# THE

# BEET SUGAR INDUSTRY

IN THE

# STATE OF CALIFORNIA.

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INTERVIEWS WITH AND LETTERS FROM

MR. CLAUS SPRECKELS,
(Of the Watsonville Beet Sugar Factory),

MR. C. C. HOWELL,
(Manager Sacramento Industrial Association),

PROF. E. W. HILGARD,
(Of the University of California),

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ALAMEDA BEET SUGAR CO.

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[Being extracts from a pamphlet compiled and published by the SACRAMENTO BANK, and republished by the CALIFORNIA STATE AGRICULTURAL SOCIETY in its Report for 1895.]

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Extracts from a pamphlet compiled and published by the SACRAMENTO BANK, in its desire to encourage experiments in the various sections of this State.

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## SUGAR BEET CULTIVATION.

**Claus Spreckels Talks upon a Subject of Great Interest—Important Industry for California—The State Could Supply the Markets of the Entire Country—Valuable Hints to Farmers—Guide to the Farmer in the Planting, Culture, and Harvesting of the Crop.**

San Francisco Daily Morning Call, December 1, 1895.

A great many inquiries have recently been received by "The Call" relative to the beet sugar industry. These inquiries refer not only to the general questions of adaptability of soil, profit in sugar beet growing, and individual benefits to be derived, but also to the details of preparing the soil, selecting the seed, and the cultivation, harvesting, and marketing of the crop.

Appreciating the long experience and thorough knowledge of Claus Spreckels upon the subject, "The Call" has frequently taken the liberty to refer these inquiries to him. Mr. Spreckels has kindly answered these questions personally. But the increased number of them, showing the widespread interest evinced by the farmers of California upon the subject, demands the presentation of facts as to sugar beet growing in such a manner that every farmer in the State may have the benefit of Mr. Spreckels' knowledge.

With this in mind, Mr. Spreckels was yesterday asked to present, through "The Call," such information as will serve the people to the best possible advantage.

"I believe," said he, "that the beet sugar industry is one of the great means by which the State of California will become universally prosperous. It is a great industry and one that, when more thoroughly comprehended by the farmers and others who should be interested, will become of great value to the farming, commercial, and transportation interests of the State.

"It may be contended by persons not fully cognizant of all the details of the industry and the benefits accruing, that there is profit only for the manufacturer. But this will not be the result. The producer and the employé must, in the nature of things, share with the manufacturer. As the sugar industry will add to the tilled acreage of California, so will it add to the facilities of the farmer for the accumulation of wealth and demand an added number of employés. The com-

mercial interests of the towns and cities must likewise be enhanced, and the consumer share in the general result. The producers and manufacturers of this State, by an association which is active in its efforts, desire the patronage of home products and home manufactures. The beet sugar industry is right in line, in a double sense, as it includes both the production of the raw material and the manufacture of the article ready for consumption. Should the industry grow, as I hope it will, to such an increase of acreage as to demand the advent of more farmers into the State, then it will become an indirect adjunct to the Half-Million Club in aiding the increase of the population of California, if not of San Francisco.

"I am willing to add to my investments in this State by the establishment of beet sugar factories, in the hope of arousing the people of California to the due importance of this great subject, as well as to my own profit. No man puts his money into an enterprise merely for the benefit of his fellow-man, but it should not be construed that an investment of money in a California home industry is purely a selfish investment. The people who will be directly or indirectly benefited by added sugar plants should not lose sight of the advantages of the industry to them. Manufacturers are no more selfish than are others who invest capital with a view to the accumulation of wealth. If the investor adds to his possessions, naturally the people whom his industry affects will prosper. The farmer who helps the manufacturer helps himself as well.

