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The cane and beet sugar crops of the world for the year ending June 30, 1899, are stated by Willett & Gray to have been 7,917,201 tons, of which 4,930,000 tons were beet sugar and 2,987,000 tons cane sugar. The total was 133,490 tons greater than in 1897-98.

The latest quotation of sugar in New York was $4\frac{1}{2}$ cents for Cuban centrifugals, at which price the market was firm, with small stocks in sight. The indications were that there would be no change from this quotation for some time, as grinding in Cuba has ceased, and the shipments from thence are practically ended for this year.

The Secretary of Agriculture of the United States Government has asked the Director of our Experimental Station to prepare a statement concerning the scientific agricultural work being done here, and to forward samples of soils, etc., to be included in the Exhibition of the United States Government at the Paris Exposition in 1900.

Notwithstanding the cut-throat competition between the sugar refiners in the United States, the net profit on every pound of refined sugar is stated to be at present three-sixteenths of one cent. On that basis a 4000-barrel refinery can secure a daily profit of \$800. The elder Havemeyer once said that his business would pay on a profit margin of one-sixteenth cent per pound.

The Sugar Trust has paid over \$100,000,000 in dividends since 1887. That vast sum, instead of being divided between a

few, was distributed among thousands of shareholders. During the last three years the Standard Oil Trust has paid dividends amounting to 94 per cent., or a total of \$91,415,000. The stock is now selling at 490, which gives it a market value of \$476,525,000.

The sugar crop of Java for the year ending June 30, 1899, has been 665,000 tons, which is an advance over the crop of the previous year, which was 550,000 tons. The increase is attributed to improved cultivation in the fields, and great improvements in the manufacture. Java, like Hawaii, has made advances in these respects during the past few years, when the crops ranged between 400,000 and 500,000 tons each year.

The principles for which you fought are union and liberty, that this country should be mighty and free, and that each man should be judged by his worth as a man; that the treatment of the people should be according to their individual merits, not according to race, color, or creed. Let us, then, realize that until we do treat man on his merits as a man we have not learned the lessons of the triumph you have won. Let us make the flag one of deeds, and not merely for men who are law-abiding and prosperous.—Gov. Roosevelt.

The Light is the name of a new Japanese weekly which has lately been started for the benefit of the Japanese in Hawaii. The editor is Mr. Okumura, who is well known throughout the group as one of the best writers and most intelligent of the large Japanese colony here. The aim of his paper will be to promote harmony among his countrymen here, and to explain the usages and laws of America—of which Hawaii is now a part—and what obligations they assume when they come here to reside. On the mainland many Japanese become American citizens, the same as Europeans do, and naturalization will be more frequent here in a few years.

The Times' correspondent at Paris states that a French engineer, M. Robin Langlois, has just invented a process, described by a leading French scientific review as very simple and inexpensive, for transforming rapidly into cubes or square blocks, possessing absolutely the external appearance and properties of refined sugar, all raw sugars made from cane or beets, hitherto whitened and purified by the methods at

present in use in the factories of the world. Under the new process the transformation of raw sugar takes only a few hours, while in the refineries today it takes from fifteen to sixteen hours. If true, the statement is of obvious importance, and particulars will be awaited with interest.—London Grocer.

Very few persons are, in these days of rapid travel around the world, compelled to submit to a rigid quarantine; still, occasions will arise now and then, when the public safety seems to demand that the law shall be carried out, vexatious as it may seem. Having once passed through the ordeal, we know its tediousness, especially when prolonged, as it sometimes is, to an extravagant, if not unreasonable, length. It affords pleasure, therefore, to note that the accommodations at the Honolulu quarantine are such that no persons can reasonably find fault with the provision there made to render them as comfortable and contented as it is possible for persons to be when so situated. Such is the opinion of Mr. George R. Carter, than whom no more competent judge could be selected to give an unbiased verdict.

Many people look upon the Filipinos as a mere race of savages, on a par with the despised North American Indian. But that is not the case. The lower classes are certainly to a great extent uneducated, but so were the lower classes of Europe and the United States fifty years back. The Filipino middle classes are fairly well educated, and the upper classes, to which Aguinaldo and his confreres belong, are gentlemen of high intelligence and exceptional attainments. It is to the upper classes of their own people that the Filipinos look for guidance, and they, being men of mark, can mold them as they wish. It is not a case of an uneducated rabble of semi-savages placing themselves in opposition to constituted authority, but a group of well-educated and courteous gentlemen, trained in modern sciences and arts, who have plenty of raw material at their disposal to thoroughly organize and carry out a campaign.

The sugar crop of these islands is now nearly harvested and ground, and most of the mills are closed for the season. The weather during the winter and spring having been good, the crop for 1899 will exceed that of the previous year, but to what extent is not yet known. A few mills, like those in Kau and Waimea, Kauai, where grinding can be done during any part of the year,

will be kept at work as usual. The several new plantations, which have been started during the past two years, will begin to affect the total output after 1900. Generally speaking, the mills and plantations are now in better condition for rapid work than ever before. This remark applies also to the mode of shipping sugar, machinery and general supplies at the various landings, where facilities for rapid work are greatly improved, as at Hilo, Kahului, Mahukona and other places which receive supplies and dispatch freight that formerly came via Honolulu. All this tends to reduce delays and expenses on such estates as are able to secure these local advantages. The weather also has been exceptionally favorable this year for all kinds of plantation work.

The interesting report on Hawaii, prepared by Dr. Maxwell at the request of the United States Government, which was first published in Washington as an official document, is inserted in this issue of the *PLANTERS' MONTHLY*. To persons residing abroad, and wishing to obtain authentic information regarding the capabilities of Hawaii, this report will supply the latest data obtainable. Regarding one statement in it—the cultivation of cereals—we must make an exception, so far as concerns wheat. The editor of this paper was interested in 1850 to 1856 in a flour mill in Honolulu, and incidentally in the cultivation of wheat on Maui. Wheat and other grains grew there well, but the wheat was of a dark color, and, when ground, did not make first-grade flour nor good bread, which was dark and heavy. This defect was noticed in the crops of several years. The flour was not to be compared with the fine California and Chilean product. Oats grew well and yielded well. The Indian corn raised there then, and still raised in Kula by the Portuguese, is equal to any American, so far as appearance is concerned. The Kula district on the western slope of Haleakala mountain, at an elevation of two to three thousand feet, possesses a cool and bracing atmosphere, and numerous Portuguese have settled in that locality. During a recent visit to Maui we were shown some very fine peaches and apples grown in that section. With a good supply of water or rainfall, some of the temperate fruits and grains could be raised to profit. But, at present, the Kula district is a very dry one, and the fruits that we have referred to as having been raised there were exceptional specimens—the peaches in particular, reminding us of the Delaware and New Jersey fruit.

SILK WORMS AND ENGLISH WALNUTS.

We have received from the Washington D. C. Bureau of Commerce a pamphlet on Sericulture and also on the cultivation of the English Walnut. The portion relating to Sericulture gives the latest improved methods now in use in France, Italy, Lombardy, Switzerland and Messena. The latest and most approved methods are here minutely described, and illustrated with numerous plates, showing the various processes adopted in the countries named. It treats of the mulberry tree, the silkworm, eggs, rearing houses, cocoons, moths, raw silk, and all the various details so necessary to learn in this delicate but profitable art of Sericulture. The same pamphlet contains a full description of the English walnut, the methods of cultivation in various countries of Europe, and showing the profit attending the traffic in these nuts, which are in growing demand in every country. The tree will grow here, but whether it produces nuts equal to those grown in colder climates, we are not informed. The business of raising English walnuts is a very simple one to learn, and is generally a very profitable one. This pamphlet may be referred to, for further information, in the library of the reading room of the Hawaiian Sugar Planters' Association.

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CANE SLICERS AND CUTTERS IN SUGAR MILLS.

Referring to an editorial in the June number of this monthly, in which reference was made in the advantages of using cane slicers, or cutters, in preparing cane for the rollers, we find an interesting article on the same subject by Mr. Thos. Gage Mann, from which we copy the following:

“When the factory owner succeeds in securing an extracting plant with adjuncts which will enable him to constantly obtain ninety-five per cent of the juice in the canes with moderate saturation, then he will be in a position to invest in other machinery, etc., to perfect the tout ensemble, and thereby reduce the cost of manufacture per ton of cane to a minimum. * * * Regularity, the desideratum in mill feeding when attained, will obviate alternating, violent strains, the cause of many and serious breakages, costly in the extreme, particularly where the campaign is of short duration. There will be a decreased tendency to lateral movement to fill interstices under pressure, and consequently less communication of

fibre. Minor adjustments will be made by the intelligent engineer, and bagasse of a more uniform and higher quality will be sent to the furnaces, and the steaming of the boilers will be more regular and reliable. Unusual mental strain and anxiety will be lessened, and watchfulness will be transferred from the carrier to the receptacle to see that there is a surplus of cut canes to keep the automatic feeder constantly in operation to supply the mill rolls. * * * When the crushing plants in the different cane-growing countries of the world are so perfect as to secure results equal to those had in the factories of Europe—a ton of cane will be manufactured at less cost than a ton of beets, and as the average saccharine strength of the juice of the cane should equal that of the beet, and the acreage yield of the former be double that of the latter—then barring the European bounty system the beet and tropical cane will stand on their merits as sugar-producing plants to supply the markets of the world.”

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QUEENSLAND'S LABOR TROUBLES.

From a recent issue of the Mackay Standard we cull the following paragraphs, which indicate that our southern neighbors, after having succeeded in partially checking the influx of Japanese coolies, are now stirred up with an Indian problem more vexatious than the Japanese. The Indians have the advantage that they are British subjects, and will probably win in the contest:

“A new phase of the alien labor question seems now to be in process of development, a phase which promises to be as serious a source of menace to the country as the invasion of Japanese, which is supposed to have been stopped by the Government—we refer to the batch of Hindoo laborers that arrived in this town last Sunday. We do not believe for one moment that it is seriously intended to permanently interdict the importation of laborers from Japan, and we are convinced that before very long the embargo that was placed upon their introduction will either be removed or very much modified. The refusal of the Government to sanction the introduction of this class of labor for the cane fields was dictated by political motives, and correspondence we now have in our possession tends to show that presently the Government will yield to judiciously applied pressure, and will once more wink at, if not openly permit, the Japanese invasion to be recommenced.

"Being British subjects, their landing cannot be impeded; but we maintain that their introduction into this country is as distinct a menace as that of the Japs. In many ways they are worse than the Japs, as they can live far cheaper, are quite as ingenious, and come more directly into competition with the European residents. Being British subjects they are fully entitled to all the privileges that Europeans enjoy; they can hold land, and are not by any means slow to acquire real estate for speculative purposes.

"If Queensland is to be overrun with Asiatics we do not see that there is much to choose between the Indian or the Jap. Both are objectionable, both bring their quota of Asiatic diseases into our midst, and the introduction of both tends to militate against the formation of a white Australia. There are not many residents in this district who seriously object to the employment of Kanakas in our cane fields, but recent occurrences show that the Kanaka is slowly but surely being superseded by the Asiatic to the detriment of the best interests of the colony."

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FRAUDS IN FERTILIZERS.

