spirit of speculation will inevitably enter into stock dealing more or less, and in large communities great harm has resulted in times of excitement. Such danger is more imminent in communities where the magnitude of the business, and the diversity of stocks, prevent an intimate knowledge of intrinsic values, and where large stock boards afford greater facilities for gambling. Here, the limited nature of the business and the comparatively intimate knowledge which all have of the value of the properties represented, will very much lessen such danger. Heretofore the lack of facilities for disposing of stocks has been an obstacle in the way of investments, and as the number of corporations increased, and many more were being formed, the advantages of an Exchange where transactions could be made became manifest.

There is no doubt that property in these Islands will be placed more and more in the form of stocks, and that small capital as well as the property of large capitalists will seek such investments. It therefore becomes of importance that the standards of value and the facilities for transfers be regulated as far as possible by sound business principles.

Great results are not to be expected from the organization, but it is reasonable to suppose that the business community will be benefitted by it.

———o———

THE LIBEL SUITS.

The July Term of the Supreme Court has been a notable one. The criminal law of libel has been on our statute books for thirty years and upwards, and the civil right of action for defamation of character has existed for a like length of time; but never until this term, has a jury of the country been called upon to decide a case of this nature. The initiation of the action has been followed by results which will not tend to make libel proceedings a popular pastime.

Not only does this term of court mark an epoch, but it may be said to mark a crisis in the history of the country. The vital question of how far public men are exempt from public criticism, was at stake. In the cases brought by John Richardson, Deputy Sheriff of Maui, against the *Ko Hawaii Pae Aina* and *Hawaiian Gazette*, the issues were clearly defined. They were 1st. Can a public officer leading a notoriously immoral life, claim that such conduct on his part concerns his private life only, regarding which the public have no right to know, and maintain a suit against a public journal which has placed the unvarnished facts before the public? 2d. If a public officer so conducts himself in his official capacity as to earn a well nigh universal reputation for corruption in office, laying himself open to charges of corruption, which charges are made, and no regard is paid thereto by his superior officers, has a newspaper the right to take notice of such a state of affairs?

In the suits brought by Dr. Fitch against the *Saturday Press*, the question was equally well defined, viz: What right has the public to know the character, qualifications and methods of a physician holding a public office, and to what extent may a public journal lay before its readers facts enabling them to form a judgment concerning the same?

The mere statement of the foregoing questions would seem to be their own answer. Not so thought these two worthies. It is well. They have had the experience and the public have reaped the benefit. The Supreme Court, and the juries of Honolulu have given forth no uncertain sound. Full, round and distinct has the law been laid down by the Court, and prompt and decisive has been the response of the jury thereto.

There is no longer a doubt as to the right of the public to know fully the nature of the character and conduct of their servants. A fountain cannot give forth both sweet water and bitter; neither can a public officer so conduct himself as to scandalize the community without at the same time prostituting the dignity of his office, whether such conduct be in relation to his so called private life, or concerning his official duties.

The following is laid down by Judge Cooley of Michigan, and is almost universally accepted as good law in the United States: "A great public character may, perhaps, suffer in reputation all his life time from an impeachment for an offense never in fact committed, yet if the impeachment was instituted in good faith, and on grounds apparently sufficient, those concerned in it only performed a public duty. We unhesitatingly recognize the fact that in many cases, however damaging it may be to individuals, there should and must be legal immunity for free speaking; and that justice and the cause of good government would suffer if it were otherwise.

With duty often comes a responsibility to speak openly and act fearlessly, let the consequence be what they may; and the party upon whom the duty was imposed must be left accountable to conscience alone, or perhaps to a supervising public sentiment, but not to the courts. * * * There should consequently be freedom in discussing in good faith the character, the habits, and mental and moral qualification of any person presenting himself as a candidate for a public office. The same freedom of discussion should be allowed when the character and official conduct of one holding a public office is in question."

The law in England is equally liberal. Chief Justice Cockburn thus states it: "Our law of libel has, in many respects, only gradually developed itself into anything like a satisfactory and settled form. The full liberty of public writers to comment on the conduct and motives of public men has only in very recent times been recognized. Comments on government, on ministers and officers of state, on members of both Houses of Parliament, on judges and other public functionaries, are now made every day which half a century ago would have been the subject of actions or ex officio informations, and would have brought down fine and imprisonment on publishers and authors. Yet who can doubt that the public are gainers by the change, and that, though injustice may often be done, and though public men may often have to smart under the keen sense of wrong inflicted by hostile criticism, the nation profits by public opinion being thus freely brought to bear on the discharge of public duties."

Pollock, C. B., in a like strain, says: The "conduct of ministers, conduct of judges, the proceedings of all persons who are responsible to the public at large, are deemed to be public property, and all bona fide and honest remarks upon such persons and their conduct may be made with perfect freedom, without being questioned too nicely for either truth or justice."

Hawaii has taken the same advanced stand upon this important question that England and the United States have. Our Constitution says that "all men may freely speak, write and publish their sentiments on all subjects, being responsible for the abuse of that right," and our courts hold that it is no abuse of that right to fearlessly expose official corruption and incompetence.

The native who in his leisure hours caught a few fish two or three times a week and sold them for a quarter apiece, is rapidly going to the wall before the competition of the industrious company of chinamen who are now supplying Honolulu with fish. At all times of day from daylight till dark they may be seen throwing their seines in and about the harbor. Their method of working is for two boats, each containing five men, to row in opposite directions around a circle of two or three hundred feet in diameter casting the net from each boat as they go. When they meet, the hauling in process begins, the whole operation taking not over fifteen minutes. There are now some half dozan of these boats, and the supply of fish at the market is much more regular than formerly.

The Hawaiian Agricultural Co., East Maui Plantation Co., Wailuku Sugar Co., and the Princeville Plantation Co., have called in their old shares of stock and issued new shares of $100 par value. An effort is being made to reduce all the plantation stocks to a uniform par value.

The pine apple crop was rather small this year, and prices have been high. The supply has not been sufficient for home consumption, and none for export. Intelligent and systematic cultivation of pineapples would yield good profits.

