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The latest quotation of sugar in New York was three and one thirty-second cents for Cuban centrifugals of 96 deg. test.

In Mauritius, the Liberian coffee is said to yield two tons per acre. The trees are larger and more hardy than the Arabian variety.

The American ship Kenilworth is now loading sugar at Honolulu for New York, and will probably leave early in March, with a cargo of about eight million pounds of dark Hawaiian sugar.

In New York State, days of grace on all notes, drafts, checks, acceptances, bills of exchange, bonds or other evidences of indebtedness, made, drawn or accepted by any person or corporation after January 1, 1895, are abolished. Payable on date of maturity is now the law.

Among the foreign arrivals during the past month, was Mr. Hubert Edson, a chemist, who has for several years past been in the service of the Washington Agricultural Bureau,

and also in that of Louisiana. He comes to take charge of the work of chemical analysis on the Paia and Hamakuapoko plantations on Maui.

It is stated that the mongoose is rapidly increasing on Oahu, and threatens to exterminate the pheasants on our mountains and also the native ducks, and other fowls. Something should be done to check this nuisance. A small bounty on each scalp might prove the most effectual means.

In 1889, Japan imported 75,860 tons sugar, and in 1892, 116,344 tons, an increase in three years of 40,484 tons. The brown sugars came from Formosa and Manila through Chinese houses, and the white sugars came from Hong Kong. It is now proposed to start a sugar refinery in Japan.

The December seed circular, issued by the Agricultural Experiment Station of the University of California, states that though carnaigre is commonly grown from cuttings of the small roots, it grows readily from seed, which is scattered on moist ground and slightly covered. The station sends out the seed to applicants for five cents per packet. Address E. J. Wickson, Berkeley, California.

The "St. Louis," the first "ocean greyhound" of American manufacture, was successfully launched at Cramp's ship yard in Philadelphia, Pa., U. S. A. She is hailed as the forerunner and pioneer of American record breakers. She is a beauty. and was appropriately christened by Mrs. Cleveland, the wife of the President, who broke a bottle of American champagne, St. Louis brand, over the bows, with graceful effectiveness. —*Ex.*

A Great Loss.—A very heavy frost occurred in Florida, December 28, with cold weather for several days after, which is reported to have destroyed not only the entire orange crop but other fruits and vegetables. The loss will foot up several millions of dollars. One report states that in the morning icicles thirteen inches in length were a common sight. And still the fruit growers are not disheartened. The *Florida*

Agriculturist says: "The freeze and its disastrous effects will not dishearten or crush the people of Florida. They are too full of pluck and enterprise to let a blizzard down them and will at once pick the flint and try again. The orange will still continue to be a staple product, groves will multiply as usual, vegetable tracts will be replanted, and out of the disaster Florida will pluck the flower of profit."

Thomas Edison says: "There is practically no limit to the speed that can be attained on a railroad. It is wrong to assume that there is. The only limit there could be would be the point at which the engine and cars break up or fly to pieces. I think the great speed will finally be attained, and it will be when we are able to obtain electricity direct from coal. The discovery of a way of converting coal directly into electricity will be the turning-point of all our methods of propulsion."

Prof. Harrison, in Demerara, has called attention to the variation of the polariscope in different temperatures. He states that the polariscopes in use are adjusted at a normal temperature of 63 deg. 5 F., and that when they are used in a temperature of 80 deg. F., the average temperature for Demerara, they will inevitably give different results, the outcome of which is that sugars, which, when using the various instruments in the manner prescribed would polarize 96 deg. at the normal temperature (63 deg. 5 F.) for which they are adjusted, show only about 95 deg. 7 at the higher temperature named above. His statement will be found in "*Sugar Cane*," page 645.

Every one has noticed that cold nights follow heavy rainfalls. This is chiefly due to the fact that what is rain on the lowlands of these islands is snow on the mountain summits of Maui and Hawaii. And when this is the case—when the summits are snow-clad—the air becomes quite cold all over the group, remaining so for several days, or until the snow melts. Of course then Hilo and other places along the shores and on the slopes of Hawaii receive the cold blasts from the summits direct, and feel them most keenly, often

down among the forties of the thermometer, while we receive them across the channels and get the air among the fifties only, and even then are glad to welcome the first rays of the morning sun.

A NEW CANE LOADER.—Mr. Amechazurra of Cuba has just invented a new cane loader which was recently tested in the presence of a large number of planters and cane growers with suprising results as to its effectiveness. The construction of this apparatus is simple, consisting of a sort of cage of the size of a cart frame, on which it is adjusted ; after the cage is filled with cane it is easily placed on the frame, which is grooved on both sides and on which four castors, attached to the bottom of the cage, slide with great facility, so that one man is able in a few seconds to load the cage full of cane on the cart, or unload it on the railroad car or the factory carrier. The cost of the cage is insignificant, $10 or $12, and it can be made adaptable to any common cart.—*Cor. Louisiana Planter.*

REMOVING SCALES.—The *Journal des Fabricants*, in noticing Mr. Morrison's method of preventing scales in evaporators, as given in our monthly for September, on page 409, makes the following comments : "The question of scales in evaporators is a source of trouble to cane as well as to beet sugar producers. The PLANTERS' MONTHLY contains on this subject a letter from Mr. James Scott, engineer in the Hawaiian Islands, who sets forth a simple means of avoiding incrustations upon the walls of the tubes. This means consists in introducing into each tube a wooden rod of dimensions such that the section of the tube is reduced one-half. Mr. Scott states, that by this means the tubes are no longer covered with scales and evaporation becomes more rapid. It is, in short, a result, obtained in a similar manner to the Canard, Montauban and Marchandies processes, which Mr. Scott seems to have discovered anew."

CLOSE MARGINS.—As an illustration of the narrow margins on which great aggregations of capital work, the statement of the great Pillsbury Flour Mills in Minneapolis shows that

they realized but five cents a barrel net profit on their output last year. This is, of course, exceptional, and illustrates both the decline in wheat and the extreme competition between the great mills of the Northwest, these two elements having reduced the price of flour in ten years from $5.92 to $3.30 per barrel. The same tendency is shown in transportation. While small lines of railroad have been consolidated into great systems, which are to a greater or less extent monopolies, the constant tendency has been toward lower rates. The all-rail rate of grain from Chicago to New York in 1869 was seventy cents per hundred pounds, and but one-third that price in 1894. Ocean freights have fallen in equal measure. Wheat which paid thirteen cents per bushel for carriage from New York to Liverpool in 1869, is now carried for four cents a bushel.

SULPHATE OF AMMONIA AS SUGAR CANE MANURE.—Valuable testimony to the efficiency of sulphate of ammonia as a manure for sugar cane land is (according to a contemporary) contained in the official report on the agricultural work carried on during the years 1891 and 1892 in the Botanical Gardens of British Guiana. This work was mainly directed to improving the local cane-sugar industry, which is understood to be largely a question of manuring. The results of the manurial experiment during the first year only are available; and these go to show that nitrogen, in the forms of sulphate of ammonia, nitrate of soda, and dried blood, excited a favorable influence upon the yield of the sugar cane, and was doubtless the main manurial constituent which really governed the incremental yield. Where applied in quantities capable of supplying not more than forty pounds of nitrogen to the acre, sulphate of ammonia and nitrate of soda were of about the same value—both being better than dried blood; but where more than forty pounds of nitrogen per acre was applied, sulphate of ammonia gave distinctly the better results. About two and one-half hundredweight per acre appeared to be the best quantity to use. Superphosphate of lime was an improvement when it came to be added to nitrogen and potash manurings.—*Kuhlow's Trade Review.*

SUGAR SUPPLIES.—The entire stock of sugar in the United States at the beginning of 1895 consisted of 165,469 tons raw sugar in the four ports, 98,000 tons balance of the domestic crop, 15,000 tons Sandwich Islands sugar in San Francisco, and 50,000 tons of refined sugar in refiners' hands. Total stock, 328,469 tons. We can count with confidence on receiving during the year 1,000,000 tons from Cuba, 100,000 tons from the British West Indies, 30,000 tons from Porto Rico, 50,000 tons from Demerara, 50,000 tons from other West Indies, 75,000 tons from Brazil, 100,000 tons from the East Indies, 140,000 tons from the Sandwich Islands, and 100,000 tons from the next domestic crop. Together 1,973,000 tons, including the stock on hand, or nearly sufficient for the entire consumption of the year. The sugars named above find their way naturally to the United States, and if they are crowded out of use here by the 1,000,000 tons surplus beet crops of Europe it will be because of a competition of low prices during the entire campaign. In 1894, 164,320 tons of beet sugars were imported, against 248,440 tons in 1893, 149,482 tons in 1892, and 331,128 tons in 1891. With discriminating and differential duties against beet sugars, Europe has found it very difficult to gain much of a foothold in the United States, but seems to have determined to keep quiet no longer, and is now raising a tariff agitation that in the end may result in largely increased exports of sugar to America. All which tends to a continuance of low prices.—*Willett & Gray's Circular.*

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HAWAII'S MOTTO—"EXCELSIOR!"

A higher compliment could not be paid to the value of the reports presented at the last annual meeting of the Hawaiian planters, than the re-publication of some of them entire in several of the leading journals of the United States and other countries. This has been done to present to sugar growers abroad the fullest information obtainable regarding the work of the planters of Hawaii, who are now looked upon as among the most successful of any engaged in the cane sugar industry.

We instance this to show the value of these reports as edu-

cators, and they can be made still more valuable by bringing in the full details of other plantations which have been quite as successful as any that have reported. A record of every branch of the work should be kept, and the details of the whole year's operations collated and reported at each annual meeting. The growing of cane and beets, and the making of sugar from them, is yearly developing some new points brought out by scientific research regarding the wants, food and habits of the plants, and of the best treatment required to extract the largest amount of pure sugar. The history of the past fifty years is a record of steady advances, made step by step, and there is no reason to believe that the next fifty years will show less progress than the last period has done.

The clear and well-prepared tables presented by Mr. Morrison of Makaweli, show facts which cannot be gainsaid, and which carry conviction to every intelligent reader who understands the subject reported on, whether he be in Egypt, Demerara, the West Indies or Queensland. Skillful cane planting and sugar manufacture are conducted on the same general principles in every sugar country, and the results, if carefully tabulated, show beyond a peradventure where the gain or loss is to be found, whether it occurs in the field or in the mill. Planters have nothing to fear from a full report of the way in which they obtain success, nor of the errors which they may make.