It is fortunate for Hawaii that we have here the factories for preparing such fertilizers as our soil requires, and that they can be made to contain the ingredients suited to the various conditions and localities of each of our islands which have been found to vary very much. To this very essential requisite may be attributed part of the success that attends the manufacture of sugar here. In a discussion of fertilizers, which took place in April last at the monthly meeting of the Louisiana Sugar Planters' Association, Prof. Stubbs gave some facts which ought to be known by sugar planters in every country. We copy part of his remarks as published in the Louisiana Sugar Planter:

"Now I wish to call attention of the planters to a matter of interest to you all. One of our planters a few weeks ago bought a large quantity of cotton seed meal, and brought us a sample. It had a beautiful yellow color. He had bought it by sight, and it had every appearance of being a first-class meal. We analyzed it, and to our horror found it contained only 3 per cent of nitrogen. We re-analyzed it, and immediately posted a man off to the planter to inform him to hold off and not to buy the goods too largely, and that he should not

pay for the goods until further investigation. We went to work and made a physical analysis. We separated the meal carefully and found 50 per cent of meal and 50 per cent of hulls—about half and half—and the hulls were so adroitly concealed in the meal by a process of polishing, and were pulverized with so much fineness that it required the microscope to detect it. By this work we found small reddish particles, which were so finely imbedded in the meal that they could not be detected with the naked eye. It was a yellow meal—at least had that appearance. You could not detect the imposition with the naked eye. This stuff contained one-half meal and one-half hulls. We immediately posted the planter, and he rejected and sent back from his plantation ninety odd tons. I have not been able to find out where the meal came from. It went away from Louisiana after the exposure. I mention this so that planters may be just as careful as they can possibly be. Under our fertilizing law we cannot inspect cotton seed meal. Three-quarters of the cotton seed meal in the Southern States goes out to foreign ports, to England and to the North, where it is used for food. We have no control over it under our fertilizing law whatever. We are willing to aid those who buy it if they will send us a sample. You can withhold payment until you find out whether the meal is pure or not. I have not the slightest idea where the meal we analyzed came from. This occurred two months ago.

“Chair: ‘Was the sample you refer to bright yellow?’

“Prof. Stubbs: ‘Just as pretty yellow as I ever saw. The cuticle had been taken off and exposed the hull of orange color inside and had been ground to a complete powder, and this was thoroughly macerated and mixed with the yellow meal. The imposition could not be detected by the naked eye, and our analysis developed that only one-half was pure meal, the other half being hulls with no nitrogen in it. If any of the gentlemen present here tonight contemplate buying cotton seed meal, I would advise them to have analysis made first.

“I don’t want to condemn our home product; it is as Mr. Goldsmith said here this evening, our cheapest and best form of nitrogen. Cotton seed meal contains 7 per cent of nitrogen, 140 pounds to the ton. If you will calculate the value, estimating the nitrogen at 15 cents per pound, and multiplying 140 by 15, you will get twenty odd dollars; and yet you pay but \$16 or \$17 per ton in this country for this cheap form of nitrogen. Therefore I don’t mean to say we should discontinue

its use; but I mention the incident referred to, so that all who buy it may, before using it, send us a sample, and we will determine its true composition.' ”

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LABOR IN BRAZIL.

The manumission of slaves inaugurated an era of labor troubles in Brazil, but those who thought that it was the end of cheap coffee cultivation in Brazil have been disappointed. Rising to the occasion, the authorities took measures that have met with some success, and free labor has been substituted for slave labor in such a way as to allay all fears concerning the future of the coffee industry. In the State of S. Paulo there has been practically no check to rapid agricultural and industrial development. When, in 1889, slavery was abolished, no compensation whatever was offered to slave-owners. They, consequently, not only lost heavily in capital, but were threatened in their income also in consequence of the impossibility of continuing the cultivation of their estates. Foreseeing this, the State of San Paulo took the initiative, and established the importation of free labor that has proved the salvation of that important State.

The cost of this was great, but Brazil stands alone in having witnessed the abolition of slavery without payment of any compensation whatever, and without disturbance or temporary suspension of ordinary pursuit and activity. No period of Brazilian industrial history evidences greater activity than that which immediately followed emancipation. Not only did agricultural enterprise, until then almost absolutely dependant upon slave labor, not decline, but plantations were extended in such a manner as to nearly double production within ten years. The same contemporary observes that the last contract authorized by the State of San Paulo was for the introduction of 60,000 immigrants in 1897. Of these, 44,000 had been imported up to December 31, 1898, of whom 25,184 entered year 1898, consisting of: Italians, 18,946; Spaniards, 3,262; Portuguese, 2,278; Austrians, 426; Germans and Swiss, 272.

This shows what a heterogeneous population is being collected in that State; but, after all, it is a population of white men, and Brazil would appear to be free from any risk of the grave danger that now menaces the United States of America in the preponderance of political power on the part of the

colored race. It may have to take precautions against the mania for revolutions that seems to afflict its smaller neighbors in South America; but that should not be very difficult.

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*HAWAII'S WONDERLAND—RECORD OF A CENTURY'S
VOLCANIC ERUPTIONS.*

There is a charm about Hawaii's volcanoes, that makes each new outbreak a center of attraction, inspiring every lover of the grand in nature with a strong desire to witness the marvelous and beautiful exhibition of our great island wonder, whether it has been seen before or not. Like the views in the kaleidoscope, Hawaiian eruptions are ever changing, each succeeding one presenting some new variations and charming features of pyrotechnic display, in viewing which the fortunate beholder never tires, and which live in memory as vivid dreams of an ineffaceable reality. After having seen a dozen or more of these eruptions, and after having lived for six years in nightly view of the glowing fires of Kilauea, the writer confesses a desire to see each new display, as eagerly as he did the first in 1859, when he stood for hours on the brink of what may justly be termed a river of liquid fire, flowing from its crater orifice, on the western side of Mauna Loa, near the summit, down to the shore, where it poured over the rocks like a waterfall into the sea—the distance from the crater to the shore having been over thirty miles—this molten river being visible its entire length.

Numerous and sudden as our volcanic eruptions have been, they have seldom been accompanied—at least since the residence of foreigners on Hawaii, with destruction of property, and never, so far as our data show, with loss of life. A Hawaiian legend, however, tells of the destruction of Keoua's army near the volcano of Kilauea in Kau by a shower of volcanic sand, which spread over a large tract, and is to be seen there now. In the lava flow and earthquakes of 1868, the dwelling-house and farm property of Capt. Brown at Kahuku, Kau, were destroyed, but no lives were lost. About the same time, a land slide, caused either by an earthquake or rain, occurred two miles east from Keaiwa (near where the Pahala sugar mill is now located,) which caused the death of thirty-one Hawaiians, who were living at the foot of the mountain.

and buried over five hundred head of cattle, which were grazing along the foot hills.

Strangers as well as residents sometimes ask how often the volcanic eruptions occur. There are no regular periods, but the records of the present century show that there have been twenty, including small and large eruptions. There has been no regularity with them. It may however be assumed that a lava flow occurs, on an average, every three, four or five years. During the first twenty-two years of the present century, we have no record of any except that of Hualalai, the large mountain back of Kailua, which took place in 1801, the stream pouring into the sea near the mountain. Native tradition reported to the missionaries that deaths had occurred from this eruption, but like the traditions concerning Keoua's army they are considered not reliable, or rather exaggerated.

1823.—The first action of the volcano after the arrival of the missionaries in 1820, was in 1823, and is described by Ellis. This took place below Kilauea, and served to extinguish its fires temporarily. Later the fires returned, and the whole area of the pit was described and pictured by him as in action.

1832.—In this year—twelve years after the arrival of the missionaries—we find the first reference to an eruption in the summit crater of Mokuaweoweo, which continued in action for two or three weeks. Kilauea, which for some time previous had been very active, subsided during the activity of Mokuaweoweo, showing a connection between the two. Kilauea iki was also reported very active at this time.

1838.—Count Strezlechi, who visited the volcano this year, reported Kilauea in extraordinary activity over its entire surface. His description seems to corroborate that of Ellis that the whole interior of Kilauea was in action then. While now or rather during late decades, the activity has been confined chiefly to Halemauuan.

In 1840—there was an eruption below Olaa, which flowed through Puna reaching the sea near Nanawali. Jarves describes this in his "Scenes and Scenery," having witnessed it. Kilauea crater was emptied and subsided for a short time.

In 1843,—an eruption took place in January, on the north side of the summit of Mauna Loa, and flowed into the valley between Mauna Kea and Mauna Loa, one branch heading towards Hilo. It lasted only three weeks, flowing about 30 miles.

In 1851, August 8, a stream broke out near the summit of Mauna Loa, ran four days down the west slope of the mountain and ceased.

In 1852.—a large stream broke out on the northeast slope, and lasted one month.

In 1855.—a stream of lava broke out on the northeast side of the mountain, at 12,000 feet elevation, and flowed into the valley region between Mauna Kea and Mauna Loa, then turned eastward and continued to flow toward Hilo for thirteen months, making the largest stream on record. It ceased when the lava had reached within eight miles of Hilo.

1859.—This year witnessed one of the grandest displays ever seen on Hawaii. The lava broke out on the northwest side of Mauna Loa, some 3000 feet below the summit, and took a northwesterly course, almost straight to the sea, some twenty-five miles distant south from Kawaihae. The flow lasted for thirteen months, and without cessation, affording to visitors the finest spectacle that could possibly be seen. It was visited by the writer, and the entire party could walk to within a stone's throw from the fiery stream, without the slightest inconvenience, except from the heat. In some places the lava stream flowed like a river of ice, bearing large boulders in its course, and reached the sea at Wainanali'i, a distance of thirty-eight miles from its source. This stream was visited by thousands, being distant from Kailua only fifteen or twenty miles—an easy horse-back ride.

1865.—An eruption occurred December 31, confined to the crater, and continued for four months.

1868.—On March 27 there was a heavy explosion on the south side of Mauna Loa, some distance below the summit, when a large stream of lava burst out and flowed rapidly down to the sea. So suddenly did this take place, that Capt. Brown, who lived at Kahuku, where Col. Norris now lives, had barely time to escape with his family, and flee, like Lot of old, for safety, leaving everything behind to be burned by the rushing lava stream, which swept over this ranch. This being another rapidly-flowing river of lava afforded to the few spectators who saw it, as did the writer, one of the most startling scenes of the kind ever witnessed. It resembled somewhat the flow of 1859 before referred to, only the lava moved with much greater

rapidity. It lasted only four days. A full description of this is given in Jarves' History, fourth edition, 1872.

1872.—A very fine eruption, confined to the summit crater of Mokuaweoweo. It continued for five months, and was visited by Miss Isabella Bird, the late Wm. L. Green, the writer, and many others.

1873.—A similar eruption, confined to the summit crater, and continued in varying activity for eighteen months. These eruptions in the summit crater are among the finest exhibitions of the volcano. They can be seen only from the rim of the crater, a distance of half a mile from the fountain. The lava ejected flows into a lake, formed in the summit crater, often a mile in length.

1875.—This was also in the summit crater of Mokuaweoweo, and lasted about one month.