"The subject of tariff on sugar is one that, in view of adding to the sugar manufacturing industry, must of necessity interest the people of this State. The Republican idea of protection becomes an object-lesson in the establishment of the sugar industry. Without a protective tariff there could be no success attendant upon the efforts of capital and the tillage of the soil to this end. But the tariff on sugar should not exceed the demands of protection. California asks nothing more for any industry than to be protected against unfair competition. But this State need not confine itself to the mere effort to supply the home market with beet sugar. If this State can become a competitor in the markets of the country there is no reason why the effort should not be made. Let there be a tariff of 1½ cents per pound on sugar, and California, with the coöperation of the farmers, would be enabled to turn 100,000 acres of land, which is not now in condition for tilling, into the growing of sugar beets, and could produce enough sugar to supply the markets of the entire United States.

"From a careful study of the subject, I have been enabled to prepare some points of information for the guidance of the farmers that will be of service to those who may be desirous of experimenting in sugar beet culture.

"The tract of land to be prepared for beets should be measured and a note taken of the crop raised upon it in the previous year. No stock whatever should be allowed upon it after the first autumn rains.

"In the preparation of the land, sugar beets should have deeply plowed, well worked, and finely pulverized soil. Plow from 10 to 12 inches deep as soon as practicable after the first rains. Thereafter, at proper intervals, cultivate and stir the soil so as to thoroughly pulverize it and bring it to a good state of tilth before planting. It should be remembered that beets can only derive sustenance from finely divided, moist soil. If it is badly prepared and full of clods, it will soon dry out, the beets will cease to grow, and the experiment end in failure. If from any cause the land is not properly prepared, it is better to abandon the experiment.

"The sowing should be done as soon as the soil is warm enough to germinate the seed. Sow about ten pounds of seed to the acre, in rows 18 to 21 inches apart, using any suitable drill with a forced feed. Sow as shallow as possible; just deep enough to be covered with moist earth. Seed should come up in from 7 to 21 days. If the stand of young beets is not good, cultivate them up and resow.

"Beets should be thinned as soon as they develop four leaves. If thinning be delayed, the beets left will be disturbed by those plucked out. If thinned when only four leaves are out, the top soil is still moist, and the beets left have no difficulty in taking hold and growing with increased vigor; but the violent disturbance caused by thinning a few days later is not so easily overcome. The top soil is drier, and the young beet receives a setback that will certainly affect the yield. Thin out from 6 to 10 inches, according to richness of soil. Leave only one beet in one place, taking care to select the most vigorous.

"Weeds must be rigorously kept under by hoeing and cultivating. If rain falls after sowing and a crust forms on the land, it must be broken up by hoeing or cultivating. Rows 18 to 21 inches apart allow enough space for a horse to draw a cultivator through them. This is a cheap and effective way to destroy weeds and keep the top soil loose. Continue to hoe and cultivate as long as weeds appear, or until the beets cover the ground.

"Sugar beets usually ripen in 120 to 160 days from date of sowing. After they have been in the ground that length of time and the outer leaves turn yellow and die down, it is an indication that the beets are ripening.

"To take a sample for analysis, dig two or three rows of beets in different parts of the field, sort these beets into three sizes—large, medium, and small—and take at random every twentieth beet from the three piles to form the sample for analysis. The sample should consist of twenty or twenty-five beets. Do not top the beets with a knife, but twist the

leaves off and ship in sacks by freight as soon as you can. Mark each sack plainly with name and address of raiser, and send a shipping receipt, together with letter containing full particulars, by mail.

"In order to enable the farmer to carry out these suggestions a very low price has been set upon sugar beet seed. P. A. Buell, of Stockton, and Capt. H. C. Corcoran, of the California Navigation and Improvement Company, have kindly consented to take general supervision of the distribution of seed throughout the State, sending to each applicant a sufficient quantity to plant one tenth of an acre. The instructions I have here given will show the experimenter how to prepare the soil and cultivate the experimental crop.

"As these instructions are being carried out the farmer should carefully note every item of expense that could naturally accrue. Then by multiplying the cost and result of his experiment by ten he will arrive at the result per acre.

"The question has been asked as to the number of acres necessary to be planted to support the establishment of a beet sugar factory. About 30,000 acres would be the requisite number. Not that a factory would consume the annual product of that acreage, but rather about one third of that. The requisition for threefold the capacity is made upon the proposition that in order to keep the land in a productive state it must be changed at least once in three years from beet planting to that of some cereal suitable to the character of the soil.