There is room for improvement in each branch of the business of cane culture, and it must be made, if we expect cane to keep abreast of its rival, whose apparent success is solely due to the extraordinary aid which it receives from the various governments. No manager should rest satisfied with the best returns that he has yet had, inasmuch as those returns may be increased by knowledge obtained by experimenting in a small way at first, and when favorable results have been secured, then by application on a larger scale. The sandy plain known as "Wailuku common," and the apparently rich, loamy soil of Kau and other districts, which now may produce only two or three tons of sugar to the acre, may by the application of elements wanting in the soil, be made to yield double the present amount, whatever it may be.

Fertilizers are each year proving their value in every branch of agriculture, by large increase of crops, when used where experience proves that they are needed to furnish the proper food for the plants. Experience is teaching that plants are like animals, in that they require certain foods to produce the best results, and that without such foods they are of little value. A sample of Hawaiian soil sent to Scotland some years ago for analysis, was reported back as utterly worthless for growing cane, because there was too much iron in it. Yet the same soil, after the application of the ingredients it lacked, is producing three times the quantity of sugar it did formerly.

Some of our plantations spend thirty to forty thousand dollars annually for fertilizers to enrich their soils, and generally with satisfactory results, in the shape of increased dividends. This may to some seem an extravagant outlay on a thousand or twelve hundred acres of land, but if the result be only an increase of one ton of sugar per acre, it pays in two ways, first, by giving an immediate return of its cost, secondly, in leaving the soil in a much better condition for a second crop. It moreover assists to give the plant a vigor and healthiness that enable it to withstand the attacks of disease and the numerous parasites which are ready at all seasons to infest plants that show the least sign of loss of vitality. Still another great benefit, which too many overlook, is that it provides the planter with the best, the healthiest and most vigorous seed that he could desire to perpetuate his fine cane, with a fair prospect of increased yield each succeeding year. Such seed only should be planted, for in no other branch of agriculture does "like produce like" more than in this. A sickly stalk can produce only sickly seed, and sickly seed will never show a handsome field nor an increase of crop, however well cultivated. With sickly seed, no planter need wonder what is the cause of his poor returns. Let the motto of every planter be "EXCELSIOR!"

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The attention of readers is directed to the article on canaigre, which furnishes the fullest information regarding it yet published.

THE EXCESSIVE PRODUCTION OF BEET SUGAR.

The following statistics are taken from a recent issue of the *Journal des Fabricants de Sucre:*

Mr. Licht's figure on the yield per hectare in Germany during the past fifteen years are as follows:

SEASONS.	YIELD IN BEETS PER HECTARE. KILOGRAMS.	PER CENT. OF SUGAR EXTRACT'D FROM THE BEETS.	AMOUNT OF SUGAR PER HECTARE. KILOGRAMS.
1894-95	34 to 35,000	12.40	4400 to 4500
1893-94	28,300	12.52	3700
1892-93	27,900	11.99	3482
1891-92	28,200	12.06	3565
1890-91	32,200	12.09	4076
1889-90	32,900	12.36	4231
1888-89	28,200	11.96	3529
1887-88	26,400	13.12	3641
1886-87	30,000	11.77	3654
1885-86	30,200	11.43	3582
1884-85	32,900	10.79	3652
1883-84	29,900	10.54	3151
1882-83	34,400	9.51	3273
1881-82	28,300	9.56	2705
1880-81	32,700	8.79	2876
1879-80	25,200	8.52	2147

"These results show that the present year is very exceptional. * * * * * The variation of the yield in sugar, which depends on meteorological conditions impossible to foresee, is then more than 28 per cent. (compared with the season 1892-93,) and it is a factor which cannot be left out, even with the best wishes in the world."

From the above figures it would appear that the present surplus in Germany is due to an increased yield of the beets, as well as to more extensive cultivation.

A kilogram equals 2.20 pounds and a hectare 2½ acres, so that 4,500 kilograms per hectare would be a little less than 2 tons per acre, for the average yield in Germany during the past year. It is interesting to note in this connection that the best report in the United States for the year ending July 1, 1894, comes from the Chino Valley Beet Sugar Co. of California, and their yield is only 1.8 tons of sugar to the acre.

J. P. C.

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A man's work is hardly worth paying for if he has to be watched.

THE SAN FRANCISCO MARKET.

(From Williams, Dimond & Co's Circular.)

Our latest mail advices from New York, of the 11th inst. state that owing to an apparent firmness in the European Market, the situation in New York has strengthened somewhat. Importers feel that their calculations upon an increasing demand for raws are justified by recent developments, the more so that buyers have shown a desire to keep their purchases secret and there is strong hope, if values do not improve, they have certainly nearly touched bottom for the present. The course of raws for the next month or so depends mainly upon the demand for refined and on the price of beet. Should the expected and natural call at this season come from distribution of refined and beet remain steady, there is reason to look for some slight improvement in prices, as stocks in this country and Cuba are but slightly in excess, if at all larger than the same time last year.

The chief cause of cheaper sugar throughout the world for the past ten years is owing to the European Beet sugar countries. They have succeeded in making Cane countries sell their production very low, but thus far have obtained little increased trade with the United States. It is now evident however that Europe is going to make a determined struggle for more of this trade. It is necessary for Germany and other Countries to keep up the agricultural industry and to do this, strong efforts are being made to increase the export bounty.

It is reported that our Government has levied an extra duty of 1-10 cent per pound on all sugars imported from Spanish Colonies or Territory. We are not informed when this takes effect, but if confirmed ought to advance the basis to that extent on sales of Cuba sugars in New York. As most of the sugars refined in Hong Kong are originally imported from Manila, it is also expected that this extra duty will be assessed on all importations of Hong Kong refined. Should this interpretation of the Law be decided correct, importers state that they will not be able to compete with our refineries and will be obliged to stop importations.

Hawaiian Rice.—Stock is very light and in the hands of

one importer, price, 4¼ cents net cash, and will not probably go higher at present, as holder believes that a further advance would but invite further importations from Japan.

KONA COFFEE.—We quote price, according to quality, from 18 cents to 20 cents, with sales of 100 bags at the latter figure.

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THE NEW MILL OF EWA PLANTATION.

Public attention abroad has been directed lately to the Ewa Plantation on this island, chiefly from the phenominal yield of ten tons of sugar from fields which had lain waste for a hundred years, and which might have remained so for centuries to come, had not the provision which Providence made for man's use, in storing an inexhaustable supply of fresh water in the vast reservoirs lying underground, been fortunately discovered, through the aid of the gentleman who owns the tract of land on which the plantation is located.—the very same place where the first artesian wells on Oahu were sunk, seventeen years ago.

Through the kindness of Mr. E. D. Tenney, treasurer of the Ewa Plantation, a party of newsmen, consisting of the Editors of the *Star*, *Bulletin* and PLANTERS' MONTHLY, with a reporter from the *Advertiser* staff, visited Ewa on the 5th instant, to inspect the new nine-roller mill and accompanying machinery lately erected by the Fulton Iron Works of St. Louis. Its new features consist in the enormous size, the rollers measuring 34x78 inches, each of which weighs twelve tons, and is made of the best of chilled steel. The grooves on these rollers, instead of being cut deep, as is customary, are made as shallow as is possible and draw in the cane, which is brought to the rollers as usual on an endless carrier, that travels about twenty feet per minute. These carriers convey the crushed cane along to the second and third setts of rollers, and lastly the bagasse is delivered at the furnace in a very dry state, ready to burn, furnishing the mill with all the fuel required, and considerable surplus, where formerly about 4,000 tons of coal were used each season in the diffusion works. These carriers work automatically, requiring little or no supervision, and the absence of workmen is noticeable.

By the introduction of this machinery, the saving in ex-

pense must be large, in more ways than one. To take off a crop of 10,000 tons now, will require but four months, where it took eight months to take off the last crop of 8.000 tons, with the diffusion plant. Then the large saving of four months labor about the mill, allows these laborers to work in the field. In various ways the labor bills will be greatly reduced.

Another innovation in the mill is Fisher's hydraulic attachment, regulating the pressure of the rollers when at work. The first sett that crushes the cane has a pressure of 260 to 270 tons from the hydraulic press, the second sett calls for 285 tons, and the third and last sett has a pressure of 300 tons and over, on the saturated trash, which leaves it as dry as the proverbial chips or shavings from a carpenter's shop. And they burn in the furnace quite as readily, furnishing all the fuel required. So rapid and perfect is the combustion, that little or no smoke escapes from the tall chimney. This attachment for regulating the crushing power of the rollers is a most ingenious device, and is also a great safeguard against accidents, which so often occur in sugar mills. The same hydraulic device is applied to the returner plate, which will prevent the vexatious breakdowns to which this cumbersome but necessary appendage is liable.

Accompanying this new mill is a powerful Hamilton-Corliss engine of 500 horse power, as fine a specimen of mechanical work as is the ponderous mill itself. The old diffusion plant had a small Corliss engine, made in Honolulu, and though it did fair work, it has not the power required for the new mill. The Hamilton-Corliss has a number of improvements and is probably one of the strongest ever imported. It does its work as quietly as a toy engine. Millmen and engineers will do well to make a trip to Ewa, and inspect this new machinery, which comes as near perfection as anything can be in the present stage of making sugar. Diffusion may have advantages over maceration in countries where fuel and labor are cheap, but for Hawaii, it now seems as though a nine-roller Cora mill will best fill the billet where sugar is manufactured on a large scale. One cannot inspect the working of such an outfit as this without admiring the ingenuity and skill which it reflects on its makers. When we

add that the entire machinery was made in St. Louis, and shipped from San Francisco to Honolulu, within three months from the receipt of the order, and that it has been erected and set to work within two weeks from the day it landed in Honolulu, without a breakage or loss of any kind—it shows what modern push can accomplish.

This work has been executed under the immediate supervision of Mr. J. F. O'Neil, superintendant of the Fulton Iron Works, St. Louis, who came out here to set up the mill. He has done himself and his principals great credit, in filling the order so promptly. When he returns home, he will be able to convince even the most skeptical doubters that Hawaii is not much farther away from St. Louis than San Diego or Olympia is, and that mill plants can be set up here as expeditiously as in either of the cities named. The story of his visit here, and what he has seen and accomplished in a very short time, will, if published, convince Missourians that the Hawaiian Islands are well fitted for, and *of right ought to become American territory.*

It is unnecessary to speak here of the cane fields and general appearance of the plantation, other than they never were in better condition, or gave promise of more abundant returns.

For the courtesies extended to the press, by Messrs. Tenney, O'Neil, Pohlmann, Mr. and Mrs. Lowrie and the O. R. & L. Co., we return our most cordial thanks.

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IMPARTIAL TESTIMONY.

The following extracts appeared in the PLANTERS' MONTHLY of March, 1892, and are reproduced here as appropriate to the occasion. As the honest views of a gentleman of sterling qualities, who resided in these islands twenty-five or thirty years, they will be endorsed by every impartial resident.