1877.—Feb. 14. A repetition of the above lasted two days. A submarine eruption occurred during this year near Keala-keakua, when the sea was covered with blocks of pumace stone floating on the water. When picked up by the passing steamer these blocks were hot, showing that they had just been thrown out from some submarine crater.

1880.—A short eruption in the summit crater similar to those of 1872. 3, 5 and 7.

1880.—In November of this year, the volcano broke out near the summit, on the northeast side, with a very large flow, which continued for nine months. The stream of lava did not cease till it had reached within a short distance of Hilo. There were three streams in this flow, and the quantity of lava discharged probably equalled that of any previous eruption.

1884.—In January of this year there was an eruption in the sea, near the shore, at East cape, Puna.

1886.—There was a small eruption in the summit crater of Mokuaweoweo, which lasted but a few hours.

1887.—An eruption took place on the southwest slope of Mauna Loa, near the large flow of 1868. It continued for two weeks, but was visited by very few persons.

1896.—After an unusually long period of rest, the crater of Mokuaweoweo again commenced action on the 21st of April, and was visited first by Dr. Friedlaender, who ascended the

mountain from Kealakekua on its western slope. The column of lava was estimated to be 200 feet high, with the large molten lake, which exists during the summit eruptions. It continued in action for one month. Since that date, neither the summit crater nor Kilauea has shown any activity worth noticing till the recent outbreak on the northeast slope.

1899.—This last eruption commenced with a grand explosion on the morning of July 4, as though madame Pele meant to join in celebrating America's anniversary. The outbreak took place some four or five thousand feet below the summit level, and divided into two or three large streams—then flowing onto the plateau between Mauna Loa and Mauna Kea, have taken an easterly course towards Hilo.

The above comprises a list of the eruptions on the island of Hawaii during the present century, so far as appear by the records at hand. It shows twenty-three eruptions, not including the first twenty years, of which we have no authentic data, excepting that of Hualalai in 1801. It is quite probable that, were the data of the first twenty years known, it would show that volcanic eruptions of some kind have taken place, every four years, on an average, during the century now ending, and also that the volcano is probably quite as active now as during any of the recent centuries.

Late investigations of European scientists have shown that steam is the active agent in volcanos, and no doubt this is the case with our volcano. The water of the ocean finds access to the internal fires, with the result that disturbances follow, with discharges of the molten lava from time to time accompanied with earthquakes of greater or less severity. No way, however, has been devised to determine when an eruption is likely to occur, nor any indications to show when it will cease. All that is left us is to enjoy the sight, unless it happens to come too near our dwellings or farm holdings.

The new eruption of the volcano on Hawaii, which broke out on the 4th, is in the same locality where some of the largest flows on Hawaii have commenced, on the north side, and three or four thousand feet below the summit level. Although its course has changed to an easterly direction—parallel to those of 1855 and 1880—the present indications are that it is not likely to flow so rapidly, nor so long, as it did its predecessors. Still

our lava streams are often very capricious and tantalizing. The smoky atmosphere which has enveloped the islands the past few days is due to the present eruption, caused by the burning of trees and grass in the lava track.

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A LARGE TRINIDAD SUGAR MILL.

The Usine, St. Madeleine, in Trinidad, is the largest Sugar Factory in the West Indies. Its output is 150 tons of sugar in 24 hours, and the crop for this season is expected to reach nearly 14,000 tons. The Usine is the property of the New Colonial Company, and it is managed by Mr. Abel, formerly a Demerara man, who has been in charge of it since 1881, when it was a comparatively small concern. It has become such a complete success that it is a recognized model for undertakings of a like kind. The Usine is supplied with canes by a group of estates in tolerable proximity, belonging to the Company, and also to a considerable and growing extent by cane farmers in the neighborhood. The transportation of canes has entailed the laying down of over 50 miles of railway.

One of the first things that strikes a Demerara planter at the Usine St. Madeleine, is the enormous quantity of work that is done by the mills. There were originally two mills, each 34 inches by 72, worked independently. A third mill has been added, so that there is now a double crushing and a single crushing plant. The double crushing plant does about 25 per cent. more than the other. As the day's output of sugar is 150 tons, the single mill runs out nearly 70 tons in 24 hours. This good result is due to an unfailing supply of canes, the constant picking of the rollers to prevent slip, the perfect condition of the machinery, a constant supply of steam at a high pressure, running the mills fast, an even feed and no backing of megass. The regular supply of canes is secured by the rigid discipline, enforced by Mr. Abel, in having his daily requisitions for a certain number of truck loads carried out to the letter. All the rollers of the mills are marked while working, with chisel-faced hammers. The back ones are marked through the megass, and the front ones through the juice which passes over them. There is practically no slip, and during the three days that I saw the mills at work none of them ever choked or refused its feed. This is the more remarkable as there is no hydraulic or other attachment to enable the mills to adapt themselves to a varying feed. The feed of the

single mill is regulated by the cane carrier clutch which is used freely. The feed board is long and steep and this length and steepness seem to lend themselves to a regulation of the feed. A constant supply of steam, at the same pressure, has a great deal to do with the successful working of the mills and, indeed, of the whole Factory.

The canes are taken from the trucks to the cane-carrier by means of newly-invented and recently erected mechanical rakes. These rakes are exactly like megass elevators, with long iron teeth on the paddles and the upper drum made to lower and raise by hand levers. The loaded trucks are run alongside the cane-carriers, the sides next to the carriers dropped down and the cane rakes lowered until they reach the canes. They are gradually lowered until the trucks are emptied. They work splendidly and have effected a saving of the labor of 60 men in the Usine. The cane-carriers are about the same width as ours, but their sides are much deeper and there are no dividing boards in them to make the canes lie in one direction. The sides are perpendicular. The depth of canes on the carriers is often over two feet. I should have expected with such a feed that at times it would be left by the carrier, but such is not the case. This is probably accounted for by the canes generally being cut to shorter lengths than ours and to the straightness of the sides of the carriers which allows the whole weight of the canes to rest on the paddles. All of the canes are weighed on a fine scale which weights four truck loads at a time.

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The following from the *American Grocer* of recent date seems to voice the public sentiments, while the Government is calling for more revenue, and can obtain it in no less onerous way: "A tax on coffee would yield from \$16,000,000 to \$40,000,000 without imposing as much of a burden on consumers as was the case in 1896, when the average cost for No. 7 Rio for the year was 15 cents. To-day No. 7 is worth 6 cents; with a two-cent duty it would cost 8 cents less, and with a five-cent duty would be two cents lower than three years ago. A duty would work in favor of better average quality; add no perceptible burden upon the people; distribute the tax almost as evenly as a tax on sugar, and more so than the tax on tobacco; give the Government needed revenue."

THE HAWAIIAN ISLANDS.

BY WALTER MAXWELL.

Director and Chief Chemist of Hawaiian Sugar Planters' Association.

AREA AND POPULATION.—The Hawaiian group comprises some eight distinct islands, seven of which have a registered population. These islands are separated from each other by ocean channels that vary in width from the narrowest, covering 6 miles of sea, to the broadest, measuring 61 miles. The archipelago lies within the limits of latitude 19° to 22° 15' north and of longitude 154° 48' to 160° 20' west.

The superficial areas composing the group, with their respective populations, are as follows:

Islands	Area Acres	Population
Hawaii	2,000,000	33,285
Maui	400,000	17,726
Oahu (seat of government)	360,000	40,207
Kauai	350,000	15,228
Molokai	200,000	2,307
Lanai	100,000	105
Niihau	70,000	164
Kahoolawe	30,000	.....
Total	3,510,000	109,020

The population record is the result of the census of 1896. Since that time, however, the total given has been appreciably added to, and the growth is in progress.

CLIMATIC CONDITIONS.—In relation to the small land areas, the variations in temperature and rainfall are extremely great. These variations are due, first, to land altitudes and, second, to the exposure to rain-bearing winds. Taking Honolulu as an example, the average of temperature for the year is 73° F., with an average of night temperatures of 68° F., and with 80° as the average of the year's day temperatures. The extremes of variation are 48° F. and 87° F. during the year's course. Locations at sea level, corresponding to Honolulu, with leeward exposures, present the same conditions, some having temperatures 1° to 3° higher, others 1° to 2° lower; while sea-level temperatures with a windward exposure are generally lower, in some cases 5° to 7°. Leaving the sea level, the air temperature falls with increasing altitude; in certain ascer-

tained locations it falls at the rate of 1° F. for each 200 feet. The rate of decrease of temperature, however, is very variable, being affected by such factors as prevailing winds, open or forest-covered areas, level or extremely broken up land surfaces, and the prevalence of deep valleys and alternating ridges. Due to these factors, climate is extremely local, varying with the prevalence of conditions confined within very small areas. Yet, there is the general decrease in temperature with the increase in altitude, this rule progressing until a temperate climate is reached, the variation in temperature moving between above freezing point and 70° F. Finally the elevation depresses the mercury below freezing point, from which level the ascent leads up to the great mountain altitudes of from 8,000 to 14,000 feet, where many degrees of frost have been recorded, and where the snow lies during most, and in some places all, of the months of the year.

The variations in rainfall are as great as in temperature, the factor of altitude being the main cause of variation. At the sea level in Honolulu the rainfall is some 32 inches per annum; at an altitude of 900 feet the rainfall is 116 inches. On the island of Maui in one district the rainfall at sea level was 28 inches, and, during the same period, at an altitude of 2,800 feet the yearly rainfall was 179 inches. Exposure to rain-bearing winds, especially where the land surfaces are covered with forest, is also a controlling factor, in unison with the factor of elevation. In the driest district the rainfall rises with the altitude; but, taking the island of Hawaii as an example, between districts of the same island, and at corresponding altitudes, the actual records show variations in rainfall between 60 and 160 inches per annum. The extremes of variation in recorded rainfalls, covering the four chief islands, are between 12 inches and $19\frac{1}{2}$ feet of rain per year.

These varying conditions of climate, due mainly to altitude, provide most reassuring possibilities in respect to the public health. It is also apparent that these great variations in temperature, by which even the limited area of these islands is resolved into actually tropical and temperate zones, constitute a basis upon which a most diverse agriculture can be built up.

SOILS OF THE ISLANDS.—Over the sites upon which the several islands rest to-day the waters of the Pacific rolled, and but a short time ago. The islands are the result, on the one hand, of vast internal earth movements, whereby submarine levels were lifted up, and even raised sheer out of the water; on the

other hand, continuous or successive periods of eruption, which were at first submarine, by vast outpourings of lava laid the broad foundations of the islands beneath the ocean surface, and finally raised the superb mountain cones and heights, reaching up to as much as 14,000 feet above the level of the sea. The whole islands, therefore, are of volcanic origin, and, geologically speaking, they are of very recent date.

In consequence of the volcanic origin of the islands, the soils are wholly derived from basaltic lavas. In respect of color and geological and chemical composition and nature they fall into the following classes:

(1) **DARK-RED SOILS.**—Soils formed by the simple decomposition of normal lavas under climatic action, and more particularly where great heat and small rainfall have prevailed.

(2) **YELLOW AND LIGHT-RED SOILS.**—Soils which differ not only in color but also in their composition from the dark-red soils, these differences being due to special physical and chemical influences which marked their origin.