The expense of the late Portuguese Immigrants has been a subject of comment, for employers had been led to believe by the assurance of the Government that the cost would be reduced, whereas it has been no less.

The heavy rains during the first part of last month were most favorable for the growing crops. Reports come from many parts of the Islands of soaking rains that have fallen, in some places there were heavy freshets.

COMMUNICATIONS.

SUGAR BOILING.

EDITOR PLANTERS' MONTHLY: Your request, with respect to sugar boiling, I comply with by handing you the following essay:

BOILING OF SYRUP AND MOLASSES IN VACUUM TO PRODUCE YELLOW CRYSTAL.

Before I commence to deal with my subject I propose to place before my readers a few hints on the economy of sugar factories, which is a very important point of consideration. It is well known that the output of factories varies very much from one and another, for cane juice that in some factories would yield say two pounds of sugar to the gallon of juice, would only yield part of that amount in others, which plainly shows that there must be a cause for this, and to find out where the difference lies it is necessary to consider the mill for one and the polarized sugar property in the juice for another. I think that all megass (or trash as it is called here) should be weighed and all the juice measured, when its specific gravity will be ascertained and the gallons turned into pounds. The weighing of the megass can be done on a very handy system; that is, on its way to the shed from the mill it passes over a scale, and is weighed with scarcely any loss of time, the tare weight of the megass truck known and the weight of the megass noted.

The next point is, how much sugar is there in the juice? In the olden and even at the present time, the method of ascertaining the specific gravity is by the saccharometer; but as there are other substances which will add to the specific gravity as well as sugar, it is necessary to have an instrument which will tell accurately the amount of sugar obtainable from a given quantity of juice. The polariscope is the only instrument which will show the exact amount of sugar in the juice, so that by its use and the weighing of the megass we readily learn where the difference lies, while comparing notes from one factory with that of another. Having given the advice of securing an accurate measurment I will now proceed with the subject of sugar-boiling.

In as few words as possible a vacuum pan is a globular shaped vessel of copper or cast iron (where chemicals are used in the pan the former is preferable), varying in size from five to twelve feet or more in diameter, provided with a steam jacket over its lower portion, and with three to six large and long coils of copper pipes in its interior. At the lower part of the pan there is an outlet, which is closed with a slide valve or other suitable arrangement, and on the top it has a wide neck leading to the condensing apparatus and vacuum pump. There is an arrangement in its

side or near the top, for taking samples or "proof" of the sugar when boiling; an inlet for the admission of the syrup which is to be boiled, air cock, thermometer and vacuum gauge, and two or more bulls-eyes or peep glasses, through which to watch the progress of boiling. The condenser is usually an iron vessel or cylinder, from two to four feet in diameter, furnished with a supply of water, which falls on to a perforated tray; a large pipe passes from its bottom to the pump to take off the water used in condensing the vapor coming from the pan, and there is a delivery pipe from the pump to carry away the water outside. The vacuum pump is generally twenty inches in diameter (more or less), and is capable of removing so much of the air from the pan that what remains has only elastic force enough to support a column of mercury two inches in height instead of the thirty inches which it does when at full pressure. In using the vacuum pan the pump is set going, and as soon as a vacuum is formed, enough syrup is drawn in to cover the jacket and bottom coil, after which steam is turned on in both. With a careless man a singular accident can now happen. If steam has been turned on in the coil before it is entirely covered the pan is likely to get intensely hot, this heat is soon communicated to the pump barrels, which then refuse to draw water, the vacuum is destroyed and boiling operations entirely suspended. If such a case happens, the only thing to do is to stop the engine and let the pan and pump cool down, which they will take four or five hours to do; at first there is a chance that by throwing cold water on the pump rods they may get cooler, but as the glands prevent the water from getting through in sufficient quantity it is rarely successful. Steam being turned on as above mentioned, the liquor will shortly be in full boil, as can be seen through the peep glass, though the temperature, as shown by the thermometer, is only 140 to 150 degs. Fah., instead of 230 degs., at which syrup will boil in the open air.

As is known, a liquid boils at a lower temperature when the atmospheric pressure has been mostly removed, because as it boils, the elastic force of its vapor becomes greater than the pressure exerted on its surface, and as the elasticity of the vapor of all liquid is increased by a rise of temperature, it is plain that such will boil at a lower temperature in a vessel from which the air pressure has been mostly removed, because the point at which the tensions of the vapors will exceed the remaining pressure on them will be soon reached.

The degree of vacuum is regulated during the boiling by the injection cock. The wider this cock is opened the more water goes into the condenser; consequently, from the quicker condensation of the steam, the thermometer falls. It is customary to boil syrup with 24–26 inches vacuum as shown by the gauge, when the temperature will be between 60° and 65° Fahrenheit.

If syrup is being boiled in an open vessel, the whole quantity to be boiled is, or should be, put in and concentrated at once without any more

liquid being added to it after it begins to get thick; for if to get a larger quantity of sling in the vessel further additions of syrup are added, the first part put in would be too long exposed to the high temperature and consequently lose a great part of its crytallizable power. This consideration, however, does not hold good when boiling in vacuum, because the low temperature of the boiling syrup greatly lessens the danger of a disastrous change in its saccharine properties, and therefore, there is no harm in adding more syrup in the vacuum pan to that originally admitted and decreased by concentration.