"In a lecture on the Hawaiian Islands and people, delivered by Mr. T. H. Davies at Southport, England, he refers to them in the following complimentary lines: 'The Kingdom of Hawaii is alone as an instance of a country which in seventy years emerged from barbarism, to be completely recognized as one of the Christian civilized nations of the world, and

whose national debt is quoted on the London Stock exchange. She is alone in not having one man, woman or child of proper years, who cannot read and write. She is alone in the large amount of foreign imports and exports per head of her population. And she is entirely alone in the wonderful fertility of her sugar lands.'

"Again, on political matters, Mr. Davies well and forcibly says: 'Hawaii alone of all the Pacific groups has been elevated into an independent State, and as she entered the family of nations under the tutilage of United States citizens, to the United States must be given the credit of the superior political position which the Kingdom of Hawaii enjoys. Then again, the United States is her nearest neighbor, and by far her largest purveyor and customer. Hence the commercial relations between the United States and Hawaii must always be of a preponderating character, in spite of the fact that the McKinley tariff killed the profits on what we in Hawaii call free trade in sugar by giving the same free trade to all other sugar.' "

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Manienie Grass.—We recently passed through three of the best Southern agricultural states, and specially noticed the Bermuda grass, which is one of the most alarming bugbears of the cotton planter, and have observed its very great value for permanent pasture and hay, This is the lawn grass of the Southern climate, and its running roots cause it to make a dense sod, which is green the whole year, excepting for a few weeks in the driest of the hot season of late summer and early fall. It seems impossible to kill this grass, excepting by plowing and cultivating, because of its peculiar habit, which gives it a special value for field growth. This grass yields a large quantity of hay and the finest pasture. As much as four tons of hay per acre has been made in an ordinary season at one cutting, when the grass has been put in in the best manner on good soil.—*Cor. N. Y. Times.*

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The weather for the past three months has been most favorable for all kinds of plantation and mill work, with abundance of refreshing rains and sunny weather.

CORRESPONDENCE AND SELECTIONS.

EXTRACTS FROM JAMES DUNN'S REVIEW OF THE SUGAR TRADE OF 1894.

GLASGOW, SCOTLAND, DECEMBER 29, 1894.

This will always be a memorable year in the history of the sugar trade; the quantity of the article to be reckoned with has been larger and the prices lower than any ever previously recorded. It is necessary to go back ten years to find anything at all approaching similar experience, and even when this is done the situation as it presents itself to-day far surpasses it in importance. The position, moreover, points to something of the nature of a new departure, and any essentially trade treatment of the subject can therefore only very inadequately indicate the possibilities in relation to it. At the opening of the year the price of 88 per cent. beetroot was 12s 6d. It then followed an uncertain course between 12s 4½d and 13s 1½d, the latter figure being its value at the end of February. In March the value kept between 13s and 12s 9d, but in April it receded to 11s 3d. In May the fluctuations were between 11s 4½d and 11s 10½d.

Shortly before the commencement of the latter half of the year reports began to circulate concerning the probabilities connected with the American Tariff Bill, and from that time onward to its final passing in August last every conceivable opinion was hazarded as to the result of the discussion. According as these opinions tended so did values fluctuate. In June prices ranged from 11s 7½d to 12s 9d, and at the close of that month they had again dropped to 11s 9d. For July and the greater part of August 11s 10½d was the highest and 11s 3d the lowest point; but towards the end of the latter month a "squeeze" occurred, and "bear" sellers who had too long left their accounts uncovered were obliged to pay up to 12s 9d. By this time the beetroot crop had made considerable progress towards maturity, and the communications received concerning it leaving little doubt as to its importance values steadily declined. In September the price fell from 12s 7½d to 10s 10½d; in October from 10s 3d to 9s 10½d; in November from a fraction over 10s to 9s, while at

the close Ss 7½d is about the value. This last figure is 1s 1½d per cwt. under the lowest depth reached in 1884. The perplexities which this extreme depression has already created can hardly be overstated; and if no hope were to be derived from past experience, the prospects for the producer might well be regarded as dismal enough. * * * *

The estimates of production available for 1894–95 have been given by Mr. Licht as 3,125,000 tons of cane sugar and 4,975,000 tons of beetroot, or a total of 8,100.000 tons. This represents a surplus of about 1,350,000 tons over last year's production, and an increase of no less than 3,500,000 tons during the last ten years. Such expansion has apparently been overdone, and the first effect, as has been seen, has of course been serious depreciation in value. But as the consumption of sugar throughout the world is still very far from what it must sooner or later become, the present condition of affairs really provides the lever by which important changes in this respect are likely to be effected. In 1884 the same causes, although in a less accentuated form, were in operation and in October of that year, when prices declined to 9s 9d per cwt., the position was then also generally regarded as an utterly hopeless one. But before midsummer of 1885 had been reached the natural remedies had taken effect, and the value had advanced to within a fraction of 17s, or a gain of 74 per cent, in the short space of nine months. For the moment the supply is superabundant, and the value now ruling amply determines that fact; but in relation to an article which still possesses an exhaustless means of dispersion and a cultivation which can be easily controlled, it is not improbable that between those two elements something approaching a better state of things may soon again be attained.

Extremes, whether as regards depression or inflation, are equally the points from which important, if converse, changes proceed, and this truism has been frequently illustrated in the case of sugar. In the meantime, however, the position does not give any early promise of such changes, although it is more than likely to produce results of a more universally beneficial character; the "bear" seller may now of course find some difficulty in discovering his chances for further hazards of that nature, and the speculator may have long to wait for

his "unearned increment:" but, what is of more importance, legitimate trading can hardly fail to be quickened by the opening up of fresh outlets, and the comfort of many a poor household may be increased. In many countries in Europe, and even in those of them in which the article is produced almost to excess, inland taxation is still so great as to render its consumption more of the nature of a luxury than a necessity, and it is, therefore, not unlikely the present difficulty, as to its disposal elsewhere, may hasten favorable legislation on this subject. This idea has been better expressed by Mr. C. Czarnikow in his circular of 6th December. If the theory holds good that the contentment and happiness of peoples and communities largely flow from unrestricted food supplies then there is certainly still sufficient room both in Europe and America for its development in relation to the case of sugar. In France the annual consumption per head is still barely 25lb; in Germany, rather under 19lb.; in Austria-Hungary, about 15lb.; while in Russia it is not quite 10lb. In Northern European countries the average consumption per head stands at somewhere about 20lb., while in Southern Europe it does not exceed an average of more than 5lb. The United Kingdom and the United States of America each consume about 70lb. per head, and some considerable addition to this consumption is still to be expected.

It is in the trans-Pacific colonies of Australia and New Zealand where the merits of the article appear to be appreciated to the fullest extent, for there the average consumption almost reaches 100lbs. per head. The colonists, of all people, have, in a general sense, been the first to understand what free drafts on the sugar bowl really mean, and this it would appear they give and important lesson on the adaptation of food to physical requirements. In an article on "Our Workmen's Diet and Wages," by Thomas Oliver, M. D., in the October number of the *Fortnightly Review*, that gentleman thus deals with the subject in connection with an article by Dr. Vaughan Harley which had previously appeared in the *Journal of Physiology*. Dr. Oliver says:—"Attention has been directed to this subject in the *Journal of Physiology*, by Harley, in which the value of sugar in muscular work is demonstrated. It struck me that it would be useful and

interesting to see how far the ordinary experience of the manual labourer, *e.g.*, the coal miner, whose hours of toil are limited and regular, supported Harley's conclusions, viz.:—(1) That there is a diurnal rise and fall in the power of performing muscular work, more being done before than after midday; and (2) that sugar is a muscular food, improving muscular work by from 6 to 39 per cent. The coalminers of Northumberland have for many years adhered to a diet which physiology demonstrates to be most serviceable, so far as the performance of muscular work is concerned. As a class they feed remarkably well; they keep a good table, on which animal food, fat, and carbohydrates are fully represented. They eat beef, and have a strong opinion that nothing can supplant it. The interesting point, however, is the large quantity of sugar they eat. As sugar is recognised as an active generator of muscular energy, it ought to be included, to a larger extent than it is, in the dietary of the working classes. There is always a small quantity of sugar present in human blood—viz., 1 per cent. When muscle is in a state of activity there is a disappearance of sugar from the blood four times greater than occurs in the blood issuing from muscle in a condition of rest, clearly indicating, therefore, that during activity sugar is used up. In his experiments to demonstrate whether sugar is a muscular nutriment Harley abstained from all food except 500 grammes of sugar daily—*i. e.*, a little over one pound by weight—and be found that there was not only an increase in the amount of work accomplished compared with that done during fasting by 70 per cent., but that muscular fatigue was decidedly retarded. It is recognised that when sugar is added to food a man is capable of doing more muscular work than without it, and that this occurs about two hours after it is taken. With Harley's experiments before us it is interesting to observe that what physiology is now teaching has apparently long been known to the Northumberland coal miner and to the English navvy. Each in his hard toil had evidently found out by experience the value of sugar as an agent in developing muscle force, and, with such testimony to its utility, sugar ought, we repeat, to be more sought after by the working classes."

The following are Mr. Licht's estimates of the crops available for 1894-95 :—

BEETROOT SUGAR CROP.	*Estimate. 1894-95.* Tons.
Germany	1,900,000
Austria-Hungary	1,100,000
France	830,000
Russia and Poland	630,000
Belgium	285,000
Holland	90,000
Other countries	140,000
	4,975,000

CANE SUGAR CROP.	*Estimate. 1894-95.* Tons.
Cuba	1,000,000
Java	470,000
Louisiana	325,000
Brazil	250,000
Philippine Islands	225,000
Hawaiian Islands	140,000
Mauritius	120,000
Demerara	115,000
Egypt	75,000
Peru	70,000
Porto Rico	60,000
Barbadoes	60,000
Trinidad	45,000
Guadeloupe	40,000
Reunion	38,000
Martinique	35,000
Jamaica	30,000
Antilles	27,000
	3,125,000
Grand total	8,100,000

The present state of consumption may be roughly estimated at about 7,000,000 tons, and this practically leaves 1,000,000 tons as a reserve balance to meet fresh demands, and to provide invisible stocks. The following shows how the consumption stands towards the various sections of the world's population :—

	Population	*Consumption per Capita* Lbs.	*Total Consumption* Tons.
United Kingdom	40,000,000	70	1,370,000
United States of American	70,000,000	70	2,100,000
Germany	53,000,000	19	450,000
Russia	126,000,000	10	450,000
France	40,000,000	24½	440,000
Austria and Hungary	44,000,000	14	300,000
Australia and New Zealand	4,000,000	100	175,000
Canada	5,500,000	56	140,000
Belgium	6,500,000	26	75,000
Holland	4,750,000	26	55,000
Italy	31,000,000	4	55,000
Spain	18,000,000	6	40,000
Sweden and Norway	7,000,000	10	30,000

Denmark	2,300,000	29	30,000
Roumania	6,000,000	7	20,000
Other European countris	35,000,000	5	80,000
			5,810,000
Asiatic and Pacific countries			1,000,000
			6,810,000
Estimated production (1894-95)			8,100,000
Estimated excess of production over consumption			1,290,000

The bounties on exports from Germany and Austria have now undergone considerable reduction. For 1893-94 they stand at equal to about 7½d per cwt. in Germany, 11d per cwt. in Austria, and 1s 6d per cwt. in France. The inland taxation in France is 24s per cwt., in Germany and Austria 9s per cwt., and in Italy 25s per cwt.