(3) **SEDIMENTARY SOILS.**—Soils derived from the decomposition of lavas at high altitudes, the decomposed matter being removed by rainfall and deposited over lower levels.

LOCATION AND CHARACTERISTICS OF THE SOILS.—On account of the gradual rise in altitude of the lands from the sea level to the mountain elevations already described, the soils have come to be spoken of also as "lowland" and "upland" soils. The measure of increase in altitude is, on an average, some 300 feet per mile, thus furnishing the acute slopes which have caused the formation of the sedimentary soils.

The "sedimentary soils" cover the levels and flats bordering on the sea, forming also the deltas receiving the wash from mountain gorges and valleys. These soils, almost without exception, are very fertile, and because of their great depth over considerable areas the fertility will be of long duration.

The "dark-red soils" are chiefly confined to the areas located immediately above the sedimentary flats and lowlands, on the leeward and dry sides of the islands. These soils are also of great depth and uniform composition, and their fertility, so far, is equal to that of the lower lands.

The higher lands, or such as range from 200 to 500 feet above sea level up to 2,000 feet, are extremely different in type and composition. Due to the heavy rains that fall upon the uplands, the decomposing lavas and soils have been largely borne down to the lower levels, and, as a result of the climatic conditions, those highland soils are not only of small depth,

but they also have been largely depleted of the more soluble elements upon which vegetation thrives. These soils therefore are less fertile, and their virgin fertility becomes comparatively quickly exhausted. In general, however, Hawaiian soils are of great virgin fertility. Agriculturally, they are young and in a state of primary freshness as compared with the soils of old continents and islands.

PRODUCTS OF THE ISLANDS.—The Hawaiian Islands are wholly dependent on agriculture for their industrial maintenance. There has been no industry not directly agricultural up to the present date of their history. This fact makes it very urgent that the agricultural resources, so far the only source of wealth of the islands, should be developed along all possible lines and to the utmost limit.

SUGAR.—The production of sugar employs the major portion of the capital and labor upon the Hawaiian Islands; it also furnishes the bulk of the exports, and provides the wealth and maintenance of the great majority of the people.

It is about sixty years since sugar was first produced for sale upon the islands. At that time the methods of cultivation and manufacture were very crude and the production was small. Even so late as the year 1880 the total output is recorded as having been 30,000 tons. Without taking the time and care to traverse each stage in detail in order to show the "ups and downs" of the industry and by what efforts it has reached the present dimensions, it will be sufficient to state the total value of Hawaiian exports for 1897 and the proportion of that value accruing from the shipment of sugar: The total of Hawaiian exports for the year named amounted to \$16,021,775.19, while the sales of sugar amounted to \$15,390,422.13. These figures present at a glance both the sum of the trade which the islands transacted in 1897 with foreign countries (over 99 per cent. of which was with the United States) and the dominant and vital part that sugar plays in the industrial existence of the country.

Sugar is grown on Hawaii, Maui, Kauai and Oahu, the four largest islands in the group, and its cultivation is about to commence on the islands of Molokai and Lanai. There are some sixty plantations now in operation, each one having its own mill or factory equipped for the manufacture of raw sugar. The sugar-growing and sugar-making capacities of these estates vary between less than 1,000 tons up to near 20,000 tons of sugar per annum.

Much of the low, level, sedimentary areas bordering on the

seashore is used for growing sugar, while the areas of rich, dark-red soils, located at comparatively low altitudes, are used exclusively for this purpose. Very considerable breadths of the less fertile yellow and light-red soils, with larger stretches of uplands that reach up to 1,500 feet, and in locations as high as 2,000 feet, above the sea, are also used, so far as it is found profitable, for sugar growing.

The relative fertility and values of the several soils are shown in the following statement from an official investigation, which embraces the average results of three successive crops:

	Pounds of Sugar per acre
Dark-red soils	10,411
Sedimentary soils	10,301
Yellow soils	6,291

On an average two years are required to make a crop of sugar in Hawaii, while only one year is required in Louisiana, so that the sum of the Hawaiian yield requires to be cut in two in order to compare it more accurately with the annual production of Louisiana.

The area of arable lands used in growing sugar in Hawaii may be deduced from the figures in the following table, which also shows the annual production of sugar:

Year	Cane Manufactured Acres	Sugar made Tons (2000 pounds)	Yield of sugar per acre Pounds
1895.	47,399½	153,419½	6,472
1896.	55,729	227,093	8,148
1897.	53,825½	251,126	9,331

The average number of acres of cane manufactured for the three years given was 52,318. As the crop requires most of two years to mature, and as two crops are always in course of growth at the same time, it is seen that the acreage under cane is not less than 105,000 acres. Since some small areas of extreme uplands are two and one-half years in reaching maturity, the above area must be considerably added to. Considering the further fact that some portion of the total area is always lying out for rest, we are justified in concluding that the land in use for cane growing is 125,000 acres.

RICE.—At the present time rice occupies the second place in the area of production and in the value of product. The total production can not be exactly estimated, since a part is

consumed upon the islands. The exports of rice for 1897 were 5,499,499 pounds, valued at \$225,575.52.

The home consumption is large and would greatly augment the production indicated by the exports.

The lands used for rice are chiefly the lowest flats found at the outlets of valleys and close on the sea. These lands are generally fertile, but often too low and swampy for cane culture. These locations are favored with an abundance of sweet water, which is discharging to the sea, and this is a first essential condition in rice culture. During the growth of the crop and up to the time of maturity the lands bearing rice are held under water, which is kept gradually flowing and not allowed to stagnate and sour on the ground.

The rice growers are almost wholly Chinamen. This race is able to work and thrive in conditions of location and climate which other peoples do not appear able to endure. From lowland climatic action, which is liable to induce low fever, especially among Japanese, the Chinaman is apparently immune. Certain small areas of low bog lands in and about the suburbs of Honolulu are being rapidly drained, cultivated, and planted with vegetables or fruits or overflowed with sweet running water to support the rice crop.

The area of rice lands is not appreciably increasing. There is a tendency to use certain of these lands, which allow of it, for sugar growing, the present prices of sugar being very tempting.

COFFEE.—The coffee berry is a natural product of Hawaii. It is growing wild in locations upon several of the islands. These wild trees have reached a large growth, and they are still furnishing berries to the native Hawaiians. When the berry was first introduced into the country is not known. It passes as one of the growths native to the islands and their conditions.

The interest taken in coffee to-day, however, with its prospective value, is lifting the question of production from a way-side matter into one of the most engaging industries of the islands.

Coffee is being cultivated upon the four larger islands. On Maui and Kauai the work has not passed the experimenting stage in areas and results. On Oahu the production is, in one district, getting on to a commercial basis. It is to the island of Hawaii, however, that one must go in order to see what is being done and to estimate the possibilities of the industry.

There are four main coffee districts on the Island of Hawaii,

namely, Puna, Oloa, Kona and Hamakua. A census of the areas in the several districts that are at this time under coffee has been attempted, but the data do not justify a precise statement regarding the number of acres and accomplished results. Many planters express areas by number of trees, but as the distances between trees are not uniform acreage can not be reliably deduced. In the district of Oloa, which claims the largest total area and the greatest number of planters, the land actually under coffee is about 6,000 acres. The other districts have relatively smaller areas under plant than Oloa, but this present circumstance does not necessarily indicate the future relative importance of the several districts. The matter of soil, with the essentially associated climatic conditions, are the prime factors which will ultimately determine the values of the respective districts for permanent coffee growing.

An idea is had of the commercial importance of the coffee industry by observing the exports of the berry to other countries. Foreign shipments, however, do not express anything like the volume of the total production, since the coffees used on the islands are chiefly home grown. The exports for 1897 were 337,158 pounds, valued at \$99,696.62.¹ These figures, however, not only do not represent the volume of production for the year stated, but they fall still further short of indicating the present basis of the industry. The coffee tree requires several years of growth in coming to economic bearing. This means that while the present area of actually bearing lands is so much, a larger or smaller area may be in course of coming up and will be added to the actually producing lands within a year or so. This fact is well illustrated by the following conditions now obtaining in the Oloa district: Coffee area—under one year old, 1821½ acres; one to three years old, 2,749½ acres; over three years old, 1,344 acres.

Certain of the areas of "from one to three years old" in 1897 are now bearing, and other areas are closely approaching that state.²

The coffee industry of Hawaii is not destined to impress the world by the great areas under cultivation or the volume of shipments corresponding to the production of other countries.

¹ Report of Hawaiian Collector-General of Customs, U. S. Treasury, 1897.

² For areas and conditions more in detail, see report of Consul-General Haywood to the State Department.

Hawaiian coffees, however, are on the way toward a permanent reputation for high and specific quality. They have their own aroma and marked flavor as distinctly as does the Hawaiian pineapple, which makes it aromatically superior to most known pineapples. With the delicate flavor is also associated a mildness and freedom from the acridness that marks many individual and unmixed coffees that are on the market. Hawaiian coffee is complete in itself, and no known mixture adds to its native excellence. Prices already obtained for selected samples sold abroad justify the view that this coffee is capable of reaching a unique position, where quality and not price is the first consideration of the consumer. This consideration of "quality" makes it necessary in the highest degree that the culture shall receive specially intelligent care. It is further and equally necessary that the utmost attention shall be given first to the cleaning, and then to the grading of the berries, in order to place them on the market in presentable and advantageous form.

The coffee industry is in the hands of men of varied nationalities. Among these are found Germans, Portuguese, Americans, Englishmen, and Asiatics. The great body of coffee growers, however, are Anglo-Saxons. These men are, in the main, prospective and permanent settlers. If they succeed in their undertakings the country will be benefited by the addition of an industry which will bring with it a class of weighty and valuable citizens.

It is not possible at this time to speak with full detail and assurance upon the present economic condition of the industry. There are concerns which are reported to be already upon a paying basis and where good interest is being received upon the capital invested. There are others which have not yet reached the stage of returns on the outlay, and there are cases where loss and failure have resulted. These cases of actual failure, however, should not be allowed to prejudice the situation of the industry. The causes of failure in certain cases have been just those causes which would have induced failure in any undertaking. For example, where a man has gone into coffee with too little capital he has not been able to hold out until the crop reached the bearing stage, or stage of returns. Again, men have gone into coffee culture without knowledge of, and experience in, the work, and loss and failure have followed in those cases also. It is most liable to be the case, however, that the man of small capital at stake and more experi-

ence to direct its expenditure men move slowly. Where both want of capital and experience come together then the result is sure and not far off. Apart from individual cases, it must be said that natural conditions, such as soil and climate, the state of the younger plantations that are on the way to the bearing stage, with certain actual results from older plantations—all these indicate that coffee growing has become a sound and paying industry in the islands.

The scale upon which it will be most profitable to carry on coffee planting has not yet been determined. The small planter may be able to make it work with coffee as the money-yielding crop, but producing most of the articles of food for himself and family. By men of capital, who have looked into the question more precisely from the financial standpoint, it is definitely stated that, in order to make coffee a permanent industry and capable of taking its place with other industries, the plantations must be on a comparatively large scale, so that it will be possible to engage a steady supply of labor for them and provide the best mechanical means for the cleaning and grading of the berries. One other view is that coffee will become the most remunerative as an adjunct to existing sugar plantations, chiefly on account of the matter of labor. It is strongly represented that as the altitude for coffee planting commences where sugar planting ceases, the industries are naturally contiguous, and by an adjustment of the labor staff could be made interdependent. There are two examples which indicate that this latter view may develop into a reality.