While the syrup in the pan is thin, the waves it makes in boiling are high and sharp and pitch about lightly and frothily, but as it gets more concentrated it becomes heavier and less lively, all of which can be distinctly followed through the bull-eyes. The time now approaches when by means of the "proof stick" the boiler begins to try the stoutness of the pan's contents, *i. e.* to see whether its degree of viscidity shows that it has been so much reduced that sugar is ready to crystallize out. Before proceeding to this point, however, I must say a few words about the previous boiling down of the syrup to this degree of concentration. It is customary to draw into the pan as much syrup as will cover the bottom coil (after having been reduced by concentration); this is called "graining low down." Some prefer to grain higher up, and some when the pan is half full. The objection to graining high up is, the grain has not so much time to grow in size, and this is a very sound objection, but does not from the shape and interior construcion of the pan always hold good. If a vacuum pan takes say seven hours to boil a strike of eight tons *massecute*, and was grained low down, it will only take six hours to boil a similar quantity if graining high up ; the crystals in the second case will not be as large as in the first, but in a large eight or ten ton pan they will be of a fair size even by the quicker method. It sometimes happens, though not often, and this, although I can give no good reason for it, is well known and appreciated by pan boilers that sugar of a larger crystal and better quality can be made in some pans by high than by low graining. I knew of a pan in which for a considerable time good sugar was not made, until by suggestion graining high up was tried, and the sugar then turned out was very satisfactory. Not being contented to accept this as a reason, it was tried afterwards to grain low down again in the same pan and found to be almost as unsuccessful. The reason for this is probably in the position of the coils; but this explanation to my mind is too vague to be deemed a satisfactory one. In drawing in the syrup for boiling down, the following plan is to be adopted: Open the charging cock and keep your eye on the inside of the pan through the peep-glass (light is thrown into the pan on the opposite side at which a strong bright light is kept burning), and as soon as the liquid boils up to the height of the bull's eye on the opposite side shut off the charging cock.

The contents will boil up quickly and go down, when you must open again, shutting off as before when the liquor boils up to the same height.

This operation is kept up until you have taken in the quantity of syrup with which you intended to form grain. It is impossible to specify this quantity exactly, but roughly speaking 2000 gallons of 18° to 20° Beaumé syrup to a 5-ton pan is about the correct amount, provided also that your juice is yielding well, by which I mean that few gallons are required to make a ton of sugar. One or two lessons in front of the pan will teach you this directly, only be carefull not to charge the pan with too much syrup at a time so as to cause the contents to boil and froth up above the opposite bull's eye, as explained before, or some of the syrup will go over into the condenser, be sucked through, and thrown outside by the pump.

And now for the granulating point—this is easily recognized by a practical parboiler, but is very difficult to describe with any useful amount of accuracy; however, one may say that if a "proof" of the syrup taken between the thumb and the finger will draw to a thread three-quarters of an inch long, the point for graining has been reached, at the time this test is of no value if the syrup is the least bit sticky, resulting from under tempering or sour canes, as a thread can be drawn out long before the granulating period has been reached. Immediately before crystallization begins the syrup in the pan is supersaturated with sugar, and only requires disturbing to begin depositing some of that body in solid form.

The disturbance is brought about by opening the charging cock (for say five to eight beats of the vacuum pump when you can hear it) and letting in some syrup, this is repeated at two to five minute intervals, and after the third, fourth or fifth disturbance if a "proof" of the contents is held between the thumb and finger, or better still, dropped on a bit of glass and looked at through it, will be seen to have small crystals floating in it; these rapidly increase in number and size, until the whole mass of liquor is filled with them. As each fresh lot of syrup is admitted into the pan it deposits for the most part on the grains already formed, thus causing them to grow larger and larger. During the process of granulation the temperature should never be more than 160° to 170° Fah., though it can be raised later on to harden the crystals; but this must not be done too soon after graining, or there is great danger that the already formed crystals will melt. I submit the following rules for guidance when graining syrup in the vacuum pan:

1. The thinner the syrup admitted into the pan the bigger will be the crystals obtained; the more concentrated the syrup, so much smaller will the crystals be, because in the latter case the syrup is too stout to allow the crytallisations to have a perfectly free and open formation.

2. In making large grain sugar a heavy charge of syrup must be admitted into the pan at a time, so as to give the grain more time to grow between each disturbance; should small crystals be required charge oftener and in smaller quantities, so as to disturb the growth of crystallization.

3. The larger the crystals you require so much more gently and slowly must be the boiling carried on, and in order to have the grain regular,

granulation is to be brought about very slowly, and on no account must the grain be forced by boiling very high before the first charge; pan boilers are only too fond of foreing grain, as it lessens the chance of false grain forming hereafter through carelssness.

About an hour after granulation I think it very advisable for the manager or building superintendent (if the latter follows my suggestion let him do it with tact, as pan boilers do, not like being interfered with,) to visit the pan and let the pan boiler take a proof and put it on a piece of glass, previously wiped dry and polished clean. Hold the glass up to the light, and if the grains are very fine and close together you may be pretty sure that the grain was forced, *i. e.* the syrup was not more than 22° Beaumé. The proof does not denote a satisfactory state of things unless the sling between the crystals is perfectly clean and bright, and there should be plenty of it between the grains. If the sling does not look clear and bright, but "smoky," you can be absolutely sure that there is something wrong, and the probability is that, that something is false grain, or as pan boilers will persist in calling it, "a cloud." Before describing false grain and its remedy if taken in time, but still at a loss, I will point out at what periods during the course of boiling false grain is most likely to form unless great care be taken. Without care cloud may form at any time. Impress upon your mind that the further apart the crystals are from each other, and the larger they are, the greater the chance of false grain. The two periods during the process of boiling when the danger of false grain forming is greatest, though in the second case the danger is greater than in the first, are :

1. The time when sulphuric acid is admitted into the pan (where such is applied).

2. The opening of the sugar when re-starting the pan to "double," that is to say, when having struck out half the contents of the pan you go about again, admitting fresh portions of syrup on to the massecute left in the pan.

If the contents of the pan are not sufficiently high when sulphuric acid (about which I shall speak presently) is admitted, false grain is liable to form afterwards whilst working up to the contents for striking. Do not, however, fall into the opposite extreme and boil up too high before admitting the acid, or an equally disagreeable disaster may overtake you, for in the case of the massecute being too concentrated the acid will cause the whole to turn into lumps of spoilt sugar very much resembling the green clinkers which are found in a furnace where there has been any leakage of cane juice. Half the contents of the pan we will say have been struck out, and the pan has been re-started with three tons of massecute left in it. This massecute is highly concentrated, and has to be reduced by admitting fresh lots of syrup, which must deposit on the grains which have already formed and been brought to a good size in the pan; but unless *great care* be taken, and the massacute opened very slowly, the new lot of syrup, instead of depositing on the already formed crystals and

increasing their size, forms an independent grain of itself called false grain, which not only produce a sugar of ununiform grain, but become sticky and prevent the molasses from leaving the sugar in the centrifugals.