The visible supply at the commencement of the year, according to Mr. C. Czarnikow, was 1,424,000 tons against 1,288,000 tons in 1893. This supply of 1,424,000 tons was steadily increased until on 5th April it reached its maximum point the quantity then being 1,870,000 tons. From this it gradually receded until on 18th October the minimum of 467,000 tons was touched. Since then, by the arrivals of the new beetroot sugar, it has been increased according to his latest returns to 1,455,000 tons.

The whole trade throughout the greater part of the year, and throughout the world at large, was disturbed, as it never had been before, by the uncertainties connected with what took place at Washington in relation to the Tariff Bill. The duties on importations under the M'Kinley Act, which were limited to sugars from No. 16 DS, were, about the time the question came under discussion considered as certain to be reduced, if not altogether abolished. And, indeed, under the application of those Free Trade principles with which President Cleveland and the Democratic party were understood to be imbued, such a consummation was promised by the passing of the Wilson Bill by the House of Representatives in January last. This measure, which all but effected abolition, had however, still to face much insidious opposition—such, for instance, as those interested in the protection of monopolies know how to exert—and so, as is usual in most human affairs in which self-interest lurks, the movements of parties soon became so mysterious and involved that any hope for fair

treatment of the question speedily vanished. The end of it all was that, instead of reducing, much less abolishing, the taxation, a bill was passed which effectually settled the matter in quite another way. To-day the duty on sugar imported into the United States stands at 40 per cent. *ad valorem*, with 1-5th of a cent. per pound more in the case of refined and a surtax of 1-10th of a cent. per pound on all sugar produced in countries paying bounties. The imposition of those duties has thus rendered the American refiner safe from anything approaching extraneous competition, and virtually gives the Sugar Trust the absolute control of prices. The full effect of this condition of affairs has, so far, been delayed by what took place in anticipation of these changes; the American markets were glutted with foreign supplies, and this to such an extent that, from sheer pressure of weight, prices remained unaffected by the new scale of duties. When this came into operation, in August last, the stocks in the four Atlantic ports aggregated no less than 430,000 tons, and as the grocers and dealers throughout the country had, besides, fully supplied themselves in the hope of profiting by the new order of things, the result was the opposite of that aimed at, and clearances were made at a loss rather then a profit. In the events which have been referred to, it is difficult to trace any evidence of the practical application of the principle of "government by the people for the people," and its absence is certainly not rendered less conspicuous by association with democratic administration. The whole thing very opportunely encourages a certain train of thought which may, with advantage, be pursued as well on this as on the other side of the Atlantic.

The business of importing and refining in the Atlantic ports of the United States has made further important progress. For the eleven months ending 30th November, 1894, according to Messrs Willett & Gray, of New York, the quantity imported was 1,527,577 tons, which, with a stock of 84,524 tons left over on 1st January, 1894, made the quantity to be dealt with 1,612,101 tons, as against 1,366,975 tons in 1893, and 1,414,364 tons in 1892. The quantity available this year for manufacturig purposes thus exceeds that of 1893 by 245,126 tons, and that of 1892 by 197,737 tons. The quantity of

1,612,101 tons was disposed of as follows, viz:—1,431,000 tons were melted, 3570 tons refined sugar were exported, and 19,321 tons raw sugar were transferred to other markets. The consumption for the eleven months appears to have been 1,408,109 tons, against 1,304,099 tons in 1893, thus showing an increase of 104,010 tons.

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SPECIAL NOTICE TO INTENDING INVESTORS IN THE OAHU SUGAR COMPANY.

Since the prospectus of this company was printed a gentleman who represents large interests in the sugar culture of these island has criticised my estimate of expense. My aim has been to make a careful, conservative estimate of the earnings and expenses of the proposed undertaking, and my object is to inaugurate a business which will be a paying investment for every one concerned, and a credit to this country. I have invited criticism from a large number of able men to whom I have submitted my Prospectus before putting it in print, some of whom have responded in writing, as may be seen in the Prospectus. If to be conservative one must place the estimated income of an enterprise at such a low point, and raise the estimated expense to such a high figure that there will appear to be no profit; such a course would be as much a mistake as to make an over estimate of profit. To meet the views of my critic, and to satisfy, if possible, any one who may question the soundness of my figures as made in the Prospectus, I beg to submit the following:—

When Ewa Plantation was started, the so-called conservative element in this country, contended, that the cost of pumping would leave no profit on the sugar raised. Haiku and Paia plantations, on the Island of Maui, have been, truly, mines of wealth for the stockholders. Great stress is laid upon the fact that these plantations enjoy the superior advantage of flowing water, for irrigation, and hence "avoid the enormous expense of pumping." Recent reports, which are authentic, give the following results:

Cost of irrigation per ton of sugar, at Haiku Plantation	$7 00
" " " " Paia "	7 69
Ewa Plantation—Pumping and Irrigating	8 09

Now we find by actual experience that it costs Ewa Plantation for irrigating, forty cents per ton more than Paia, and one dollar and nine cents per ton more than at Haiku. A difference so small on enterprises of such great magnitude as to "cut on figure," when the value of a water supply which can be regulated at will is duly considered.

While I believe the Oahu Sugar Company will be in position to pay a dividend on the *first* the *second* crops; to be "conservative" I suggest that *no* dividends may be paid until the second crop has been harvested. The third crop according to the plan in the Prospectus will cover 4,000 acres; 2,000 acres of "Plant Cane," 1,200 acres of "Short Ratoons," and 800 acres of "Long Ratoons." It is not expected the crop will on any year following the third crop be less than 4,000 acres, though the area of land held by the Company will admit of an annual crop much larger, say 5,000 to 6,000 acres. Starting then, with the third year, I will make a conservative estimate of the sugar to be made each year from January to July, and will estimate the expense for the entire year at the rate suggested by my conservative critic.

The yield of Ewa Plantation in 1894, under unfavorable circumstances, due to an inefficient mill, was six and ninety-six one-hundredths tons per acre for the entire crop harvested. While it is admitted generally that the lands of the Oahu Sugar Company are as good if not better sugar lands, I will place the estimate of average yield at one-half ton per acre less, say six and one-half tons.

ESTIMATED YIELD OF SUGAR FOR 1899.

Crop to be taken off between January and July:

4,000 acres at six and one-half tons	26,000 tons	
26,000 tons, net of marketing charges (which are not included in the estimated expense) at $55		$1,430,000

ESTIMATED EXPENSE 12 MONTHS FOR 1899.

Agricultural labor, conducting irrigation and milling	$475,000	
Incidentals	82,100	
Pumping on say 5,000 acres of land at $60	300,000	
Rent on estimated yield as above, 3 per cent on $1,430,000	42,900	
		$ 900,000
		$ 530,000

The foregoing is certainly a conservative estimate, and yet the result shows $130,000 larger profit than is represented in the Prospectus.

ULTRA CONSERVATIVE ESTIMATE.

I base the yield on the average returns of "Ewa's" last crop, say seven tons per acre:

4,000 acres at seven tons	28,000 tons	
28,000 tons sugar at $40 per ton		$1,120,000

EXPENSE 12 MONTHS OF CURRENT YEAR.

Agricultural labor, irrigation and milling	$475,000	
Incidentals	82,100	
Pumping	300,000	
Rent 3 per cent, on $1,120,000	33,600	
		$ 890,700
		$ 229,300

This estimate with sugar netting clear of shipping charges $40.00 per ton, shows a profit of nearly thirteen per cent. on the proposed capital required and eleven and forty-six one-hundredths per cent. on the total Capital Stock.

B. F. DILLINGHAM,
General Manager Oahu Railway and Land Co.

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NUTRITIVE VALUE AND COST OF FOODS.

Through the courtesy of the Secretary of Agriculture we are enabled this week to lay before our readers, says the AMERICAN GROCER, some interesting extracts from the manuscript of the forthcoming report on the "Nutritive Value and Cost of Foods," by Prof. W. O. Atwater. The work has occupied this distinguished scientist for many months, and will be supplemented by a more exhaustive and technical monograph for the use of students and investigators. This treatise is popular in character, and may be divided into two parts, the first dealing with the composition of food materials and the needs of the body, and the second with the pecuniary economy of food, and suggestions regarding wastes to be avoided. The extracts here presented are from the first chapter, and will be followed by a resume of the second part of the work.

"Ordinary food materials," says Professor Atwater, such as meat, fish, eggs, potatoes, wheat, etc., consist of two portions—the refuse, as the bones of meat and fish, shells of shell-fish, skin of potatoes, bran of wheat, etc., and the edible portion, as the flesh of meat and fish, the white and yolk of eggs, wheat flour, etc., The edible portion consists of water and nutritive ingredients or nutrients. The principal kinds of nutritive ingredients are protein, fats, carbo-hydrates and mineral matter. The water, refuse and salt of salted meat and fish are called non-nutrients. In comparing the values of different food materials for nourishment they are left out of account.

"A quart of milk, three-quarters of a pound of moderately fat beef, (sirloin steak, for instance), and five ounces of wheat flour all contain about the same amount of nutritive material; but we pay different prices for them and they have different values for nutriment. The milk comes nearest to being a perfect food. It contains all of the different kinds of nutritive materials that the body needs. Bread made from the wheat flour will support life. It contains all of the necessary ingredients for nourishment, but not in the proportions best adapted for ordinary use. A man might live on beef alone, but it would be a very one-sided and imperfect diet. But meat and bread together make the essentials of a healthy diet. Such are the facts of experience. The advancing science of later years explains them. This explanation takes into account not simply quantities of meat and bread and milk, and other materials which we eat, but also the nutritive ingredients which they contain."

Professor Atwater likens the human body to a machine requiring material to build up its several parts, to repair them as they are worn out, and to serve as fuel; but, he says that it is more than an ordinary machine, for we have not simply organs to build and keep in repair and supply with energy; we have a nervous organization; we have sensibilities and the higher intellectual and spiritual faculties, and the right exercise of these depends upon the right nutrition of the body.