FRUITS.—The fruits that are grown in quantities to amount to items of export are bananas and pineapples. The total production of these fruits it is not possible to give. The home consumption of each fruit is very considerable, being consumed by all classes of the community. The exportations of the two fruits, respectively, for the year 1897, most of which went to the United States, with a fractional portion to Canada, were as follows: Bananas, 75,835 bunches, valued at \$75,412.50; pineapples, 149,515 packages, valued at \$14,423.17.

These are the two chief fruits of the islands, for which there is an ample market in the United States free from competition with the American articles. Any other fruits, such as oranges, limes, and lemons, or stone fruits, although capable of being grown in abundant quantities to meet the island requirements, can not be grown for export to enter into competition with the fruits of California.

The bananas grown on the islands are well known for their extremely good quality. Chinamen are the chief cultivators of the banana, which flourishes in rich, deep, alluvial or deposit soils on the low levels near the sea and in the rich and protected valleys. White men with their better methods surpass Chinamen in the cultivation of this fruit.

The pineapple culture has been taken up by Americans and other white culturists. The very finest fruit, however, is the small native pineapple, which has an extremely delicate aromatic flavor. The latter has been grown an indefinitely long time and chiefly by the native Hawaiians.

The capabilities of the Hawaiian soils and climates for variety and excellence of fruit production have not yet been amply tested. There are individual locations and private grounds where experiments are seen in course of trial which indicate that fine quality and an enormously increased quantity of the fruits mentioned and numerous others can be grown with full success.

VEGETABLES.—The city of Honolulu is almost wholly supplied as to its table needs by Chinamen, who occupy suitable lands within and around the city limits. The mode of distribution or service of houses is fairly good, but the quality and variety are limited and poor. Without specifying in detail, there is an ample field for improvement in the methods of supplying the tables of the city with green food of well-developed quality and freshness. The country districts provide themselves, yet hardly any surplus reaches Honolulu excepting native taro and a few bags of Irish potatoes.

NEW CULTURES AND INDUSTRIES.—Concerning the addition of new cultures and industries to the ones that have been described very considerable may be indicated. Most prominent among probable successes is grape culture. There are numerous examples upon a small scale in several of the islands which attest beyond question that much can be done in grape and wine production. It is not possible to say at this time what action the soils may have upon the character of the juice and its products, excepting that much of these lands naturally tends to produce high purity and quality in the saps and juices of vegetable organisms generally as compared with the soil and atmospheric conditions of other lands.

Also, in addition to fruits and their products that may be added to the present industries of the islands, it is quite within the limits of probability to say that the soils and climates of

the islands will be found favorable for the culture of plants and trees that yield "barks" and "milks" from which medicinal preparations are made. The cinchona barks can certainly be produced on the sheltered altitudes of the islands. Again, there are the conditions here for producing growths yielding flavors and dyes.

Further, there is room for a great expansion in fruits and growths that thrive specially well in salt soils near the sea. The cocoanut trees thrive admirably in these locations, and in time would be remunerative as an incidental culture.

Some note is to be made of possibilities in cereal production. The great differences in climatic conditions, that is, in temperature and rainfall, of which account has been given, indicate that there probably exist locations at temperate altitudes where wheat, barley, oats, and corn (maize) can be, and in fact are, successfully grown. At an earlier time wheat was grown in small amounts for bread making. Patches of oats may be seen to-day, while very recent experiences with American corn have shown that this cereal grows and matures perfectly. These observations are of special moment, since the successful establishing of small holdings and permanent settlers upon the available lands not under sugar will largely depend upon the ability of those small farmers to provide all the feed required by their animals, as well as most of the sustenance for themselves and their families. It is thus fortunate that the conditions suitable for growing coffee are also the conditions in which corn, sorghum, rye, and other cereals, and all common vegetables can be produced.

FORESTS.—The forest areas of the Hawaiian Islands were very considerable, covering the upland plateaus and mountain slopes at altitudes above the lands now devoted to sugar growing and other cultures. Those areas, however, have suffered great reduction, and much of the most valuable forest cover has been devastated and laid bare. The causes given, and to-day seen, of the great destruction that has occurred are the direct removal of forest without any replacement by replanting. Again, in consequence of the wholesale crushing and killing off of forest trees by cattle, which have been allowed to traverse the woods and to trample out the brush and undergrowth which protected the roots and trunks of trees, vast breadths of superb forests have dried up, and are now dead and bare. All authorities of the past and of the present agree in ascribing to mountain cattle, which were not confined to

ranching areas but allowed to run wild in the woods, the chief part in the decimation of the forest-covered lands.

Forest areas reserved with respect to location and maintained in a state of vigor and sound growth are of the first importance to the agriculture of the islands. The greater number of the sugar plantations and all of the rice and banana fields are dependent upon an elaborate and costly system of irrigation for their water supply, and the operation and availability of the irrigating waters are largely depending upon the area and state of the forests upon the mountain altitudes. It is not only claimed that cool forest covers cause precipitation of rain, but that the thick undergrowth and brush assist in conserving the water and in preventing its precipitous discharge to the sea, which conditions are indispensable in maintaining a regulated supply of water for distribution over lower lands.

Efforts have been made to restore the forest where it has been killed out. Several of these individual efforts have not only resulted in great benefit to the localities where the experiments have been made, but they are serving as object lessons, showing the immediate need of enclosing given forest areas and defending them against the action of cattle, thus allowing the depleted undergrowth and trees to come up again, a result which had followed in every case where inclosure has been adopted. Local efforts, however, do not meet the demand of the forest question from the standpoint of the interests of the island as a whole. What appears to be the most immediate needs are a thorough expert examination of the islands and of their requirements in permanent forest areas, an inspection of the existing forests, and the adoption of means for improvement and maintenance. It may be possible for such an expert survey to show that portions of lands still under forest could be cleared for cropping without prejudice to the immediate or to distant localities, and, on the other hand, to indicate that the disturbance of existing forest areas in given locations would result in detriment to agriculture all around. Because of its bearing upon the immediate and permanent interests of agriculture, there is no question which demands at once a more careful and expert investigation than the state of these island forests.

INSECT PESTS AND PLANT DISEASES.—In reference to insect pests and plant diseases, a statement from Prof. A. Koebele, official entomologist of the Hawaiian Islands, bearing upon

the existence of or liability to plant diseases, is here given, as follows:

DR. WALTER MAXWELL,

United States Special Agent, Hawaiian Islands.

Dear Sir:—In reply to your inquiries, I will say that it appears to me that little fear need be entertained in regard to the introduction of scale and other insects, since we have here an abundance of parasites and predatory insects preying upon and keeping the same in check.

Strict attention, however, should be paid toward guarding against the introduction of *Melolontid*, *Elateriu* beetles, etc., destructive to living roots of plants, as well as to any fungoid diseases destructive to vegetation that are liable to reach the islands with soil or plants imported.

Respectfully,

A. KOEBELE.

January 5, 1899.

The labors and experiences of Professor Koebele upon the islands amply qualify him to speak upon the matter in question, and his statement gives the assurance desired within the limits spoken of.

RANCHES.—Up to the present time the Hawaiian Islands have been supplied by home-grown meats, and the supply has been ample. In fact, it is recorded that the number of cattle ranging the grazing areas some years ago was so large in proportion to the consumption of meat, that they were slaughtered chiefly for the hides, the carcasses having but very small value. Since that period the meat-eating population has increased, while the areas devoted to grazing and the number of cattle have gradually diminished, so that at the present time we are face to face with a situation in which the supply will no longer cover the demand. The supply of the country districts is furnished by the immediate localities. In some cases the sugar plantations have cattle lands which meet the demands of the plantation labor and of local private requirements. There are also large independent ranches. After the local demands have been satisfied the surplus of meat cattle produced upon the several islands is gathered up and shipped to Honolulu, to meet the consumption of the city tables. It is thus seen that the first indications of short supply will be felt in Honolulu, and the meat supply associations state that this is already the case.

It has been found by investigation that districts upon the

islands, notably Kauai, which formerly had a large surplus for shipment, are at this time barely meeting the increased and increasing local demands. Ranchmen report that "in given districts the supply is now hardly adequate to the immediate local calls." In view of these facts, it is at once apparent that the future meat supply of the islands, and particularly of Honolulu, will depend upon new factors and conditions. The present requirements of the city and of vessels making port at Honolulu are shown by the animals slaughtered in 1898, as follows: Cattle, 8,780; calves, 1,578; sheep, 9,171; swine, 7,266. These data were furnished by William T. Monsarrat, veterinary surgeon and Government inspector of meats. Mr. Monsarrat not only possesses all data relating to the number of cattle slaughtered, but he can also report upon the state of health of Hawaiian cattle. Concerning cattle slaughtered outside of Honolulu data are not available.

The course through which ranching may develop into a more remunerative industry and the means by which the home supply of meats may be rendered a sure factor and more nearly adequate to the growing demands of the community are bound up with the future character of other industries, more notably that of sugar.

Formerly, and but little more than a quarter of a century ago, cattle were more numerous upon the islands. They had wider ranges to rove over and feed upon; they were the possessors of the land, and their value consisted chiefly in the labor and hides which they yielded. At that time the plantations, which were of smaller areas than now, were almost wholly worked by bullock labor. Even to-day there are still thousands of oxen used in plowing and hauling, their energies being utilized as mechanical force instead of in the form of meat. In the course of time, and that very recent, the sugar industry has undergone great expansion. The lands, some of which formerly were among the best for meat-making uses, have been absorbed by the plantations, and the cattle have been gradually forced within narrower limits at higher altitudes. With the increase in sugar the number of cattle has become relatively and constantly less. A first result of this change was that an adequate supply of "cattle labor" was not available. Room was thus made for mule and horse labor; more recently steam, as applied to the plow, has come in, and in some districts has almost wholly superseded animal labor in the field. With the extension of the use of steam for plowing and hauling and the introduction of electricity where

steam is less practicable, it appears a question of only a short time when the bullocks will be forever released from their yokes and the island cattle will be grown and used only for meat purposes. The present trend is wholly in the direction of a higher condition of things and the rate of change is distinctly rapid. Any change or reversion of the present relations of the sugar and cattle industries must depend chiefly upon the relative values of sugar and meat. At the present prices of sugar even the thinnest upland soils pay to plant with sugar cane. As an immediate fall in sugar value is not imminent, it is not apparent that any immediate change in the relations of the two industries will take place. However, this is not positive. When sugar declines from the present prices, which the cost of production makes probable in the near future (within the comparatively short time of three to five years, as regarded by most authorities) and the price of meat goes up, then the land areas, respectively under sugar and meat production, will undergo some change. A fall of from 1 to 1½ cents per pound in the price of sugar and an increase of the same amount in the price of meat will put back certain areas of the uplands to meat production. This change would very materially aid the increased production of meat, and would not seriously, if at all, curtail the output of sugar, since those poorer uplands are the least productive in sugar, although among the best quality for grazing at certain seasons of the year. Moreover, experience has shown that a greater and more permanent increase in sugar production is practicable by leaving out the worst of the uplands from sugar and concentrating labor, fertilization, and costly water upon the richer and more durable lowlands. With a reversion of a part of the uplands to grazing purposes the sugar production can still continue to expand to the limits that have been stated.