There are only two occasions when a careful boiler fears "a cloud," but with a careless and inexperienced man this is to be apprehended and expected any time after granulation up to the striking point. If false grain should appear in the pan, and you can be certain from the time at which it appeared that it is not caused by acid, or doubling, you can be pretty sure that it is the result of the pan boiler having opened his sugar too much, endeavoring to swell the grain. This however is no excuse, as in such a case it always gives a timely warning by the sling between the grains taking on a thick smoky look, when, if prompt measures be taken the danger can be averted, as will be explained presently. It is seldom that one meets such a mishap; but once experienced it is of such a nature that it is never forgotten.

Pan boilers frequently get it in their pans but drive it away before striking, and the fact goes no further, only the number of gallons of juice taken to make a ton of sugar will be greatly increased. In cases where false grain is very bad there is no remedy for it, and the only course to pursue is to strike it all out immediately, and spin it in the centrifugals, mixing it with warm water if found necssary. The use of hot water however is only to be recommended when the sugar positively cannot be dried without it. When the "cloud" is not very bad the best way to get rid of it is as follows: If the pan is not more than half full, or very little more, shut off the injection water, or nearly all, and make a few heavy charges; the heat combined with the washing influence of the new syrup washes and melts away the false grain. If, however, the pan is nearly full, and the false grain is fairly developed (through the gross negligence or ignorance of the operator), the remedy is to shut off the injection cock as in the other case, and work the massecute up as high as it can be got (do not forget the size of the outlet, I mean the boiling over). This plan will not eradicate all traces of the "cloud." but will do so sufficiently to allow the sugar to be dried. When there is an abundance of syrup on hand the pan should be kept going. It is frequently the case that when boilers are inattentive they leave the charging cock open too long, and suddenly discover that the syrup is boiling over. Of course they will take good care to have everything straightened, so that their carelessness will not be known; but for all that the loss is made nevertheless. This is not an overdrawn picture, this I can assure you. It is then when a manager has the opportunity of judging his man—when a careful sugar boiler can be appreciated.

The time now approaches when sulphuric acid is to be admitted into the pan for the purpose of lending to the contents that delicate yellow bloom and brilliancy so much sought after and admired. I look upon bloom as quite distinct from color, as sugar may be yellow and the bloom wanting. But while imparting but a temporary bloom, sulphuric acid enables the

proprietors to sell their sugars for a much higher figure than they would otherwise fetch, by drying away that nasty vegetable green grey color from the sugar, which planters hate to see. From this remark it will be clear how important is the use of this acid. If too little is mixed with the massecute in the pan the color and brilliancy is scarcely improved, and if too much the sugar is damaged, turning quite red a day or two after drying. Just as in the clarification of cane juice, there is one, and only one correct quantity of lime to use; so in coloring sugar in the pan, there is one, and only one correct quantity of acid to be used, which must be admitted last of all, and you should not make a charge of syrup after the acid is admitted; for this reason, it is a loss of sugar in proportion to the quantity of acid admitted at this period. It is the opinion of an eminent sugar chemist, that the acid so acts on the juice if taken into the pan at this time as to convert the greater part of the crystallizable sugar of that portion of syrup admitted into the pan after the acid has been applied into molasses. The next point is the quantity of acid to be used and its strength. It is impossible to state exactly how much to use, as this depends on the color of the massecute, but as a rule I have found three gallons of acid diluted with water (condensed water when cold is best) to five tons of sugar to be right, and to every two gallons of acid put two gallons of water. This is a strong solution, but is not stronger than is usually required; where, however, the clarification is very perfect, and the syrup filtered and well subsided, one may say that as much water can be added to the acid as will reduce it so that you can immerse your hand in it without feeling any burning. The weaker you can use the acid the better, but it is only occasionally that it can be reduced to such an extent with benefit to the sugar. When admitting acid into the pan be careful that the massecute does not rise up and go over into the condenser; it is liable to do so at this time from the acid cock being open and the vacuum unsteady. The degree of concentration which the massecute must have attained immediately before the acid is admitted, is difficult accurately to describe, but when I say that the proof should run just so quickly out of the socket of the proof stick that very little remains sticking in it, a fair idea can be formed on the requisite degree of concentration. Remember that it is better to have the massecute a little too low than too high at this time, but do not forget the danger of false grain forming when working up afterwards to strike. In the second cut of the pan a little less acid can be used, and in the third cut a little less again, about half or three-quarters of a gallon decrease on the original amount, but here be guided by the color of the sugar.

When there are two pans on an estate a great improvement in economy and quality of sugar may be effected by having them connected, for by this means drawing in syrup on acid, and by boiling in of the acid into the massecute, after the first cut of the pan, is avoided, thus saving the inversion of a great deal of crystallizable sugar. It is true that this can be

prevented by single skips, but when the vauum pan is small the grain cannot be raised sufficiently, and there is no alternative but to strike out half and go about again on the remainder, which contains half the quantity of acid used before striking. When the pans are connected this is avoided, as follows: Two pans, A and B, are situated a few feet from each other. A goes about first and is filled up in the ordinary way, and when full half, or if the pans are equal in size, a little less is drawn over through the connection (a five-inch bower copper pipe) into B, and boiling started and continued in it. The one full first, say A, has acid admitted and is struck out entirely. Half or a portion of the other pan is then drawn over as before into it, and the boiling is continued in this manner until the contents of both pans show that doubling can no longer be carried on without endangering the sugar either by stickiness or false grain. By this plan a large crystal is obtained, and no acid boiled into the massecute for longer, at the outside, than a quarter of an hour, while the sugar is being concentrated for striking. I cannot help saying here that I believe it pays the planter better to boil a second skip with the acid from the half of the first skip remaining in it, than to boil only single strikes. A first strike is never so good in point of delicacy of color and size of crystal as the second strike, and I believe that the gain by improved color and grain more than covers any loss that may be going on through inversion of crystallizable sugar caused by the action of the acid, and which does not happen when boiling single skips.