"The chief uses of food," he continues, "are two: First—To form the material of the body and repair its wastes. Second—

To yield heat to keep the body warm and muscular and other power for the work it has to do. In forming the tissues and the fluids of the body, the food serves for building and repair. In yielding heat and power it serves as fuel. The different nutrients of food serve the body in different ways. The principal tissue formers are the protein compounds, especially the albuminoids. These make the flesh of the body. They build up and repair the nitrogenous materials, as the muscles and tendons, and supply the albuminoids of the blood, milk and other fluids. The chief fuel ingredients of the food are the carbo-hydrates and fats. These are either consumed in the body when the food is eaten or they are stored as fat to be used as occasion demands. In being used as fuel, these nutrients tend to protect the albuminoids of the food and prevent the materials of the body from being consumed.

"The albumen of eggs, the casein of milk and cheese, the gluten of wheat, the myosin of lean meat, and the other albuminoids of food are transformed into the albuminoids and gelatinoids of the body. Muscle, tendon and cartilage are made of albuminoids. The albuminoids of food also serve as fuel. A dog can live on lean meat; he can convert it into muscle, heat and muscular power. The gelatinoids of food, as the finer particles of tendon and the gelatin, which is dissolved out of bone and meat in making soup, though somewhat similar to the albuminoids in composition, are not tissue formers. But they are used as fuel, and hence are valuable nutrients. The albuminoids are sometimes called 'flesh formers' or 'muscle formers,' because the lean flesh, the muscle, is made from them.

"The starch of bread and potatoes and sugar are burned in the body to yield heat and power. The fats, such as the fat of meat and butter, serve the same purpose, only they are a more concentrated fuel than the carbo-hydrates.

"The fats of the food are stored in the body. The body also transforms the carbo-hydrates of food into fat. This fat, and with it that stored from the fat of food, is kept in the body as a reserve of fuel in the most concentrated form. One chief use of the fat stored in the body is for fuel, to be drawn on in case of need.

"The different nutrients can to a greater or less extent do

one another's work. If the body has not enough of one for fuel it can use another. But while the protein can be burned in the place of fats and carbo-hydrates, neither of the latter can take the place of the albuminoids in building and repairing the tissues. At the same time, the gelatinoids, fats and carbo-hydrates, by being consumed themselves, protect the albuminoids from consumption.

From the knowledge of foods thus obtained, Professor Atwater formulates the following definitions:

First—Food is that which, taken into the body, builds tissue or yields energy.

Second—The most healthful food is that which is best fitted to the wants of the user.

Third—The cheapest food is that which furnishes the largest amount of nutriment at the least cost.

Fourth—The best food is that which is both most healthful and cheapest.

He then proceeds to the consideration of the composition of food materials, and as the result of his investigation presents the following table giving the fuel value and nutritive ratio of various articles of food, using the "calorie" (*i. e.*, heat required to raise the temperature of a pound of water 4 degrees, F.) as the unit of comparison:

ANIMAL FOODS.

Food materials.	Fuel value. Calories—	Nutritive ratio. 1—
Beef—		
Neck	880	2
Chuck rib	1,125	3
Rib	1,405	5.1
Shoulder	895	1.8
Sirloin	970	2.5
Rump	1,570	5.1
Round	855	1.5
Cooked (corned) and canned	1,215	1.6
Liver	665	.8
Mutton—		
Shoulder	1,075	2.9
Leg	935	2.3
Loin	1,480	5.3
Pork—		
Loin	1,330	4
Smoked ham	1,735	5.8
Fat (salt) pork	3,510	—
Chicken	330	.3
Turkey	550	.9
Shad, whole	375	1.2
Mackerel	370	1

Bluefish, dressed	205	.1
Haddock, dressed	160	.1
Cod, dressed	205	.05
Halibut steak	465	7
Dry salt cod	315	.05
Salt mackerel	910	2.4
Canned salmon	975	1.7
Oysters "solids"	260	1.2
Lobster, whole	130	.3
Eggs	720	1.6
Milk	325	3.8
Butter	3,615	—
Cheese, full cream	2,070	2.9

VEGETABLE FOODS.

Potatoes	325	8.6
Sweet potatoes	475	18.5
Turnips	165	7.1
Granulated sugar	1,820	—
Dried beans	1,615	2.8
Cornmeal (maize)	1,645	8.6
Oatmeal	1,845	5.7
Wheat flour	1,645	7.2
Wheat bread	1,280	6.8
Rice	1,630	10.9

Professor Atwater discusses at length the proportions of individual nutrients found in various foods, and calls attention to the fact that vegetable foods are rich in carbohydrates, like starch and sugar, while the meats have not enough to be worth mentioning. On the other hand, the meats abound in fats, while the vegetables have but little. Mistakes are apt to be made, however, by those who read the Professor's table hastily. "For instance," he says, "rice consists of about seven-eighths and potatoes only one-fourth nutritive materials. The first inference is that rice is more than three times as nutritious as potatoes. In one sense this is true; that is to say, a pound of rice contains more than three times as much nutrients as a pound of potatoes. But if we take enough of potatoes to furnish as much nutritive material as the pound of rice, the composition and nutritive value of the two will be just about the same. In cooking rice we mix water with it, and may thus make a material not very different in composition from potatoes. By drying the potatoes, they could be made very similar in composition and food value to rice. Taken as we find them, a pound of rice, and three and a half pounds of potatoes would contain nearly equal weights of each class of nutrients, and would have about the same nutritive value."

The Professor discusses in a very interesting manner the question of cheaper bread, and says:

"Flour, such as is used by bakers, is now purchased in the Eastern States at not over $4 per barrel. This would make the cost of flour in a pound of bread about one and one-half cents. Allowing one-half cent for the shortening and salt (which is certainly very liberal) the materials for a pound of bread would cost not more than two cents. Of course, there should be added to this the cost of labor, rent, interest on investment, expense of selling, etc., to make the actual cost to the baker.

"Very few accurate weighings and analyses of bakers' bread have been made in this country, so far as I am aware, but the above statements represent the facts as nearly as I have been able to obtain them.

"The average weight of a number of specimens of ten-cent loaves purchased in Middletown, Conn., was one and one-quarter pounds. This makes the price to the consumer eight cents per pound. The price of bread and the size of the loaf are practically the same now as when flour cost twice as much.

"The cost of bakers' bread is a comparatively small matter to the person who only buys a loaf now and then, but in the Eastern States and in the larger towns throughout the country, many people, and especially those with moderate incomes and the poor, buy their bread of the baker. Six cents a pound, or even half that amount, for the manufacture and distribution seems a very large amount.

"In the large cities competition has made bread much cheaper, but even there the difference between the cost of bread to the well-to-do family who bake it themselves, and to the family of the poor man who buys it of the baker is unfortunately large."—*N. Y. American Grocer.*

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WHAT AN AUSTRALIAN TOURIST SAYS.

[Some of our readers will remember Mr. A. Archer, a former resident of Kauai, but now of Queensland, who revisited these islands in the spring of 1894. On his return home, he addressed a letter to the *Brisbane Courier*, giving

the result of some of his observations, from which we clip the following paragraphs.—EDITOR.]

"In the early part of this year (1894), I visited the Sandwich Islands, and spent three very pleasant months there. As I had previously resided several years in these islands, and been part of that time employed on sugar plantations, I was anxious—having heard reports of the phenomenal yield of sugar there of late years—to inspect some of the plantations and compare their present state with what it was when I knew them years ago. It was my intention during the coming recess to have written something about what I saw there for publication, along with some photos, in the *Queenslander*, but having lately noticed several letters in your paper *re* the extent to which gumming has attacked sugar cane in different parts of Queensland, I have decided to request the publication of this now, in the hope that it may be of some little use to our sugar planters.

"I may, say, then at once that never have I been more struck than when shortly after my arrival in the islands I first saw a field of plant cane, then about eleven months old. It was not so much the size of the cane, although it was very large, as the immense mass of it, and its look of vigorous health. The cane was called, as far as I remember Lahaina. At all events, it was of a bright yellow color, the skin of it as clear as if it had been washed. This cane had been planted there for years, and there was not a spot on it or a sign of disease. Remembering that of old the borer used to damage the cane of some extent, I remarked to the manager who stood by me that I saw no sign of it. "No," said he, "plenty of lime and deep cultivation have given such a skin to the cane that the borer can do nothing with it." The cane certainly did look as if it had been polished. "What sugar do you expect to the acre?" I asked. "Well," he said, "the field of ratoons we passed in coming here is 113 acres. It was plant cane last year, and gave 1137 tons of sugar, or a little over ten tons to the acre. I think this field as good and expect as large a crop, but feel sure it will go over nine tons." I need not here describe what more I saw on this splendid plantation, but only state that the manager gave very deep cultivation, liberal use of lime, and occasional use

of fertilizers credit for the results obtained. The lime used was not quicklime, but coral sand or old rotten coral reef, of which there was plenty near at hand. Of such lime he would use as much as thirty tons to the acre, which, of course, lasted for years and years, as it decayed slowly as the plant required it. Unburnt but crushed limestone would, of course, answer the same purpose.

"The plantation I have just spoken of was for the Sandwich Islands, where some of the plantations are very large, a small one, turning out a little over 3000 tons of sugar, polarizing 98 degrees. It was, however, the most highly cultivated I saw, but during my stay on the islands I did not see a single diseased cane. It is not, however, the practice to grow third and fourth ratoons. As one manager said to me. "Whenever the crop falls to nearly four tons of sugar to the acre, we plough it up and plant again."

"I noticed a letter appeared in your issue of the 22nd of October, written by Mr. Knox, that some people regard the gumming in cane to be caused by the quantity of lime contained in the cake from the filter press which is put into the fields. This may be likely to help the disease. In the first place the lime used is quicklime, and hard as it is pressed, some of the juice of the cane will remain and ferment, and if not broken up and exposed for some time to the air, would, I believe, do more harm than good. In the islands they sprinkle the molasses over the field from watering carts, so that too much of it does not lie in one place. I may say that if our sugar-planters will plough their land deep—even letting one plow follow another in the same furrow, so as to get well down, if they will supply the field with a dressing of coral sand, ground coral, or crushed limestone, and use a fair quantity, say one-half ton to the acre of the fertilizer now to be had from the meat works, in which both the blood and the bone are preserved, they will find that gumming will disappear and the output of sugar to the acre will be doubled.

"This method of cultivation will be more expensive per acre than that now used, but if it results in healthy instead of diseased cane, and doubles the output to the acre, it will be for the farmer to consider if the more expensive cultivation will not result in the greater profit. They might at least

make an experiment with five or ten acres, and if it did not succeed they could fall back on their own plan of scratching the ground again. I have no hope that anyone who cultivates a small field can ever rival the Sandwich Islands plantations. There they plough and cross plough with the largest steam ploughs, going from twenty inches to twenty-two inches in depth. This is, of course, quite out of the power of the small farmer; but if he wishes to have fine cane he must go as deep as he can, and not take too many crops of ratoons from one planting."