There are other conditions than the relative values of sugar and meat that control the remuneration from ranching, and which depend upon the ranch owners. In the first place is mentioned the quality of the cattle, which is dependent upon the management of the herds. Very considerable sums of money have been expended by well-known ranchmen and patrons of cattle breeding for high-class bulls. Pedigree animals of such breeds as Shorthorns, Devons, and Scotch Angus (also some of the finer milk-yielding Jerseys and Alderneys) have been introduced and let loose upon the ranches. Considerable improvement has resulted from the use of these high-bred animals, yet the permanent results have not been

anything like so great as they should have been, and for the following reasons: In the first place, the influence of the pure-bred bulls, when let loose in the herds, was spread over cows and heifers of all sorts and sizes instead of their service being confined to selected animals that would have rendered the most immediate benefits from crossing with good blood. Of course, it is not so practicable a matter to isolate and paddock cattle on a large ranch as it is upon a modern farm. Again, the stock coming from the high-bred crosses were not made the most of. This selection, omitted in the first coming together of the imported bulls and ranch heifers, continued to be neglected, no "culling" of the weaklings and undersizes being practiced, the breeding continuing from big and little, good-grade and scrub cows alike. These matters have been reported to the writer by several of the better-known ranch owners, and the results are apparent. With better values in prospect for home-grown meats, the management of the ranching properties will be brought under the more modern systems in respect of the methodic introduction and changing of blood and a careful selection and culling of the breeding stock. At no previous time have the inducements to do good work on the ranches been so great, nor has the certainty of remuneration been so sure for investments in meat production on the islands. Ranchmen will be prudent if they take immediate advantage of the present situation; if they do not, and the supply of home-grown meat declines still further, the country will be obliged to enter upon the importation of frozen meats. This will only be profitable if done on a considerable scale; if large importations of meats are made it seems necessary for prices to fall, and home-meat producers will be the first sufferers. The meat supply is a matter of prime concern to the city of Honolulu. It is in the first degree desirable that fresh meats shall be available for daily use. Frozen meats that have been a long period on the ice, and subjected to changes of temperature during movements in transit, are not the same as meats killed on the ground and kept in cool chambers for a few hours, or at the most a day or two, before being consumed. It is found that meats and fowls that have been long on the ice spoil very rapidly in warm countries after removal from the ice. But the argument for the necessity of a home-meat supply in view of the contingencies of a war does not obtain, since if an enemy were able to cut off the islands from the mainland of the United States, it would be a much

more simple matter to stop shipments between the islands, when Honolulu would be just as effectually starved out.

DAIRYING.—The requirements in milk and butter of the country districts of the islands are supplied locally. The milk demands of Honolulu are met by suburban dairies, which also furnish a part of the butter consumed, but the chief supply of butter is by importation.

The milk supply of Honolulu is also a matter of some concern. During the past year it has barely met the city's demands. This was, in part, due to the presence of United States troops, who were quartered near the city for some months. When considerable numbers of the soldiers were in the hospitals and in special need of milk, extreme difficulty was experienced in obtaining anything like an adequate supply from the public dairies. In consequence several private families turned over their individual cows to the service of the United States military authorities.

The current price of milk (10 cents per quart) indicates the inadequacy of the supply; although it has to be considered that the cost of maintaining a dairy in or near Honolulu is greater in proportion to the number of cows kept than on farms in the United States. This is due partly to the price of imported feedstuffs and also to the prices of lands and the cost of applying irrigation water within the city limits.

The interests and protection of milk and meat consumers have been undertaken by the board of health, this organization having instituted examinations of meats and of dairy animals in respect of the existence or prevalence of liver fluke, tuberculosis, and other diseases. Recent examinations, covering the year 1898, have furnished the following data upon the condition of herds and dairies:

Animals	Number slaughtered	Number with liver fluke	Number with liver abscess	Number condemned from tuberculosis	Total condemned
Cattle	8,780	2,589	21	15	17
Calves	1,578	433	.....	.....	.....
Sheep	9,171	50	.....	.....	.....
Swine	7,266	50	.....	.....	.....

Inspection of milch animals are given as follows: Number of cows inspected, 286; number of cows affected with tuberculosis, a majority; number of cows condemned, 10.

Mr. Monsarrat states that several of the worst affected cows were the individual animals of private families. These data,

although not worse than are furnished by other countries, show the need of vigorous care.

The increase in the population of the city, with a permanent establishment of United States military headquarters, will increase the call for fresh meats and fresh milk and butter. Therefore dairymen, as well as ranchmen, will be amply remunerated for a systematic and careful selection of animals from the standpoint of the public health, for a more rational management upon the ranches, and in the providing of food for the dairies. The people of Honolulu are prepared to pay a just price for these cardinal articles of diet, but they may demand that the wholesomeness of the supply shall be guaranteed by the health authorities.

LABOR CONDITIONS.—The hired labor of the islands is used chiefly upon the sugar plantations, other industrial labor requirements being small in comparison.

In line with the expansion of sugar production, the demands for labor have increased. Originally the labor was done almost wholly by Hawaiians, but as the requirements increased, coupled with the somewhat native objection of many Hawaiians to hire at regular labor, the leaders of the sugar industry were obliged to look elsewhere, and this led to the introduction of Asiatic and other labor. In the following table is presented a view of the component nationalities of the population, and the relative numbers of each nationality engaged in plantation labor:

1897	Hawai- ians	Chinese	Japanese	Portu- guese	Other for- eigners	Total
Population ...	39,504	21,616	24,407	15,191	8,302	109,020
Labor	1,497	8,144	12,068	2,218	756	24,658

These figures amply illustrate the labor relations of the respective nationalities to the main agriculture industry of the islands. The Hawaiians, relative to their number, do not seek plantation work, and when they do, it is chiefly as teamsters, in which work they are good and desirable. The inclination of the Hawaiian is to personal occupation rather than to labor for others. This is, in part, due to an objection to continuous labor, but more to the native instinct, which is averse to subjection, unless to Hawaiians of high standing or white people of authority. The writer hopes to see this characteristic of the Hawaiians maintained, and that the pride of the native people will assume such a course as to accommodate them to the new

conditions in such a way that the race will yet reestablish for itself a permanent economic position in the community.

A reference to the figures of the above table also shows that the Portuguese do not generally go to plantation labor. These people are very energetic and thrifty. They are inventive along the line of introducing new, small horticultural growths, such as the grape, etc. When they do work on plantations it is usually as teamsters, and they are comparatively highly paid for unskilled labor.

The burden of agricultural labor is borne by the Asiatics. One-third of the Chinese and one-half of the Japanese populations are engaged in plantation labor. The large remainder of the Chinese is privately occupied in rice, or fruit and vegetable culture, or in domestic service.

Concerning the conditions of the Asiatic laborers, it may be said, in general, that the presence of these peoples here demonstrates that the wages and personal comforts are greater in their present situation than they were in their native countries. This is further accentuated, in the case of the Japanese especially, by their disposition to settle permanently on the islands.

In regard to the question of compensation, a bare statement of wages does not cover the situation nor furnish a full comparison of the conditions that obtain here with the compensation of labor in other countries. The cost to the laborer of providing himself with fuel, clothing, and food is less upon these islands than, for example, in Louisiana, or in any other section of the United States. On the other hand, the value of labor to the employer, where the labor is paid at so much per man per day, depends upon the laborer and his power to work. From this standpoint it is found that different nationalities are capable of rendering different amounts of labor per day, and they are thus paid different wages. The power to work and the rate of wages of the Asiatics are less than in the case of white men (and of colored peoples in cooler climates) where the conditions of climate allow the latter to work. Where the climatic conditions exclude the white man the labor power of other races is also low.

General statements, however, upon this and all similar subjects are not of much value, so that a summary is here given of the labor roll for the month of December, 1898, from the largest sugar-making estate on these islands, the Ewa Plantation

Company. All skilled labor, composed of Americans, British, Germans, and Norwegians, is excluded, only Portuguese and Asiatics being included:

Laborers	Number of Laborers	Wage per month	Monthly total
Portuguese	34	\$ 27.55	\$ 930.70
Contract Chinamen	204	15.16	3,092.64
Day Chinamen	67	16.73	1,120.91
Contract Japanese.....	380	15.66	5,950.66
Day Japanese	100	18.04	1,804.00
Total	785		\$ 12,899.05

The differences between "day" and "contract" men are chiefly due to the fact that the day men are ex-contract and experienced laborers. It is thus seen that 785 laborers receive \$12,899.05 in money, which is \$16.43 per man per month, or 63 cents per day. Where overtime is made by the laborers, either contract or day men, the time is duly paid for. If all the plantations were canvassed the mean monthly wage would be found to be slightly higher than that in the example given, since on the larger plantations the number of higher-priced men is relatively smaller than on smaller plantations. This is still more specially the rule in respect to skilled labor.

The table gives only the payment in money per month. All the laborers, however, receive free lodging, free fuel, and free medical attendance, and their children free education.

More point will be given to the statement of wages paid to labor on these islands if a comparison is made with the values of labor in corresponding conditions in the United States. For this purpose Louisiana is selected. In 1896 data upon the prices of plantation labor in Louisiana were furnished to the writer by the Hon. John Dymond, planter, editor, and sugar statistician of New Orleans. Mr. Dymond states in reply to questions: "The average monthly wage for years has been and is \$20, or 75 cents per day. This does not cover the grinding season (of some sixty days), when about \$1 per day is paid." The grinding season in Hawaii lasts one hundred and fifty days or more, when special wages are earned by overtime. For the purpose of comparison the special wages are excluded in both cases, although that item is in favor of the Hawaiian laborer. Mr. Dymond further says, "The plantation laborers are furnished free house room; they steal their fuel, and require but little medical attention; work stopped by weather

stops also the wages." These conditions are partly similar, but less favorable than corresponding conditions on Hawaiian plantations, the difference being decidedly in favor of the Hawaiian laborer. Again, the Hawaiian laborer requires less clothing, and, what is more important, he does not need to lose one day in the year from the weather. These considerations cause the comparison to be drawn as follows:

Place	Wage per day	Wage per month
Louisiana	\$0.75	\$20.00
Hawaii .....	.70	18.20

A detailed comparison, including the extra money earned by overtime, would make the wages paid in the two localities almost, if not exactly, equal.