We now come to the striking point, one of great importance, and in connection with this the following rule must be borne in mind: The bigger the grain in the pan the higher must the sugar be when struck out. Many when about to strike are guided almost entirely by the degree of vacuum indicated on the gauge, striking at 26½ vacuum with free and 27 with sticky sugar. I do not, however, recommend this loose way of judging the degree of concentration of the massecute; it is better to be guided entirely by the proof removed in the proof stick. The proof point for striking is when the proof of massecute will scarcely run out of the socket. Do not, however, be guided by the first proof (of massecute) indicating a required degree of stoutness, but take four or five proofs from the pan one after another in rapid succession, and form your decision by the fifth and sixth. The massecute next to the copper and low down is at this stage more concentrated than that in the body of the pan, and the last proof will show thinner than the first. It is very important that the sugar should be struck high, but the outlets of some vacuum pans are so small that a proper degree of stoutness cannot be reached without danger of the whole mass becoming hard and fast inside the pan. When this happens, as it occasionally does, put the pan about again quickly, and add syrup to the contents, which if not too concentrated will absorb the liquid, and matters will soon be all right; after a certain point, however, the fresh syrup will not percolate through the massecute, and then there is no remedy left,

but to dry out the sugar. This takes up much time, and causes both annoyance and loss.

Massecute on leaving the pan should look bright red in color, tinged with a golden look, and must be struck to a temperature of 160° Fah., never higher. Doubling next engrosses our attention. The sole objects in doubling are to swell the grain so that the market value of the sugar may be enhanced, and to save time. Some syrup makes sugar which will bear doubling two, three, four, and even five times, while some get sticky after the first cut of the pan.

Having struck out a portion and gone about again the greatest care must be taken while loosening, *i. e.* opening out the massecute left in the pan, for if this is done too quickly, or in other words, if syrup is admitted on to it too rapidly false grain will form. At this period, when boiling the third or fourth cuts, a temperature of 165° Fah. may be maintained while the sugar is being opened slowly and carefully, the time required to perform this operation being from 15 to 25 minutes. Having successfully loosened the sugar, the drawing of syrup can be proceeded with as before, with this care, that the sugar requires if possible more care and watching in the second and subsequent cuts than it did in the first. The bigger the crystals get the greater is the care required. Proofs should be taken constantly, and after each cut the massecute must be held a little closer than in the previous one. When two or three doubles have been made you have to decide whether the sugar in the pan will bear another double. This is just one of those points (like several others before mentioned) which cannot be described on paper with sufficient accuracy to be of any practical value, one lesson at the pan teaching more than fifty descriptions. When, however, the sling between the crystals looks "coarse," the proof being at the same time very sticky and the grains quite hard, there is great danger in persistent efforts to swell the grain by continuing to boil: besides the loss caused by the invasion of crystallizable sngar taking place after each charge of syrup, caused by the hardness and stickiness of the syrup; an inversion going on over and above the inversion which may be happening at the same time from other causes, such as the presence of sulphuric acid, etc., etc. I have proved the correctness of this statement by watching how much syrup it took to fill up the pan after the second strike, and how much after the third strike, the syrup being of course all of the same density and quality, each strike takes a little more than the preceding one.

Should you see that after the second double the crystals are rounded at the corners, *i. e.* not perfectly sharp cornered, do not double any more, but strike out; for when the crystals get round cornered, which often happens from an insuffiency of lime, they seldom grow in size afterwards, and there is waste of time and loss by trying to swell them. It is left to the sugar chemist to tell us how great a loss is caused by doubling, but as I said before, I believe the improved quality and color obtained by doubling fully repays for such loss, though probably it may be that I am misaken.

There is another thing which is very hard to account for; that is that one grain of sugar is larger than the others; but for all that I believe that this solution may be accepted as the right one, that I believe that during the process of granulation there are certain spheres in the interior of the pan more favorably situated for crystallization than other parts, and that is when the syrup in its evolutions of boiling passes through such changes that the large grains are rapidly formed, while in less favorable spheres, where the aids to granulation are less perfect, the grains are longer in struggling into existence. This is theory, but no proof. The doubling finished, strike out the whole contents of the pan, steam out well at once, and go about again for an entirely new sugar.

Even on the best arranged estate it sometimes happens that sour canes are sent to the buildings amongst good canes, either from being rat bitten or partly rotten, or laid over canes which cannot be guarded against sufficiently, and the result of such cane will be that sugar is apt to be sticky in the pan, and occasionally to such a degree as to seriously interfere with the formation or further development of the grain, and to endanger the whole strike of sugar. If this stickiness is not very bad, two or three buckets of strong lime water taken into the pan through the sulphuric acid cock will put things straight, but if the stickiness is very bad, and when in this state it rapidly gets worse, energetic measures must be taken immediately, although good bright sugar cannot be expected even if the means taken are successful. I am now only left to deal with the boiling of first and second molasses, and my article on sugar boiling is ended.

First molasses is that which runs from massecute which has no molasses boiled into it, and second molasses drains from massecute boiled with molasses in it, third molasses drains from second massecute in which molasses has been boiled into it. It is quite requisite that each of these three molasses should be kept distinct, and on no account be mixed. Third molasses is so sticky and impure that it cannot be boiled with success as regards either quality or economical production, so it is generally manufactured into rum. Only first molasses should be used for mixing with syrup to produce the desired color.

There is a great difference of opinion about the boiling of molasses, but while respecting every man's opinion on the subject, I intend to point out here one of the best ways for economically and successfully using molasses, provided (mark this word for a deal hangs on it) the arrangements of your buildings are such that the molasses can be boiled within an hour or two of its separation in the centrifugal, subsiding and keeping molasses being very detrimental.

I believe that this is the first time the plan I now recommend for dealing with molasses ever was brought before the public. Suppose the pan has filled up; struck out three tons (half, say), gone about and filled up again, and struck out another three tons, leaving three remaining in it. Now, instead of filling up the third time with syrup, do so entirely with

diluted and tempered molasses, a molasses not diluted with syrup but with water, and quite fresh from the centrifugal. After having been filled up with this molasses the pan strikes out all its contents.

From the moment that the pan boiler admits molasses into the pan, up to the striking point not one drop of syrup should or need be used, if the operation is properly performed.