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THE COFFEE TRADE.

[American Grocer.]

The influence of increasing productive area and an estimated yield for 1894-95 larger than any previous supply on record had its effect on the coffee market and led to a reduction in average cost for the year as compared with 1893. It is the forerunner of a more marked decline in 1895. Throughout Brazil, Mexico, Central America and the United States of Columbia there has been a rapid extension of coffee plantations, under the stimulus of high cost in consuming markets since 1887.

Coffee growing is a profitable industry with coffee 50 per cent. less than present ruling prices in consuming market. Planters have been amassing fortunes and retrieving the losses incurred prior to 1886, when the coffee production ran far ahead of the world's requirements, causing an era of low cost.

The year past has been fairly satisfactory to the distributers. Transactions on the Coffee Exchange were 4,618,750 bags, against 5,880,250 bags last year and 6,926,000 bags in 1892. The sales of the current option ranged in price from 17.15 in January to 12.25 in October, closing 13.65. The highest on spot, No. 7, was 18¼ @ 18½ on January 9, and the lowest, 14¾ @ 15 on October 23, closing at 15½.

Messrs. James W. Phyfe & Co. report a distributive demand from New York of about 250,000 mats East India coffee, of which about 120,000 mats were Padang. This small supply was due to light crops in the east, particularly in the Government districts. The 1894 crops of Government coffee in

Dutch East Indies are the lightest on record, stocks here and on the way are very small. The Dutch Government have under advisement plans to stimulate production, and which include higher wages to the natives. Free coffee, or coffee grown on private plantations, shows better quality, as the result of more care in cultivation and curing. The outlook for 1895 is for a light supply of Padang and Java, at very high prices.

The Rio crops of 1894-95 are variously estimated from 6,000,000 to 8,000,000 bags. The world's entire production from 12,000,000 to 13,500,000 bags.

The monthly deliveries of the year compare as follows:

	1894.	1893.
January	407,567	443,518
February	378,810	354,853
March	436,486	349,753
April	360,203	353,117
May	350,247	365, 67
June	340,541	329,267
July	289,162	277,921
August	343,842	293,091
September	367,355	388,725
October	345,334	350,590
November	365,306	338,552
December (subject to revision)	404,627	376,112
Totals	4,389,480	4,220,666

The following table represents the average monthly and average annual spot cost of coffee:

	No. 7 Rio. *Cents.*	*No. 3 Rio.* *Cents.*	*Maracaibo.* *Cents.*	*Padang.* *Cents.*
January	18.00	19.62	20 @22½	21½ @24
February	17.22	19 20	19¾ @22½	21½ @24¼
March	17.45	19.25	19½ @22½	21½ @24¼
April	17.19	19.12	19½ @22½	21½ @23½
May	16.24	17.75	19½ @21¾	21½ @23
June	16.11	18.18	19¼ @21	21½ @22¾
July	16.41	18.50	19⅜ @20½	21 @23
August	16.12	18.50	19 @20¼	21 @23
September	15. 2	18.00	17⅛ @19½	21 @23
October	15.03	18.50	16⅞ @19¼	21 @22¾
November	15.52	18.38	17¾ @19½	21 @23½
December	15.80	18.38	17½ @20½	21½ @24½
Average 1894	16.40	18.61	18.78@21.02	21.29@23.48
" 1893	17.08	19.28	19 @22 1-6	21.42@25.37
" 1892	14.43	18.33	16.45@22.41	25.73@26.85

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It would be quite accurate to say that the besetting weakness of the American people is that they are too much devoted to money making, but such a statement would not be far from the truth.

THE CANAIGRE OR TANNERS DOCK.

By E. W. Hilgard, Director and Chemist.

The Canaigre or tanners dock *(Rumex hymenosepalus)* has of late attracted so much attention as a promising field crop and forms the subject of so many letters of inquiry addressed to this station, that it seems desirable to summarize for the benefit of the public the various results obtained and publications made in regard to it, here as well as elsewhere; in order to enable every one to form his own judgment in regard to the probable merits of the culture for this State. Thus far the best source of information on this plant is Bulletin No. 7 of the Arizona Experiment Station, at Tucson.

The Canaigre plant, though recognizable as a dock by any attentive observer, differs from most of the common species in being of less height (rarely over two feet in this State) and more succulent; the stem rather brittle, the lance-shaped leaves smoother and of a lighter green than most others, quite smooth, and red-veined. The flowers and seeds are less abundant and larger than in our other docks, are borne on erect branches, and are suspended by longer and thinner, reddish-colored stalklets. The seed vessels are conspicuously winged and reddish, with a very small black seed. The tuberous roots resemble sweet potatoes or Dahlia roots; single ones weigh from six to fourteen ounces each, and from one to four are found with a single stalk.

The canaigre is indigenous to Southern California as far north as the Kern valley, so far as known; it is more particularly at home, however, south of the Tehachipi mountains, in the sandy lands of the San Fernando and San Bernardino plains; also on the Gorgonio pass and on the border of the Colorado desert generally; also no doubt in the valleys of San Diego. Outside of California it is apparently most abundant in Arizona and Southern New Mexico, and in northwestern Texas; it reaches to Utah and the Indian Territory. Its abundant occurrence in New Mexico led to the establishment of a factory for preparing the tannin extract for shipment instead of the root, and similar establishments were proposed for Arizona. But it has quickly become apparent that the supply of the wild plant would soon become exhausted, and that in or-

der to place the industry upon a permanent basis it would be necessary to grow it as a regular crop. Now that the value of the root for the tanning of fine leathers has been fully established and a market is assured, the only remaining question is that of the best conditions for its cultivation, as to climate, soil, and mode of culture, to endure profitable returns.

As regards *climate*, it should be understood that in California the plant starts its growth from the root with the first rains, in October or November; reaches bloom about the end of January or first part of February, perfects its seed about April and dies down to the ground in May; varying according to the winter temperature and the advent of spring warmth. It is not therefore to be expected that it will make a normal growth where the ground freezes in winter, although like some other culture plants it may be able to adapt itself to a different *regime* so long as the root is not frosted. We have not as yet any definite data as to what amount of winter cold will kill the root.

As to *soil*, the presumption is that, like other root crops, it will do best in light soils, which it seems to occupy naturally by preference. Yet it has made a good normal growth in the heavy black adobe of the Economic Garden at this station, which however has, of course, been kept well tilled. It appears therefore to be quite adaptable to a variety of soils; the New Mexico station reports "adobe soil" as its preferred ground, but the term is evidently used there in a different sense, as designating the loams of the character actually used for building adobe houses; a use for which the average adobe of California would be inapplicable.

Propagation.—The easiest way to obtain a stand of the canaigre is to plant the smaller roots obtained in harvesting the crop. These develop rapidly and according to the observations made at the New Mexico station will, when irrigated, quadruple their weight in one season; they will also in that case produce seed abundantly. One marked peculiarity of the roots, remarked upon by all reports, is that when cut, the upper portion (the one having the root crown) will reconstruct its lower part by new growth which differs markedly from the older by its smoothness.

Propagation by seed seems to occur quite rarely in Arizona

and New Mexico, as well as in California south of the Tehachipi range. But with more abundant moisture, as in the "Weedpatch" of the Kern valley (an ancient channel still receiving some seepage) and at this station when early rains occur, the fallen seeds sprout abundantly; and we will the coming season be enabled to ascertain what advantage there may be in propagating by seed instead of devoting a portion of the root crop to replanting. The seed must be sown quite shallow and lightly covered, when the ground is moist.

When irrigated the roots will stand close planting, say nine or ten inches apart in rows thirty inches apart, as in the case of sugar beets. Since the roots are on the average somewhat smaller than sugar beets, the average crop will be somewhat less in weight.

Canaigre roots will sometimes remain in the ground during several successive dry years without injury, growing as soon as the needful moisture comes. This indicates the mode of keeping the roots for seed, viz: in dry sand or loam, in a dry place. When kept in piles for any length of time, the canaigre root heats and spoils even quicker than the sweet potato.

Cultivation will, it must be presumed, not differ materially from that of the sugar beet, except that there will be no thinning needed; and as in the case of the latter, only a few cultivations will be required to subdue weeds and to maintain good tilth in the rainless summer climates in which it is at home. The Arizona station prescribes that "to secure the largest yield the planting should be done before the first of October (in that climate) and the soil moistened and plowed; then the roots dropped and covered with a potato planter adjusted to suit the case. The crop should be irrigated from four to six times and some implement of the two-horse cultivator style run through the rows after each irrigation."

The amount of irrigation that should be given will of course vary according to the kind of soil and the natural moisture. As it seems that too much water depresses the tannin-percentage (see below), while increasing the weight of the crop, there is evidently a certain measure that cannot be profitably exceeded, but which must be established by experiment. At this station, with an average rainfall of 23 inches during the winter, irrigation is certainly not called for.

Harvesting can be done as in the case of beets, by means of a "digger" such as is used for potatoes and (in a modified form) for the sugar beet. A crop of ten tons per acre from roots planted as indicated above and properly cultivated for one season, is probably a fair average expectation.

But it is not necessary to harvest the root at any particular time, since it not only does not deteriorate by remaining in the ground but actually increases its tannin-percentage about the time the buds for the second year's growth begin to move; as has been shown at the Arizona station. In fact the tannin appears to increase to a maximum at the end of the second season, after which it seems to remain constant; at least we have never found a higher percentage in roots older than two years, than in the two-year-old. As the roots do not die or decay, it is optional with the farmer when to dig them. At this station, when a clump that had grown from a single root was dug up after remaining undisturbed for eight years, not a decayed root was found and the whole weighed 13 pounds. The older roots are much darker in color and have a rougher surface than new roots, which are as smooth as sweet potatoes.

The canaigre thus differs from almost every other crop in that its harvest can wait for the convenience of the farmer, within wide limits. It is not certainly known as yet whether the root increases in weight after the second year; our impression is that the increase is slight if any, and that it will not be found best to defer harvesting after the second year. But we have found that there is no material difference in the tannin contents of the full-grown root whether the plant is resting, blooming or seeding.

Marketing.—As has been stated above, the canaigre root, while an excellent keeper when kept very dry, spoils readily when kept in mass. It cannot therefore be shipped green to any great distance, but must for distance shipments be either dried or converted into extract.