So far, the case has been stated for the laborer, showing the value of his labor to him. The cost of labor to the employer in Howoi may now be shown. In addition to the 63 cents per day paid in money, the employer furnishes fuel, which is very dear (coal, \$10 per ton; wood relatively dear), and a free doctor in addition to what is allowed in Louisiana. These extras raise the cost to 66 cents per day per man, but these extras are trifling in comparison with the extra cost per laborer per day that arises from the difference in the ability of the several nationalities to work. In the example given, the Portuguese receive, on an average, \$27.55 per month, and the Asiatics \$15.93 per month, which indicates that the latter possess a power to work, and consequently are paid 43 per cent. less than the Portuguese. Mr. Dymond states that where men in Louisiana are on piecework the variation in their earnings is 37½ per cent. These examples are very pronounced, and probably extreme. It appears quite safe, however, to put the labor power of the Asiatic at 18 per cent. less than that of the mixed labor of Louisiana, which is equivalent to saying that four Louisiana laborers are equal to five Asiatics. The difference is greater rather than less than is stated. Then, in view of these special considerations, at least 18 per cent. has to be added to the 66 cents per day that the Hawaiian employer has to pay for his laborers, and this raises the cost of labor per day to 81 cents, which is 6 cents per day more than the average rate of wages in Louisiana, as stated by Mr. Dymond.

There is extreme confusion existing in the matter of labor values in different countries, which is due to the fact that the daily wage is taken as the sole evidence of cost. This applies

to other kinds as well as to agricultural labor. A house carpenter receives from 25 cents to 75 cents per day more than a corresponding carpenter in Honolulu, but the Boston man, due to total suspension of business for about four months in the winter, earns very considerably less annually than the man in Honolulu, who practically has not to lay off a day in the year; and between what is called coolie labor, operating in warm climates, and mixed American labor, or selected Asiatic labor, working in cooler climates, there are differences in labor power which cause extreme variations in the values and cost per day of those kinds of labor.

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 TROPICAL LABOR.

The question of how the tropical possessions which have of recent days fallen into the hands of the United States can best be governed with a view to the profitable utilization of their natural gifts, is engaging the attention of the thoughtful amongst the conquering people, and it is beginning to dawn upon the nation in general that the actual warfare which led up to the formal possession was only the opening portion of the work which has fallen to be done by the victors. Amongst the writers who have taken a part in the discussion of the question in the American press is Mr. W. Alleyne Ireland, well known in our Colony, who has contributed a paper on "European experience with Tropical Countries" to the Atlantic Monthly, and one on "The Labor Problem in the Tropics" to Appleton's Popular Science Monthly. In the former of these the writer instances the experience of a number of colonies to prove that the negro as a laborer to depend upon is of no practical value, save in one or two places, such as Barbados, where the density of the population and the difficulty the idle man finds of obtaining his daily supplies from nature's storehouse, together make a condition of predial affairs similar in practical effect to the system of secured labor to which other colonies have had to resort to enable plantations of tropical produce to be maintained. To give point to his charge against the negro, the colonies of the Dutch in the East and in the West are instanced to show in contrast the superiority of the natives of the East to those of the West as tillers of the ground. In Java, the Dutch at the outset determined to govern the island as a national plantation, "and instituted a system of forced labor which with slight modification still exists." Under this

system the Government has reaped enormous profits and the people have enjoyed "a degree of material prosperity before undreamed of." The more intelligent of the natives are now holding important and responsible posts "which had to be created as a result of the commercial expansion arising out of "the enforced industry of the people." In Surinam, the Western colony, where the resident population consists of negroes, there is the antithesis of the agricultural and commercial success which is to be found in Java. The negroes will not work regularly, and the estates cannot depend upon them for a labor supply.

The Dutch found the negro undesirable as a slave; they have found him still more undesirable as a free man. Having developed no civilization of his own, he cannot adapt himself to an alien civilization. Exhibiting some outward indications of adherence to Christianity, he reverts, as soon as he is left to himself, to the disgusting rites which belong to his gross and abominable superstitions. He will not work, for he has no ambitions to gratify. For authority, unless it be of the rigorous military kind, he has no respect. His passions are easily aroused, and he is prone to riot and insurrection. Finally, there seems to be no general tendency in the West Indian negro to improve under the influence of education and example. The character of the negro, then, is one reason why Surinam differs so widely from Java.

In case his readers might suppose that the failure of the Surinam negro to make a good colonist was traceable to bad management on the part of the Dutch, Mr. Ireland asks them to consider the condition of the tropical negro as he is to be found under an enlightened form of British government. In the smaller West Indian islands a most depressing state of things exists, and in the larger ones, such as Trinidad and Jamaica, the sugar estates, the main resource of revenue, have been kept going solely through the introduction of coolie labor from the East. Summing up, the writer cautions the people of the United States against the delusive thought that their tropical countries will soon be made self-governing, and shows that past experience gives but little hope that that pleasant anticipation will ever be realized.

We look in vain for a single instance within the tropics of a really well-governed independent country. Would the United States tolerate under its flag the condition which prevail in

Venezuela, in Siam, in Hayti, in the Central American republic?

In his article on the Labor Problem, Mr. Ireland goes more directly into the system of indentured Eastern labor which exists in many tropical countries of the world, and explains that his knowledge of the question has been obtained during ten years in the tropical colonies of France, Spain, Holland and Great Britain. To illustrate by way of statistics the wide difference in the commercial conditions that exist between Colonies with coolie labor and those without, he gives the following table:

Trinidad	\$ 26 48	Dominica	\$ 7 28
British Guiana	34 26	St. Vincent	7 68
Martinique	23 48	Ceylon	7 24
Mauritius	20 28	Montserrat	7 89

The colonies in the first column are those in which the colonists depend upon imported 'contract' laborers for the cultivation of their fields; the colonies in the second column are those in which the so-called laboring population is home-born "for at least two generations." The figures show the average value per capita of the annual exports of native products; and it is interesting to notice that the highest amount stands to the name of our own colony. As the development of the tropics is pretty certain to be towards agriculture rather than manufacture, it is not sufficient that labor should be plentiful, "it must be at all times immediately available," for the reason that the requirements of tropical agriculture "in respect of labor are most arbitrary." And the writer gives a lucid explanation of this fact which is well-known to dwellers in the tropics.

A sugar estate in the tropics spends about eight months out of the twelve in cultivating the crop, and the remaining four in reaping and boiling operations. By the time the crop is ready to reap many thousands of dollars have been expended upon it by way of planting, weeding, draining, and the application of nitrogenous manures. If from any cause the labor supply fails when the cutting of the canes is about to commence, every cent expended on the crop is wasted; and if for want of labor the canes which are cut are not transported within a few hours to the mills, they turn sour and cannot be made into sugar. It will thus be seen that in the case of sugar-growing a perfectly reliable labor supply is the first requisite.

The same might be said of the cultivation of tea, coffee, cocoa, spices, and tropical fruits.

The writer expresses the opinion that the East Indian laborer will yet play a greater part in the development of the tropics than he is doing at present; and he goes on to describe minutely the whole system of the British Guiana Immigration system from the engagement of the coolies in India to their settlement on the sugar estates. This he has done in a simple straightforward manner without exaggeration; and as corroborative evidence of his assertion that the relations between the laborers and their employers are harmonious and that the laborers can and do make a good deal of money for themselves, he has published a statistical table showing the number of people imported annually from 1886 to 1896, the number who during that time returned to India, the value of money and ornaments carried back by them, the number of coolie depositors in the Savings Bank, with amounts of their deposits, the number of planters convicted of offences against immigrants (six of these years show one such offender, in each year), also, the death rate amongst the coolies and the death rate amongst the inhabitants in general. Mr. Ireland has stated his views on the Labor Problem very clearly and dispassionately, and as a Colony we are indebted to him for having attacked misunderstandings entertained in many quarters in the States regarding our Coolie Immigration, and demolished the reckless charges of 'slavery' which certain persons, ill-conditioned or ignorant, or both, in England as well as in the States, have laid against the system. But for coolie laborers. British Guiana would in all probability have been by this time a mere geographical expression, the place itself of no value and no interest to the civilized world. As it is, its sugar industry has developed, the Colony has flourished, and the coolies are already not only the most important section of the laboring population, but an important and wealthy section of the middle class, promising in course of time to be the chief landed proprietors in the Colony. The system has withstood all the many attacks that have been made against it, and it has always been the case that the more malicious the attack and the closer the investigation into the alleged iniquities, the more clearly the integrity of the system as between employer and employed, and its merit in general, have been brought into prominence. It may now be regarded as beyond the influence

of adverse criticism, and it is not too much to hope that through a continuance of the system for several years to come the Colony will develop into a far more important sugar country than it is at present, and the East Indians into a still richer and more influential section of the people.—Dem. Argosy.

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*THE BEST METHOD OF PLANTING, FERTILIZING AND
CULTIVATING CANE SO AS TO GIVE THE
BEST RESULTS IN SUGAR.*

(A paper read by Mr. H. S. Crozier, read before the Louisiana Sugar Planters' Association.)

Never in the history of Louisiana has a more important subject come up for discussion; and never was there a more propitious time presented for this discussion, because it is very important to connect the topic of our last discussion, as it is necessary to unite them both for the mutual interest of the buyer and seller of cane. This subject has been almost ignored by the association, and has been absorbed in discussing only the manufacturing part of our industry. I have been attending these meetings for the last ten years, and heard about every department of the sugar house, from the top of the chimney to the skim ditch. There never was a more serious mistake made on earth than not connecting the field and the factory; because the field and factory are linked together by the strongest and most inseparable connections, owing to the peculiar relation affecting the cost of sugar according to the yield and percentage of the raw material. As the sucrose runs up or down in the stalk of cane, the scale of profit is regulated, as the thermometer marks the temperature of the weather. For instance, if it cost \$2 a ton to raise a ton of cane making a hundred pounds of sugar at 3 cents, you give two-thirds of the value for the labor; if you raise 175 pounds you give only about two-fifths of the product for labor. If we pay for our labor in sugar, you can readily see at a glance how it would affect the relative value of work paid for out of the product of a ton of cane.

Three conditions in the last twelve months have cast a cloud over our industry, which threatens us with a loss that seems almost too distressing to contemplate. First the complication with Cuba which threatens us with a competition with Cuba's riper cane under peculiar circumstances. Second, the

most phenomenal peculiarities surrounding the character and qualities of our cane harvested this last season. Thirdly the unprecedented cold that filled us with a gloom and fear that we have never experienced before, as Nature seems to have robbed us of our climate, which has been a precious inheritance that was so essential to our tropical plant that has been protected so many winters by the balmy breezes of our Gulf that softened the wintry blasts in our tropical clime. None of these obstacles however can we control; but their serious consequences combined have impressed upon us the importance of first preserving our cane for the factory, and our attention has by this severe lesson been forced to direct itself with redoubled energy towards the practice of economy and the best method of producing a ton of cane that will be best suited for the factory and of the greatest profit for the grower. Two of the foregoing conditions prove also to the Louisiana planters more than ever that our crop is an artificial one and that it is necessary to resort to some artificial means not only to protect it from the cold, but to force its development in such a manner as will secure the best results. The very fact that all the Louisiana planters united in desperate efforts to establish some method of buying cane on its intrinsic value in order to protect themselves against green cane, shows that it is necessary for the grower of cane to resort to some means of making it less green. It is also a positive admission on the part of the planters that there is a possible chance of arriving at some medium, which through the co-operation of science and nature, with judgment in cultivation and fertilizing, that some of the obstacles will be overcome, that go to produce green cane.