"If these ideas are followed the experiment will prove successful, and the ultimate result should be the establishment of the beet sugar industry in this State to an extent that will greatly enhance the interests of the whole people."

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**WHY THE BEET SUGAR INDUSTRY SHOULD BE SUCCESSFUL IN SACRAMENTO.**

**C. C. Howell Tells what He Learned in Watsonville, Alvarado, Chino, and other Centers where Sugar is Manufactured from the Juice of Beets.**

Sacramento Bee, December 5, 1894.

*To the Editor of the Bee*—SIR: When in Utah and Nebraska I wrote you something about the sugar beet industry in that section. On my return to Sacramento many of your readers were anxious for me to investigate the sugar industry in this State, and make the same known to the people of Sacramento. Since my return I have visited Watsonville and Alvarado, and am now at Chino.

Watsonville started in 1890 with a factory having a capacity of about 300 tons. Each year they have increased the capacity, until now they are able to treat 800 tons of sugar beets a day. The farmers were slow to get started in the beet industry, but the profits from raising beets have been so much more than those derived from growing grain or fruit that

the applications already presented to the factory are greater than the capacity of the factory for another year. Grain sowing other than for home use, is about abandoned; fruit planting is very limited, excepting where farmers are growing beets and raising orchards together.

The factory at Watsonville is paying $5 per ton for beets this year, regardless of the saccharine matter they contain. They will average about 14 per cent. Next year they expect to pay but $4 per ton. The farmer has the cost of raising to a certainty, averaging about $20 per acre, and is paying from $10 to $20 per acre for land, depending upon its locality near the factory.

The entire yield of the Watsonville district averages about 12 tons to the acre, leaving a margin greater than that of any other crop. There seems to be less fault-finding among beet-raisers than among any other class of farmers that it has been my good fortune to meet. The general conditions around Watsonville show that the beet sugar industry gives the people a prosperous appearance. All the money from the entire product of the factory goes into the hands of the community there. The lime rock used at the factory is mined in the county. The wood for fuel is procured in the county. Over a million dollars has gone into the hands of the people in that part of the county, and not a single dollar gone out for material.

At Alvarado, in Alameda County, they are not through with their campaign. They had applications this year for a third more acreage than they contracted, and will be harvesting until December 1st, and will have in store at that time over 11,000 tons of beets. Their capacity is about 300 tons per day. They are paying $5 a ton for beets this year, but do not expect to pay more than $4 next. In conversation with many of the growers there I learn that they pay about $20 per acre, on an average, for the land, and as land in that locality is valuable for vegetables, being so close to San Francisco, I am inclined to think they will have to pay $4 50 in order to get enough to run their factory to its full capacity another year. The yield in the territory of this factory averages about 20 tons to the acre. They have not been able to reduce the cost of production, as the people of Watsonville have, and are paying the same price for work to-day that they did when they first commenced to raise beets. The growers of beets are largely Portuguese, and they do not seem to "catch on" in the economy of raising beets.

The Alvarado factory has been running for several years, and is the outgrowth of the original factory at one time located at Brighton, near Sacramento. There are a number of the presses now in use that were in the factory at Brighton. The balance of the material bought has long since gone into the scrap pile. The factory at Brighton was built for 60 tons, while the present Alvarado factory has a capacity of 300 tons. No fuss has been made by the stockholders over this industry, but it is known

to have been financially a success, although it has had a great many obstacles to overcome, being the pioneer in the beet sugar industry in this country. It is the smallest, excepting the one at Staunton, Virginia. Alvarado has some advantages—that of cheap fuel, cheap transportation of its products to a good market, location to sell its pulp and syrup to good advantages—none of which Sacramento does not possess. In addition, Sacramento has the advantage of the river for getting beets.

After a careful study of all conditions, all the beet sugar factories, and the country in which sugar beets grow, Chino, or perhaps Anaheim, in Orange County, furnishes nearer the conditions which exist at Sacramento than does any other part of the country. I shall go more into the details of sugar beet growing, and the value that it is to a community, especially to one located as is Sacramento, from this place. I have an engagement in the morning with Richard Gird, the promoter of this industry at this place—perhaps I should call him a philanthropist rather than a promoter.