Drying is costly and laborious, and after all of somewhat uncertain result on the large scale. Tannin is a very easily decomposable substance; drying at a high temperature will injure it as well as when, at too low a temperature, the drying progresses too slowly and permits fermentation to start up. Even small roots cannot be dried whole without serious

deterioration; it is absolutely necessary to slice them, very much as beets are sliced for sugar-making. But when machinery is once procured for slicing, it seems better to go a step farther and end all fear of deterioration by preparing the *extract*, which will keep indefinitely.

The cost for a factory plant for preparing the extract need not be large, but it must be managed by competent hands.

According to the data obtained by the Arizona station, agreeing well with the averages obtained by us, three tons of green roots will make one ton of dried, or one-half ton of extract; or, six tons of green root will yield one ton of extract, averaging from 60 to 65 per cent. of tannin, and, therefore, very well capable of shipment to a distance, so far as value is concerned.

Structure and chemical composition of the root.—As the canaigre root varies in its outward aspect, so it also differs quite obviously in its internal appearance. Old roots are darker-colored than young ones, both outside and inside; the latter point seems also to be influenced by differences in soil and cultivation.

The fresh root shows on a cut surface irregular orange or lemon-yellow blotches and streaks, sometimes covering the greater part of the section almost uniformly. On exposure to the air the color rapidly darkens into brownish-red, which is also the color of the extract as a whole. Microscopic examination shows that the coloring substance (aporetin?) is contained in separate cells almost free from starch grains, while the uncolored tissue is full of starch. The tannin appears to be very uniformly distributed throughout, in solution in the sap; but in the case of large roots appears to be most abundant near the axis or center line, contrary to what occurs in the case of sugar in the beet.

The tannin-content of the fresh and dried root from different localities, of different ages, etc., as heretofore determined at this station, are given in the subjoined table; for the sake of comparison, the tannin percentages found in other materials available in this State are also given.*

*The tannin determinations given here have been made by the permaganate method, but have been repeatedly checked by the gelatine (or hide-scrap) method, with but trifling differences in the results. These therefore represent fairly what hides will take up from the root or root extract.

	Material.	Locality.	Sender or Grower	Water, per cent.		Tannin, per cent.		
				Fresh	Air dried	Fresh.	Air dried.	Dried at 100° c.
1	[1]Canaigre (Root of *Rumex hymenosepalus*)	Northwestern Texas		*68.07	11.17	8.51	23.45	26.30
2	Canaigre	San Gorgonio Pass	Dr. C. C. Parry	*75.00	11.40	9.60	34.20	38.40
3	Canaigre, roots sliced and dried						14.97	16.90
4	Canaigre, roots dried whole						5.40	6.09
5	Canaigre, roots with little coloring matter	Gathered April 10, 1889. Experimental Garden, Berkeley					5.91	30.80	34.76
6	Canaigre, roots with large amount coloring matter						5.97	31.13	35.14
7	Canaigre, outside sections of root						5.60	27.64	31.20
8	Canaigre, inside sections of root				83.00	11.40	7.79	40.57	45.80
9	Canaigre root, small						7.10	37.03	41.79
10	Canaigre root, large						6.54	34 11	38.51
11	Canaigre root	Gathered May 20, '89.					5 80	30.21	34.12
12	"Red Dock" (wild)	Weed-patch, Kern Co.	L. H. Filcher		12.50		25.30	29.00
13	"White Red Dock" (wild)	South Fork Kern River	A. B. Leckenby	*61.40	10.50	7.50	17.43	20.30
14	Canaigre (one year old, grown with irrigation)	Bakersfield, Kern Co.	A. B. Leckenby	*74.80	11.10	4.35	15.35	17.80
15	"Red red Dock" wild; on moist ground?)	Weed-patch, Kern Co.	A. B. Leckenby	*74.20	12.66	9.00	30.70	35.10
16	"White Dock" (*Rumex Berlandieri?*)	Weed-patch, Kern Co.	L. H. Filcher	48.88	.....	0.00	00.00	00.00
	Other Tanning Materials.							
17	Black Wattle (*Acacia decurrens*) Bark	Experimental Garden, Berkeley		45.70	14.85	26.4	41.40	48.60
18	Silver Wattle (*Acacia dealbata* var. *mollisima*) Bark			47.99	20.49	13.1	19.70	24.80
19	Golden Wattle (*Acacia pycnantha*) Bark			41.10	11.19	27.6	41.60	46.80
20	European Tanner's Sumac (*Rhus coriaria*) Leaves				10.20		16.80	18.70
21	California Tall Sumac (*Rhus integrifolia*) Leaves	San Fernando plain, Los Angeles Co.					11.70	.....
22	California Tan-bark oak (*Quercus densiflora*)						12.00	.....
23	[2]Oak (*Quercus pedunculata*) Bark						10.50	.....
24	[2]Hemlock (*Abies canadensis*) Bark						12.00	.....

* Partially dried in transmission. 1 Analysis taken from Report Sec. Agriculture, 1878, 2 Analyses taken from Allen's Commercial Organic Analysis, VIII.

The first analysis here given was published in the report of the U. S. Dep't of Agriculture for 1878 and refers to roots from northwestern Texas. It will be noted that the tannin percentage there given (26.4 on the average) is the lowest of all the results obtained from wild roots. The Arizona Station gives as the average of wild roots from that territory 30.5% of tannin while the average of the wild roots from California is seen to be 35.85, or 5.35% higher. Whether this is due to climatic or soil differences remains to be determined. The fact that large roots from the Gorgonio Pass and from the Berkeley Economic Garden both yielded the maximum percentage (38.5), while the soils are respectively at the opposite extremes of sandiness and clayeyness, would seem to indicate climatic factors as the more probable cause of difference. At all events, it appears clearly that the California-grown root is likely to be superior rather than inferior to that grown farther south.

As regards the relation of tannin-contents to *color*, analyses 4, 5, 11, 12 and 14 furnish some interesting indications. It appears that in Kern county the canaigre is known as "red dock," probably more from its red leafstalks and veins than because of the color of the root. There is a variation in the color which is expressed by the popular names of "white red" and "red red" dock, while there is also a kind called "white dock." The latter as the table shows is a different species and contains only traces of tannin; the "white red" has only a little over 20%, the "red" (No. 11) 29%, the "red red" 35%. It is thus evident that in the case of the canaigre as well as in that of other culture plants, there is a considerable variation in the quality of different varieties; and it seems that tion in the quality of different varieties; and it seems that the deeper the tint of the foliage (and root) the greater the tannin-yield is likely to be. Doubtless in the future we shall be able to improve the canaigre in this respect as the sugar beet has been. But it is also clear that the extent of moisture and irrigation has a very great effect in this direction; since we see that the well-irrigated plant from the experimental field of the Kern Co. Land Company near Bakersfield yields only 17.8%, or about half as much as the best wild plants.

Analyses 1, 2 and 3 show plainly the effects of drying in various ways. No. 1 was rapidly dried by steam heat after

cutting into very thin slices; No. 2 was cut more thickly and placed in a drier on a tray, as might be done on the large scale; No. 3 was dried whole at a gentle heat. It will be noted that while the first contained unusually high percentage, the second was reduced to less than half, and in the third, five sixths of the tannin was destroyed by the process.

Comparing the canaigre with other tanning materials given in the table, it will be seen that the bark of the black wattle and golden wattle exceed the root in tannin contents. The question then arises whether, supposing the two materials to be of equal quality for tanning purposes, it will be more profitable to grow canaigre than the wattles. An approximate comparative estimate for the crops will therefore be of interest.

Here the time element comes in as an essential factor. It takes eight or ten years to mature a wattle plantation; the yield of bark per acre is, for the first eight years (for the black wattle), estimated at about twelve tons, besides possibly 100 cords of wood, available for firewood. This estimate is based upon the planting of 400 trees per acre; close planting being desirable in order to secure long trunks. The bark is worth about $25 per ton in Australia. At the end of eight years twenty acres will yield 240 tons of such bark (value $6,000), plus 2,000 cords of trunk wood, which would barely bring one dollar per cord in this country. Therefore $8,000 represents the gross returns for the twenty acres as against about $2,050 of cash outlay plus rent of land, interest, wear and tear, etc. The clearing of the land for replanting would cost from $40 to $50 per acre, so that $800 to $1,000 must be added to the above estimate of cost; leaving the net returns for the eight years about $5,000.

On the other hand we would have in the case of canaigre, estimating on the cost of the cultivation of sugar beets, and allowing for the differences in the operations required, about $3,000 for the eight years, plus again the rent of land, interest and wear and tear. In return for this, at the rate of ten tons of roots per acre, there would be obtained 1,600 tons of fresh roots worth $8,000, upon the basis of the price of beets only (viz.: $5 per ton). According to the prices as above estimated the outcome of the eight years' culture would be very nearly the same for black wattle and canaigre. But the returns from

the latter, unlike the former, would bear interest during the eight years; and the wide climatic range of the canaigre renders it much more widely available.

This pre-supposes that the tannin of both plants will in commerce bring about the same prices. But it is well known that the acacia tannin is not available for the tanning of fine leathers, for the reason that it tends to render them somewhat brittle. But if, as we are now informed, the tannin of canaigre (rheo-tannin) is well adapted to *all* purposes, including the finest leathers, it will go far towards throwing the balance still farther on the side of the root as against the trees, particularly where the price of labor and capital is high.

ASH COMPOSITION AND NITROGEN CONTENTS OF THE CANAIGRE ROOT.

In its draft upon the soil ingredients, the canaigre differs from the beet and most other root crops in drawing much less heavily on potash, but more heavily on magnesia, and on phosphoric and sulphuric acids. The following table illustrates these points. The ash analysis of the root, grown at this station, was made by Mr. P. W. Tomkins, a student in the agricultural laboratory. That of the sugar beet, placed alongside, is an average from European data:

ASH COMPOSITION OF CANAIGRE ROOT.

	Canaigre.	Sugar Beet.
Silica (SiO_2)	3.89	3.50
Potash (K_2O)	28.74	49.40
Soda (Na_2O)	2.47	9.60
Lime (CaO)	8.16	6.30
Magnesia (MgO)	16.93	8.90
Br. ox. manganese (Mn_3O_4)	.98	.....
Per-oxide of iron and alumina	2.45	1.10
Phosphoric acid (P_2O_5)	18.19	14.30
Sulphuric acid (SO_3)	13.16	4.70
Chlorine	6.43	2.60
	101.40	100.40
Excess of oxygen due to chlorine	1.40	.57
Total	100.00	99.83
Percentage of pure ash in dry root	4.48	4.35
Percentage of crude ash in dry root	4.79	5.44
Percentage of carbonic acid in crude ash	5.20	20.00
Percentage of total nitrogen in dry root	1.93	87

A partial analysis reported from the Arizona station, while confirming the greater demand for phosphoric acid by canaigre as compared with the sugar beet, assigns to the former twice as much potash as to the latter, and does not mention either soda or magnesia. While such differences are not unexampled, these data can hardly be accepted as proving them in this case. Roughly speaking, we are probably justified in assuming that for equal weights of crop the cost of replacing the mineral soil ingredients by the purchase of fertilizers when necessary, will be about the same for both crops; while as regards nitrogen, our determination shows that the canaigre draws nearly twice as heavily as the beet, so that a crop of ten tons of fresh roots will take out of the soil nearly 100 pounds of nitrogen per acre. In regular culture, it should, therefore, probably be alternated with leguminous crops, that enrich the soil in nitrogen.—*Report of Agricultural Experiment Station, Berkeley, Cal.*

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CULTIVATION OF VANILLA.