Now while recommending this mode of using molasses I must not fail to point out some objections to it. The chief one is the difficulty in getting a sugar boiler who will fill up the pan with the molasses as described without mixing syrup with it. The reason for this is probably to be found in the fact that the boiling of such a large quantity of molasses into sugar requires the greatest care, and is much more difficult to perform successfully than the usual way.

A few words on the tempering of second and third sugar. There is a rule which applies to both first and second molasses. To 400 gallons of molasses, where sulphuric acid has been used in the manufacture of the sugar, from which the molasses is obtained, showing a density of 40 per cent. Beaumé, put in 15 gallons of 17 per cent. Beaumé cream of lime and 100 gallons of water—this should reduce the molasses to near about 30 per cent. Beaumé. If it should be sweeter add more water. When you need molasses for coloring your sugar in the pan, reduce to 25 per cent. Beaumé and temper with 2 gallons of lime cream, standing 10 per cent. Beaumé to the 400 gallons of molasses. When boiling molasses sugar keep changing and concentrating until the pan is full, and before striking raise the temperature to 170° Fah., which you have had previously at about 160-165 Fah., and when ready to strike, shut the foot valve (thus destroying the influence of the vacuum pump) and keep on the steam in the coils and jacket until the vacuum as shown by the guage is destroyed, then shut off the steam and strike. The object in striking at such high temperature is to accelerate and force the granulation hereafter in the cooling box or tank. The striking point for molasses sugar is more difficult to describe than that for syrup sugar; but when a thick thread can be drawn from thumb and forefinger (these extended to their fullest) without the thread "cutting" the striking period is reached.

I will now conclude by saying that I have no doubt that many may not agree with some of my remarks, as every one has his own ideas on a subject, and his own way of doing things. I trust that combined with practice before the pan, which is as indispensable as dissection is to a medical student, this essay will not fail to be useful to any one engaged in the sugar industry, but also be a guide to young beginners.

LOUIS J. LIONARON.

—Since the arrival of the large numbers of Chinese during the early part of the year, and the Portuguese and Germans, wages for day laborers have fallen in some places.

THE FERTILIZATION OF THE SUGAR CANE BY ARTIFICIAL OR OTHER MANURES.

EDITOR PLANTERS' MONTHLY: I have read with interest the opinions expressed in your columns regarding the use of artificial manures for these Islands. And it is gratifying to know that successful results have been, and are being, obtained from the use of bone meal.

I now venture to give you and your numerous readers my opinions on this important subject, having formed the same from several years practical experience during a residence in the West Indies, where all known sorts of artificial manures have been tried.

As a primary principle we desire to obtain year after year, from a given quantity of land, the largest possible amount of sugar, at the least possible expenditure of time, labor, and money. And the object every planter has in view in manuring his lands is to keep up a constant fertility, which will enable him to reap from them every year the largest possible crops. It is but reasonable to suppose that constant cropping would speedily exhaust any soil, unless we return to it, in some shape or other, those substances of which we deprive it; and that this is in reality a fact, every day's experience proves to us. It has been often demonstrated, that if plants grown on any given space of land be ploughed into the soil whilst they are in a green and succulent condition, the fertility of that land is much increased. This proceeds from the quantity of nutriments those plants have abstracted from the atmosphere during their growth; so that by their being ploughed into the soil whereon they had grown, they afford to it a much greater amount of substance than they received from it; consequently whatever excess they may furnish, so far enriches the soil.

Some plants are much more remarkable in this respect than others: for instance, lucerne ploughed into the soil previous to blossoming, enriches it exceedingly, and in Europe is very much used for that purpose. This is what is termed "green soiling," and by it the plant used is made the means of conveying to the soil the carbon and ammonia, which in its growth it extracts from the atmosphere. It also appropriates to its own use the excrementitious matter deposited by other plants growing in the soil previously, and deposits its own excrement, which serves as food to others succeeding it. In Europe and all cold climates this excrementitious matter voided by plants is much longer passing into putrification than in tropical countries; the necessity, therefore, of adopting a rotation of crops is much greater in the former than in the latter. All plants void excrement, which, when acted on by air and moisture, putrifies and becomes converted into "humus," or vegetable matter in a state of decay. This deposit of organic matter is common to all plants, and exercises a very beneficial influence on land, by furnishing it with a subsistence capable of being converted into humus, which is so desirable in a soil; but plants cannot long be replaced in the same soil without it being seriously affected by their own excrement; so much so that at length they altogether fail.

Artificial aid, however, induces a more speedy conversion of this matter into humus than would otherwise take place. This is effected by frequently turning up the soil with the plough or hoe, so as to expose the excrement to the influence of the atmosphere; and by irrigating the land with river water; as the water of rivers and streams contains oxygen in solution, which affects a most rapid and complete putrifaction of the excrementitious matter contained in the soil which it penetrates.

Whilst the cane is growing, it is constantly depositing in the soil, through its roots, the excrementitious matter of which I have already noticed. Were this allowed to remain undisturbed by the planter, it would accumulate to such a degree that canes would no longer grow on the land; but being exposed by frequent ploughings to the active influence of the air, it becomes transformed by putrifaction into humus, which supplies to the roots of the plants a constant store of nutriment, in the form of carbonic gas and nitrogen. Thus, the very excrement which the plant deposits in the soil, becomes by exposure to the air (and consequent oxidation) a fertile source of genial nourishment to itself, and to the members of its own class succeeding it. The greater portion of this organic matter is unquestionably derived from the atmosphere (as numerous experiments have fully proved). We therefore find that a constant store of manure is being prepared by the plant itself during the whole period of its growth, and that the aid of man is alone required to effect those changes which serve to render that stock of manure available.

The ploughings, however, serve to affect other changes than that relating to the conversion of excrementitious matter into humus; as the mineral constituents of the soil are exposed to the influence of the atmosphere, and undergo a disintegration of a portion of their parts; which thereon becomes, through the medium of water, befitting food for plants.