A great many men establish monuments for themselves in after years, but none has ever established a monument that will do a greater good to a country than that established by Mr. Gird. Thousands of people will receive honest employment and thousands of acres of land will be cultivated profitably through the results of his efforts in establishing this factory at Chino.

C. C. HOWELL.

*Chino, Cal.*, November 28, 1894.

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### MONEY IN BEETS.

**How Mr. Gird, of Chino, Realized a Fortune and Populated a Once Desolate District—a History of the Establishment of the Chino Beet Sugar Factory—How Indomitable Energy and Enterprise Overcame all Obstacles and Won the Fight.**

Sacramento Bee, December 6, 1894.

*To the Editor of the Bee*—SIR: For the last two days I have passed the most pleasant time in investigating the sugar beet industry since I started in this work last May, particularly so as the conditions here at Chino are more like the conditions at Sacramento, save and excepting the fact that there is more rainfall during the wet season in Sacramento Valley than there is in the Chino Valley; the rainfall being only 8¼ inches for the past twelve months, the consequence is that the beet crop in this locality this year has been only about two thirds what it would have averaged had they had their usual amount of rainfall, which is about 19 inches.

NO LONGER AN EXPERIMENT.

The production of sugar from beets has already passed beyond the stage of experimentation in California, and must in time take rank ahead of all her industries, for there is more encouragement from it than there is from any other product of the soil. The economical necessity of saving to the country from $130,000,000 to $150,000,000 a year is important, when we have in California land that will produce a greater tonnage to the acre, carrying as high a percentage of saccharine matter as the sugar beets grown in any other country. Germany leads all other countries, and their average is about 12 tons of beets to the acre, carrying 14 per cent saccharine matter on an average, 80 per cent fine, while California's average is 12 tons of beets to the acre, carrying 15 per cent saccharine matter, 80 per cent fine.

At this point is a good place to determine the advantage that California has over any of the country east of the Sierra Nevada Mountains. The owners of this factory, the Oxnards, of Philadelphia, own the two factories in Nebraska. They were all built about the same time. This factory has been increased three times in its capacity since 1891, and the Nebraska factories have remained as they were originally built. This year was a dry year in Nebraska, and they are only running one factory. There has been a drought here in Southern California this year, but they have two thirds of a crop in tons, and the beets run for the entire acreage 16 per cent saccharine matter, over 80 per cent fine.

This plant, as it now stands, has cost the company a million of dollars, and has done its share in demonstrating that the manufacture of sugar from beets is a success and beyond the stage of experimentation.

HISTORY OF THE CHINO FACTORY.

The readers of your paper will no doubt be much interested in knowing what benefits a sugar factory gives to an agricultural community such as surrounds Sacramento, and I cannot better illustrate these advantages than to explain to them the history of establishing this factory at Chino.

When the great boom was on in Southern California, about 1887, Richard Gird was owner of the Chino Valley Ranch and some surrounding property, in all about 50,000 acres. He subdivided 32,000 acres into ten-acre lots, ostensibly to sell out to small farmers to raise fruit. The boom bursted about the time he got started, and the scheme was a failure so far as selling out the property was concerned. Mr. Gird set himself about to find something to raise upon these lands that would be profitable for the settlers during the time they might be growing their orchards. Ramie, cañaigre, and sugar beets were tried, and in the experiments, running through the years 1888 and 1889, he planted

of all three of these products, hundreds of different small patches all over this district of country at different seasons and at different times; he investigated at the same time not only the culture of these different products, but also the market, and it is interesting to know that sugar beets were by far the most profitable and had the greatest future. Their growth and the increasing of their factories you could not hope to overdo for fifty years to come.