[FROM THE KEW BULLETIN.]

The following further information respecting the cultivation of vanilla in the island of Tahiti has lately been published in a Foreign Office Report, prepared by Mr. Vice-Consul Brander, No. 319, Miscellaneous Series, 1894:—

The cultivation of vanilla has been carried on in the island of Tahiti for several years, but is limited to a few districts only, that of Papara supplying more than half of the quantity sent into the market.

MODE OF CULTURE.—The native mode of culture is, as a rule, simply to plant the cuttings of the vine under the shade of trees, and then to leave them to grow and twine round supports as best they can. Occasionally attention is paid to keep the vines trained round the trees and to prevent them from attaining a greater height than 9ft., so that during the inoculating season the flowers may be reached without difficulty.

Shade, though not dense, is absolutely necessary during the growth of the vanilla vine to ensure a successful crop of beans. About one year from the time of planting, the vine

commences to flower, and the inoculation, which then takes place, must be carefully attended to; this is generally carried out by women and children whose light hands are best suited for the delicate operation. In from six to nine months from the time of inoculation the bean will be ripe for picking and curing.

The native method of curing is to keep the beans alternately indoors rolled in cloths, and outdoors during the day spread on mats exposed to the sun for periods of three or four days at a time, until they are dried and ready for the market. The disadvantage, by drying on mats in the open, of having beans frequently wetted and deteriorated in value by sudden showers before there is time to get them under cover, has made itself apparent to many native planters who now dry their vanilla in boxes with glass covers similar to those used at the Temarua plantation, in the district of Papara, which is under foreign management.

In this plantation great attention is paid to trimming the plants, and keeping the ground clear from weeds; the vines are trained on well selected supports; and the process of inoculation is invariably carefully attended to. It may here be remarked that low prices in the market one season may render the native planter so indifferent to his interests that his plantation may be left entirely neglected the following year, the flowers even not being inoculated.

These failings naturally tell to the advantage of the Temarua plantation, though from steady and good management its crops invariably command the highest prices in the market.

Curing.—The boxes used for curing the beans are made of hard wood with glass covers, and measure 6′ x 4′ x 2′ in depth. They are usually filled three-quarters full, the beans being placed on a blanket in the bottom of each box and covered with a double thickness of blanket at the top. The glass lids are then put on, and the boxes exposed to the sun for about 15 days, when the beans are generally found to be sufficiently sweated to admit of their removal to the drying house.

This building is constructed throughout of corrugated iron, and contains three tiers of wire shelves. The beans are laid on the top tier first, then they are moved to the second and

third in succession as they gradually dry, and remain on the latter until they are perfectly dry and fit for the market.

AREA AND COST OF CULTIVATION.—The Temarua plantation consists of 23 hectares, about 51 acres; 3 hectares of which have been newly planted, and will soon be bearing. The planting of these 3 hectares has cost the proprietor $105, or $35 per hectare, and when the crops are ready for picking they may be valued at $2,500.

EXPENSES.—The annual expenses of a plantation of this description, with an experienced foreman receiving $1,000 per annum, amount to about $2,000.

CROP.—The crop varies from 100 kilos, to 200 kilos., and in some cases to 300 kilos, per hectare per annum; an average, therefore, of 150 kilos, would give the proprietor 3,450 kilos, per annum, and the average price being $2 per kilo., he may calculate on a clear profit of $4,900. The average this year has, however, fallen very much short of preceding seasons, owing to the continued rain.

QUALITY.—The Tahiti vanilla is inferior to that of Mexico, Bourbon, and Mauritius, and this drawback is not improved by the careless manner in which the native, and even the European, dries and ties his bundles of beans for export.

EXPORTS.—The exports for the past 10 years has gradually increased, the United States being the principal market; small quantities are, however, from time to time, sent to France and England.

TABLE SHOWING THE EXPORT OF VANILLA DURING THE YEAR 1883-92.

Year.	Quantity.	Value.	Year.	Quantity.	Value.
	Lbs.	£		Lbs.	£
1883	2,726	818	1888	12,569	5,028
1884	5,454	1,636	1889	8,789	1,758
1885	4,919	1,475	1890	15,882	3,248
1886	8,408	2,522	1891	24,585	7,456
1887	7,610	3,044	1892	25,560	4,418

In the United Consular Reports for February, 1894, p. 265, the following additional information is furnished respecting vanilla in Tahiti:—

Vanilla beans have decreased greatly in value during the past two years, owing to the overstocking of the San Francisco market. During the month of December they enhanced

slightly in value; but no marked improvement can be reported, and in my opinion, none will be realised until the 15 tons of Tahitian vanilla in San Francisco are sold. America is the largest market for the Tahitian vanilla, and all grown on this island finds a market there, with perhaps the exception of about one ton, which is sent to other countries. This year there was exported to all countries, 25,560 lb. of vanilla, valued at $28,599.

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THE SUGAR CRISIS IN GERMANY.

(From the *Journal des Fabricants de Sucre.*)

The attitude of the German beetroot cultivators and sugar manufacturers in face of the sugar crisis is most singular. No idea of it could be formed from the accounts given by us of various public meetings published a week ago. The method of reasoning of the cultivators on the other side of the Rhine is as follows: wheat, because of the world-wide competition, has fallen to a very low price, and the cultivation of this cereal is no longer remunerative. There remains the sugar beet. But as the fall in the prices of sugar threatens to bring about a corresponding reduction of prices for beets, and consequently a diminution of the sowings, this depreciation must be prevented, and to this end the Government must maintain the premiums on export granted to sugar and even increase the rate of these bounties, so as to put the German industry in a condition to compete with the French industry in the world's market. If necessary, and with a view of balancing the advance made in the rate of bounties, the German Government is to increase the tax on consumption. Such is, in substance, the ingenious solution of the crisis suggested by the beetroot cultivators of Germany.

We do not know what fate may be in store for these proposals, the discussion raised on the subject in the Reichstag by Professor Paaschen not yet being concluded. The present ideas of the Government respecting sugar legislation are for the time unknown, and the German Emperor, although in a recent conversation he made allusion to beetroot, has not yet publicly made known his intentions with regard to the great German industry. As for ourselves, we decline to accept as

serious the complaints formulated by the German cultivators. It is possible that wheat, which at the present moment is quoted at fr. 16.50 per quintal at Berlin, no longer pays the grower, but such is certainly not the case with the sugar beet. As a matter of fact, in Germany they have succeeded, by selection and careful cultivation, in raising the cultural yield to a very large extent; efforts in this direction have been made incessantly for a number of years, and the quantity of beets got in this year per hectare shows as compared with the last 15 years an increase of not less than 36 per cent. With progress like this, the cost price has been largely reduced, and everybody knows that Germany now holds the first rank in the list of beet-sugar producing countries. The German agriculturists are therefore perfectly well able to stand a notable reduction in the price of beets, and their complaints on this score cannot be justified.

With regard to maintaining or raising the export bounties on sugar, we can scarcely see, on reflection, anything that can justify the desires of the German cultivators. The reform effected by the law of 31st May, 1891, in the German sugar legislation was, it will be remembered, especially aimed at modifying the development of the sugar production. To this end, the German chancellor reduced the rate of premiums, and looked forward to their complete abolition by the 31st July, 1897. It is true that Germany hoped by this policy to put pressure on her rivals, and thought that the various bounty-granting countries would not hesitate to follow her in this direction. Now, nothing of the kind has taken place. And why? Simply because the German industry, which had acquired, thanks to a protection of more than forty years, a remarkable superiority over the greater part of its rivals, has preserved its initial preponderating position in the universal market It has continued to advance with giant strides, leaving France, Austria, Russia, etc., far behind, and the fiscal reform of 1891 did not, when we come to reckon up, retard that advance in any shape. Before that reform, the German production had attained its maximum with a figure of 1,284,000 tons: this present season, three years only after the reform of 1891, it will reach 1,800,000 tons. It is, therefore, evident that, contrary to the expectations of the German legislator, the reduction of the export bounties effected in 1891 has not exercised any restraining influence on the development of the German production, and consequently it is logical to assume that raising the rate of the

present bounties would have no other effect than that of supplying a fresh stimulus to the beetroot cultivation and the sugar manufacture of our neighbors.

It must be admitted that this would be a strange way of remedying a crisis originating principally in an excess of production imputable to a large extent to the German manufacturers. It would really seem as if Germany had no suspicion of the enormous contribution which she is making to the over-production. Starting with a production of 180.000 tons in 1871–72, she has reached the colossal figure of 1,800,000 tons. In other words, she has in twenty years increased by ten times her production, while her consumption has only risen from a little under 300.000 tons to 600.000 tons, that is, a little more than doubled. After such a launching out, reason itself should lead her to moderate her movements. For it is clear that if the German beet cultivators were to obtain the desired increase in the export bounty, the ascending ratio of the production would continue its course, and Germany would soon obtain or exceed the figure of 2,000,000 tons.

As the German manufacturers are steadily reducing the cost price of their sugar, and as the quotations in the universal market ultimately depend very closely on the exports from Germany, crises, such as that which we are now passing through, will become periodic and be more and more frequent. Again, as a consequence of the higher tax on consumption which will be necessary to meet the increase of the bounties, the consumption of sugar in Germany will remain stationary, and the quantity available for export will go on increasing. We can easily see the fatal consequences which would result from such a state of things, not only for the sugar industry and for agriculture in Germany, but also for the sugar producer in all other countries. It is, then, to be hoped that the wishes of the German agriculturists may remain ungratified.

As to the danger of French competition alluded to by the German cultivators, this is unfortunately an imaginary fear. The French production has hardly doubled since 1871, while the German production has increased tenfold, and considerable progress must be realized by our cultivators, and numerous improvements in machinery must be adopted by our manufacturers before they can reach the prime cost which has been attained in Germany. But this end can only be reached if the law of 1884 is maintained in its full integrity, and if Germany does not render the conditions of the contest still more unequal by means of new fiscal facilities accorded to her industry.—*Sugar Cane.*