Now the question is what are we to do? This part of the industry has been absolutely neglected, and the impression prevailed that no means were in our power to improve the sugar contents, and at our last meeting the planters came to the front and said "if you do not grow riper cane, we will not buy it." I am sure the multiplicity of obstacles that block the rugged road that leads us in the direction of making riper cane will spring up from every direction and every voice at this meeting. Success is a good criterion and is generally a target for us to make our pattern; but even this fails in sugar culture, as the field for economy is so latitudinal that many leakages in one branch or other overbalanced by strict economy in other departments of the plantation administration.

With these wide differences of management they often produce the same financial result. Now causes and effects have established rules in nature, as well as mechanical, therefore the causes which produce green cane affect the causes which make it less green, and if we admit our knowledge of most of the conditions that produce green cane we should be able to control to some extent the conditions that make it less green, which is equivalent to making more sugar. I do not agree with the authorities that say we cannot increase tonnage and at the same time increase sucrose; because the object of fertilizer is to increase tonnage and force maturity; and the sooner we expose the red joint the sooner we develop maturity, which naturally makes more sugar even if we resort to mechanical means of topping properly to reduce tonnage.

All cane should be fertilized when planted, as it absolutely secures the stubble crop under ordinary circumstances, and the vitality of the roots produce an early development in our stubble crops which is of the greatest importance, as it is the first cane ground, and its development depends on the fertility of the land to reach this development as early in the season as possible. Suckers are produced from two causes. One is to check the cane out of the ground, so that the root vitality will be strengthened in this manner and subsequently throws out suckers. But by fertilizing with the proper fertilizers you strengthen this root vitality sufficient to grow and put out suckers at the same time, even when your cane is dirted in dry weather. You can also increase your tonnage by planting a six foot row instead of seven foot row. This would give you five more rows to the acre that can be cultivated more economically and the fact that the nature of our plants is a social one, the sooner we shade the ground the sooner we force the growth of the cane, by retaining moisture. Five foot rows have another advantage over seven foot rows. Often in plowing out the middles of a seven foot row the mules make sixteen hundred tracks on the sides of the plowed ground. This can be obviated in a five foot row with cultivators and advance plow. Great importance should be attached to the manner of squaring up the edges of the row; so the cultivators can lift the dirt which softens the crust and holds moisture, which is a substitute for late plowing. Care should be taken to keep the beds square, so that the fertilizers will not be washed in the direction of the water furrow.

Good judgment in cultivation I consider has much to do in effecting good results in the direction of ripe cane, and a uniform tonnage seems to be more desirable. One of the most discouraging features suggested to me that will continue to present an interruption in the direction of riper cane is the fact that the greater portion of Louisiana interests are in full control of agents and managers, whose ambition is to please the fancy of the owner of vigorous top-heavy cane, that he watches growing for nine months. And while he justly claims that he has done his duty well, the sugar maker growls, the mill trembles, the coal pile is never still, the hot room is jammed, and as the angry smoke rolls out the big chimneys, all seem to join in a chorus of indignation at the manager; since he had one year to study the conditions that made these troubles, and the factory only a few hours. If he too were interested in the sucrose, I am sure we would have much better results. One-half per cent sucrose on the tonnage of last season would have given a thousand overseers additional wages of \$3,600 each.

This subject is too serious for the planters to be deceived into thinking that sugar contents cannot be improved. Every intelligent planter knows that phosphates force maturity in every crop under the American sun; and as sugar cane is the only crop under the American sun that does not mature, how very important it is for us all to join in the crusade against green cane and march back along the line and study from our experience the conditions that make it less green if we cannot make it riper. I call your attention to a few examples that I hope will be calculated to increase your prejudice against green cane:

Twelve per cent sugar at 3 cents is the same as 9 per cent sugar at 4 cents. 9 per cent sugar with 75 per cent extract equals 135 pounds at 4 cents, or \$5.40 per ton. 12 per cent sugar, 75 per cent extract equals 180 pounds at 3 cents, or \$5.40 per ton. 15 per cent increase in extraction is not equal to 2 per cent increase in sugar. 65 per cent, or 1,350 pounds, 12 per cent sugar, 162 pounds at 3 cents, \$4.96. 80 per cent extract, 1,600 pounds x 10 per cent sugar is 160 pounds at 3 cents, \$4.80 per ton. 1 per cent extract is equal to 2 pounds of sugar to the ton. 1 per cent sucrose is equal to 15 pounds of sugar. 2 per cent increase in sugar makes 20 ton cane equal to 30 ton cane.

I have known instances where there was a difference of \$30,000 in crops of equal tonnage. I think the great solution of this problem of how to make riper cane has been partly solved when we decide to buy cane on its intrinsic value. In 1894 two planters in the same neighborhood, one had 80 per cent extraction, the other 60 per cent extraction, but both made the same sugar on the same number of tons, mascutte worked alike. The difference was 400 pounds of juice to the ton, on 20,000 tons was 8,000,000 pounds of juice, necessitating the use of over a million pounds of coal.

I consider that this subject has also been seriously neglected from a scientific standpoint as the organic materials of the cane have never been analyzed sufficiently at the different stages to study the conditions more closely. Sucrose at the time of harvest seems to be our only desire to determine results without causes. Sugar cane, is said to be a species of grass; if this is the case, we all know that the grass grown in the phosphate lands is far superior to any other grass in the world, and we should never use ammoniates on cane of any nature without using phosphates. The wheat grower with his hundred and fifty pounds of bone manure has not only doubled his crop, but lays the foundation for productive leguminous crops, and the cotton planter has brought his product into the market one month earlier. Planters should not be prejudiced by the competition in the competitive brands of fertilizers; they should study closely the commercial values and use every effort to get the managers to use them intelligently. Cane intended for the mill in October should not be fertilized and cultivated in the same manner as cane we expect to grind two or three months later. The more we fertilize and the less we cultivate late is, in my opinion, the best way to mature cane.—Louisiana Planter.

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CUBA VERSUS LOUISIANA.

Since my return from Cuba with the Second Louisiana Volunteer infantry many inquiries have been made of me as to the soil, climate, etc., of Cuba, and principally as to the prospects of sugar raising in competition with Louisiana. In my personal opinion, shared by those in Cuba familiar with existing and probable future conditions, the Louisiana planter need have no fear of Cuban competition for the following reasons:

1. While the island has undoubtedly rich soil and favor-

able climate, it must be recollected that the day of cheap labor has gone by in Cuba never more to return. Further, it takes eighteen months to make a crop and transportation to the seaboard is very costly.

2. There are very few good titles to land in Cuba and no mortgage laws, and capitalists engaging in the business have to furnish every cent to produce, transport, store and market their crops. Bad titles alone will make capitalists cautious and no investment of less than \$1,000,000 will be remunerative.

3. It is so much easier and simpler to raise, cure and manufacture tobacco, that for many years this will be the main crop; in fact, a large syndicate has now control of this business with a capitalization of \$6,500,000.

4. The banking and monetary systems are limited and very poor. It has only been lately, with the establishment of an American bank, that a check was used in Cuba. Previously all depositors had to draw their money in person.

5. The government of the island, either as a colony, territory or "Free Cuba" (Cuba Libre), is bound to be costly, for the suppression of brigandage will necessitate a large force of military or police, which has to be paid for out of the island revenues, and as real estate is not directly taxed, the produce has to bear the burden. Again, the wharf monopoly and transportation charges are so heavy that, with the produce taxes, they amount to a very substantial protective duty.

Summary: While soil and climate are favorable, "where every prospect pleases and only man is vile," it must be noted in all tropical climates man loses that nerve and energy which characterizes the American people. So if the Louisiana planters will study their prime need, which is a good soil, imitating the Cuban soil, which contains lime in large quantity (due to disintegration of coral rock) and supply this deficiency in their own soil by superphosphates, making rich, ripe cane instead of heavy tonnage of low grade, the problem of successful competition with the world will be solved. It is the further observation of the writer, who has been through Texas and Florida, that a strong similarity exists in the famous cane soils of Oyster Creek, Texas, and many on the Rio Grande, so it would seem the part of practical common sense to study the quality and have an analysis of these soils, then add to our soils the deficiency found, which the writer believes to be lime, and further believes the marl of Carolina or the phosphate rock (ground) of Florida will be one of the remedies.—John E. Caldwell.

REPORT FOR MONTH ENDING JULY 10, 1899, OF INCORPORATED HAWAIIAN SUGAR COMPANIES.

NAME OF INCORPORATED CO.	Authorized Capital	Par Value, Shares	Number of Shares Authorized	Shares reported as sold past Month	Highest	Lowest	Latest Sale Reported
American S. Co. (\$750,000 paid up)	\$ 1,500,000	\$ 100	15,000	25	\$ 170	\$ 140	\$ 170
Ewa Plantation Co	5,000,000	20	250,000	250	30	28	30
Haiku Sugar Co	500,000	100	5,000				
Hawaiian Agricultural Co	1,000,000	100	10,000	20	300		300
Hawaiian Sugar Co	2,000,000	100	20,000	100	224	215	224
Hamoia Plant. Co. (not listed)	175,000	100	1,750				
Honokaa Sugar Co	2,000,000	20	100,000	325	27½	26½	26½
Honomu Sugar Co	750,000	100	7,500	5	185		185
Hawaiian Com. Sugar Co*	10,000,000	100	100,000				101
Hutchinson S. Plant. Co*	2,500,000	50	50,000				33
Hakalau Sugar Co*	1,000,000	100	10,000				
Hana Plantation Co*	5,000,000	100	50,000				17½
Kilauea Sugar Co*	2,000,000	50	40,000				
Kahuku Plantation Co.	500,000	100	5,000				
Kihei Plantation Co. (\$1,500,000 paid up)	3,000,000	50	60,000	290	50		42
Koloa Sugar Co.	300,000	100	3,000				
Kipahulu Sugar Co	160,050	100	1,600				
Kona Sugar Co. (\$180,000 paid up)	500,000	100	5,000	25			20
Maunalei S Co. (\$100,000 paid up)	1,000,000	100	10,000				
McBryde Sugar Co	5,000,000	20	250,000	7550	5½	2¾	2¾
Nahiku Sugar Co	750,000	20	37,500				
Oahu Sugar Co	2,400,000	100	24,000	252	310	304	306
Onomea Sugar Co.	1,000,000	100	10,000				40.12
Ookala Sugar Co	500,000	20	25,000	260	2450	21	21
Olowalu Sugar Co	150,000	100	1,500				
Olaa Sugar Co.	5,000,000	20	250,000	2685	2	1	1
Paauihau Plantation Co*	5,000,000	50	100,000		40½	39	40
Pacific Sugar Mill	500,000	100	5,000				
Paia Plantation Co	750,000	100	7,500	8	300		300
Pepeekeo Sugar Co	750,000	100	7,500				
Pioneer Mill Co	2,000,000	100	20,000	60	305		305
Wailuku Sugar Co	700,000	100	7,000				
Waianae Sugar Co	300,000	100	3,000				
Waialua Agricultural Co. (\$1,500,000 paid up)	3,500,000	100	35,000	440	175	155	165
Waimanalo Sugar Co.	252,000	100	2,520				160
Waimea Sugar Mill Co.	125,000	100	1,250				130

* Incorporated in California. Sales in San Francisco reported.