Every ploughing, therefore, that land receives may be termed an atmospheric manuring. Cabbet says, "A bright plowshare is the cheapest commodity ever used by a farmer;" and I not only agree with him, but I also sure that the planter who keeps it bright by constant work, will speedily be convinced that it is the cheapest fertilizer he can apply to his land. We perceive, then, that by frequent ploughing the soil is constantly improving, and the excrementitious matter voided by the cane is changed from a detrimental into a nutritive substance; so that the cane plant can be cultivated in the same soil, I might say for centuries, provided that the same good and effectual system be continued. In addition to this we must calculate the amount of ashes furnished from the furnaces of the mill, and the skimmings from the clarifiers and cleaning pans, together with other refuse which accumulates about the buildings.

In a succeeding number of your valuable monthly I shall continue this subject, and point out the great benefits to be derived from the collection and application of these substances as a fertilizer for the cane plant.

I am, sir, yours, etc. F. S. K.

VARIETIES OF CANE.

EDITOR PLANTERS' MONTHLY: The following is a description of the canes of these Islands by their native names, as I know no other. I am personally acquainted with the canes cultivated on the Hilea, Wailuku, Waikapu, Ulupalakua, Lahaina, and Pahala Plantations, and excepting Hilea, with the methods of cultivation employed. There is more variety among the striped cane than in any other. In 1877, during my first visit to Naalehu, I saw a great variety of cane growing in the same field. I asked why so many kinds were planted together, and Mr. Hutchinson answered that is was owing to the scarcity of seed cane when he commenced planting, owing to which he had bought seed wherever he could get it, in small patches and from the gardens of natives.

The following canes are indigenous on these Islands. I have been assisted in the preparation of the list by C. N. Spencer and others, and it is substantiated by a number of old natives.

1. Ualalehu.
2. Ualalehu maoli.
3. Honuaula.
4. Laukena.
5. Kea.
6. Papa.
7. Ohua.

The following canes were brought here from abroad, or generated here by change of seed to different elevations and localities:

1. Lahaina—From Marquesas Islands.
2. Palani—Origin unknown.
3. Kanio—Origin unknown.
4. Mikioi—Origin unknown.
5. Hou—Origin unknown.
6. Ainakea haole.
7. Ainakea maoli.
8. Manulele (highland cane).
9. Apeape—Origin unknown.
10. Puaole—From Waikapu.
11. Ko Wini—Discovered by H. M. Whitney at Kau.
12. Ko Uala—A highland cane of heavy growth and very productive.

We have what is called Otahiti cane, but I very much doubt whether it is the real Otahiti cane. I read in the sugar reports of the United States that Otahiti cane was introduced into the West Indies from the Island of Tahiti, and that it is distinguished by its great height, the long intervals between its joints, and the great length of the hairs which surround the flowers. This description seems to resemble our *ko kea*, or native white cane. I have been in Tahiti, and remember seeing cane there which resembled our *ko kea*.

In the *Annual of Scientific Discovery* for 1851, it is stated that the Crystalline, or Salangor and Chalk recently introduced into Louisiana, is superior to any other variety. From the description given I believe it to be what we call Lahaina cane. It is a large, long cane, with a tough rind and large firm eyes, and extremely productive.

The introduction of new varieties of cane cannot fail to be of great benefit to planters. The complaints of the degeneracy of cane after several years planting are becoming so frequent as to be alarming. Sometimes the cause is imperfect seed, sometimes defective planting.

The varieties of cane cultivated in Louisiana are five in number, viz: the Crystalline, the Bourbon, the Red Ribbon, the Green Ribbon and the Creole. The descriptions of the Red and Green Ribbons much resemble those of our Honuaula, Laukena and Mikioi.

The only authentic account we have of imported canes is concerning the Lahaina cane, which was brought here by Captain Edwards, ship *George Washington*, from Marquesas. GEORGE W. WILFONG.

CHINESE LABORERS.

Our responsibility toward these people (Chinese) cannot pass unheeded with impunity. However much we may ignore or deny this responsibility it still remains. And in this case our duty is coincident with our self-interest.—*June No. Planters' Monthly.*

On other occasions and in other periodicals it would be proper to set forth and urge the moral improvement of our Chinese population from a religious stand-point, but now, I desire to argue with owners of sugar plantations that it is for their *self-interest* to elevate and improve their Chinese laborers. This point is capitally put by the editor of this Magazine in the June number, from which I quote above.

Responsibility cannot be avoided, neither will it be, if the planter will consider that his success depends upon securing good reliable laborers. "Duty is coincident with self-interest," hence in arguing for the education and improvement of the Chinese population, an appeal can be made to the planter's self-interest. As facts are stubborn things, a few may not be of place.

It is a fact that Kohala plantation has been worked during the past four years by a very superior class of laborers, and the said plantation has acquired a most honorable reputation, *even in China*, so much so that any number of laborers could be secured, if they were assured of a position on that plantation. At the period referred to an unusual number of Christian Chinese engaged to work on that plantation, and to meet their spiritual want, the proprietors secured and paid a colporteur, who has so far discharged his duties that now his services are continued, and a Christian Chinese Church has been organized in that district.

The plantation has found it for its *self-interest* to donate a valuable site for a church edifice, upon condition that such a building was erected. The

building is erected and to be dedicated to the worship of God on the first Sabbath of the present month of August. The cost of church and parsonage will amount to about $3,500 cash, aside from valuable contributions in labor, and abatement of charges by the plantation and Messrs. Allen & Robinson, whe have furnished the materials.

Now I am fully prepared to argue that it is for the *self-interest* of not only the proprietors of the Kohala plantation, but of the other large plantations in the district, to foster and promote this enterprise; and for the same reasons that it tends to the pecuniary advantage and prosperity of a manufacturing town in England and America to be supplied with suitable churches. The district of Kohala is *pecuniarily* benefitted by the new Chinese church and parsonage erected in the centre of that prosperous community. It is reasonable to expect that this Church will soon be self-supporting, the same as the Chinese Church of Honolulu.

The existence and prosperity of this new church, will tend to elevate the standard of morality among the Chinese, and thereby contribute to make more valuable all plantation property in Kohala. The writer of the article above referred to well puts this point, when he says, "Those who have homes here, and property interests at stake, and the welfare of the country at heart, should give their full attention to this matter.

I do not hesitate to say that I honestly believe it would contribute to the pecuniary advantage—in the end—if the proprietors of all the plantations on the Sandwich Islands would support on each plantation a school-teacher, and instruct their laborers in the English language. I would not only include Chinese, but Portuguese and other nationalities. How much better for the laberors to gather for an evening and Sabbath school, than to spend their leisure hours in gambling, opium smoking and other vicious practices. This plan cannot be carried out by the Government, or by our Missionary Society, but it might be by the proprietors of plantations employing a school teacher, or lay missionary. Self-interest, gentlemen, should incline you to promote this enterprise: "Give and it shall be given unto you," are the words of Him who spake as never man spake. It is for your self interest to foster, encourage, and support schools, churches, and whatever tends to improve the mental and moral improvement of your laborers.

S. C. DAMON.

Honolulu, July 25, 1883.

DIVISION OF SUGARS.

EDITOR PLANTER'S MONTHLY: The following is a statement of the method of dividing sugar between different planters whose cane is ground the same day, the juice being mixed and passing through the clarifiers and cleaners together. Say cane is ground for three different parties A, B and C for whom there are ground in one day 10 clarifiers each. The

The average density of A's juice is 10°, of B's 9°, and of C's 8°. Multiplying the number of each man's clarifiers by the density of his juice gives for

A	100	units of	density.
B	90	"	"
C	80	"	"
Total	270		

The 30 clarifiers produce say 27,000 lbs of sugar:

A will then receive $\frac{100}{270}$.
B " " " $\frac{90}{270}$.
C " " " $\frac{80}{270}$.

A will thus receive 10,000 lbs or 1000 lbs per clarifier, B will receive 9,000 lbs or 900 lbs per clarifier, and C will receive 8,000 lbs or 800 lbs per clarifier. Each party thus receiving as much per unit of density as the others, but a smaller yield per clarifier.

The abovd method has been used at the Pahala Plantation, with great satisfaction to all the parties interested. GEO. W. WILFONG.

SUGAR PER CLARIFIER IN HAMAKUA, HAWAII.

The following statement of yield of various plantations in Hamakua, Hawaii, is supplied by Mr. G. W. Wilfong.

Cane of Mr. R. A. Lyons:

1st field, elevation 500 to 1000 feet above the sea level. Average density of 556 clarifiers of 500 imperial gallons capacity, 10°B, average yield of sugar from same:

No. 1 sugar 713.5 lbs.
No. 2 sugar 276.6 lbs.
No. 3 sugar 81.3 lbs.

Total per clarifier 1,071.4 lbs.

2d field, 1,000 to 1,400 feet above sea level. Average yield of 362½ clarifiers of 500 imperial gallons capacity:

No. 1 sugar 702.5 lbs.
No. 2 sugar 274.1 lbs.
No. 3 sugar 83.3 lbs.

Total per clarifier 1,059.9 lbs.

This is the average yield per clarifier of 500 gallons in this district.

Ratoons ground in October, 1882, at Honokaa Mill, from a field 700 feet above sea level, averaged a density of 10½°, clean 8°, and 1045 lbs to the clarifier. Plant cane cut in March 1883 averaged in density 10°, cleaned 7°, and 1040 lbs per clarifier from a field 1.000 feet above sea level. Another field of plant cane cut in February, 1883, averaged a density of 9° B, cleaned 6°, and made 930 lbs per clarifier. The average yield per acre this year has been, for plant cane 3 tons, for ratoons 2 tons. Exceptional fields of plant have reached 4 and even 5 tons.

SCIENCE ON SORGHUM.

No subject connected with our agricultural resources is to us of greater national importance at the present time than that of sorghum. This to many may seem a stronger statement than truth will warrant. *Sorghum* has become to some degree a sort of by-word, for though largely cultivated in the Western and Northwestern States, and producing annually a return worth about $8,000,000, still it has confessedly failed to do what was expected of it. Somewhere about thirty years ago the Chinese variety of the plant (the varieties are numerous) was introduced into this country, and the excitement in relation to it was not small. Its sugar producing qualities were extolled above measure; our sugar trade was to be revolutionized, so to speak; every farmer was to have a little mill, and a little kettle, and he was not only to boil out his own sugar, but to supply his less fortunate neighbors.

Some way, however, things did not seem to work right. The sugar no doubt was in the sorghum cane, for when its juice was boiled down a sweet syrup was obtained, but there the demonstration stopped. The sugar was in the sirup, but it most persistently refused to come out of the sirup; it could not be induced to crystallize; and though the sirup had a certain degree of value, yet it was not the thing wanted, and in the disappointment the popular feeling swung round to the unjust judgment of condemning sorghum, simply because it had been the victim of ignorance and mismanagement. Such utter and inexcusable carelessness and negligence prevailed in the treatment of the plant, that even the sirup was often nearly spoiled, and had a nauseous, disgusting, "burnt pumkin" flavor which could not fail to bring it into disgrace, and most justly so for itself, but not justly so for the plant from which it was derived. Recent researches however have done much toward explaining and removing the difficulties which have been in the way of successfully crystalizing the sugar from the juice of the sorghum.

Part of this has been accomplished by work in the laboratory and part by work in the field, the mill, the boiling house, etc., and they together have shown that the "national importance" of sorghum is not an exaggeration. The report presented by a committee of the National Academy of Sciences in 1882 has just been published as a Senate document. It is entitled, "Investigation of the Scientific and Economic Relations of the Sorghum Sugar Industry, being a Report made in Response to a Request from the Hon. George B. Loring, U. S. Commissioner of Agriculture." The committee consists of Prof. Bremer, of Yale, Prof. Chandler, of Columbia, Prof. Silliman, of Yale, Prof. Smith, of Louisville, and Dr. C. E. Moore, of New York.

The report shows clearly that essentially the two points on which success depends are maturity of the cane, and prompt correctness in working. With these, sugar from a field of sorghum can be as surely and safely expected as from a like field of sugar cane, and with perhaps fully as great a return.

The immense possibilities which such a revelation opens for the future sugar crop of the United States must be discussed at another time.—*Scientific American*, July 14, 1883.