A factory for sugar would cost three times as much as a factory for treating either of the other products. Mr. Gird worked faithfully to get people in all parts of the country interested, and finally, about the last of December, 1890, a contract was made with the Oxnards, of Philadelphia, who had been in the sugar business, and their father before them, for a great many years. Their refineries had been sold to the sugar trust some months before, and they had been to Europe for some time looking up the beet sugar industry as it was carried on in that country. To get them interested, Mr. Gird gave them 2,500 acres of land and a site for their factory in Chino; guaranteeing, besides this bonus of land, which is said to be worth $150 per acre ($375,000), 2,200 acres of beets the first year, 3,000 the second year, 4,000 the third year, and 5,000 for the fourth and fifth years thereafter—five years being the life of the contract. He also agreed to furnish the factory 3,000,000 gallons of water per day, during the campaign, free. The price established to be paid for beets that carried 12 per cent in sugar was only $3 50 per ton, and 25 cents per ton additional for each per cent of sugar above 12 per cent.

The first year was very unsatisfactory, in many respects, for both the factory and the producer, as the business was new. Mr. Gird had very hard work to get anybody to grow beets, and of the 2,200 acres of beets he had agreed to furnish the first year, he had to plant 1,600 acres himself in order to comply with his contract. The second year the factory did well and the producers did well, so this last year the entire acreage was planted by people who either had bought land and raised beets for the factory, or by his renting the land to people who were not able to purchase it, paying a quarter of the crop for the rent of the land, which has netted him for three years $15 for each acre of beets that have been planted on the land rented of him.

Mr. Gird commenced selling a little land in 1892, and in 1893 about $100,000 worth of land was sold in ten and twenty-acre tracts, at $125 to $150 per acre. And from the first of January, 1894, until the first of November, over $250,000 worth of land in his ranch was sold to farmers at $140 to $200 per acre. Within the last few days the balance of the land has been sold for $1,600,000, excepting the town of Chino.

In 1891 there were about fifty people on this ranch; now there is about 2,500 people, and in about six years there will be 10,000 people

This tract of land Mr. Gird purchased in 1882 for $225,000. It has cleared him about $2,000,000, besides the interest on the investment during the time he has owned the ranch, and he has the use of it for a year to come, or that portion of it which he considers his stock farm, he taking that time to dispose of his stock. The new proprietors will take the contract off his hands to furnish beets to the factory for 1895 at the same old prices.

THE PRICE PAID FOR BEETS.

Your readers will notice that the price paid for the beets here is not as good as the price paid in any other part of the country, and still there is a number who are pioneers in the industry of raising beets here that have purchased their land and have it entirely paid for from the profits, who had nothing to start with. The records of the fruit farmers in California cannot compare, in the amount of money made off their farms of the same size and investment, with the records of those who have raised beets. There is no questioning the assertion that the greatest field for the products of the soil in California, where properly adapted, is the growing of the sugar beet, and the manufacturing of it into sugar. Nothing would help Sacramento and the surrounding country and do as much good as an industry of this kind.

In my letter to-morrow I will give other reasons why a beet sugar factory is of value to Sacramento.

C. C. HOWELL.

*Chino*, November 30, 1894.

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**VALUE OF SUGAR BEET PULP FOR BEEF CATTLE.**

Sacramento Bee, December 7, 1894.

*To the Editor of the Bee*—SIR: The most valuable product, next to sugar, from a beet sugar manufactory is the pulp, which product is about 50 per cent of the tonnage of beets treated at the factory, and it sells here for $1 per ton to farmers and outside dairymen, who come here to purchase the same. One concern at Riverside took one hundred cartloads for his dairy this season. Its value for a dairy can be better understood by giving you the contents of a letter received by Mr. Gird some time since from the President of the Staunton (Virginia) Chamber of Commerce, who established a small beet sugar factory there, which has been only a partial success so far as making sugar is concerned, the climatic conditions being against profitable beet growing in that country. He writes under date of May 15, 1893: "We began giving away the pulp from the beets when we first started this factory, but soon after began to sell it as it came from the diffusers at $1 per ton. We put some of it away in silo, covered with lime paste, and sold that at $2 per ton, but finding it selling so rapidly at that price, and wanting to keep some over

until next September, we raised the price to $3 per ton. It sold none the less rapidly, and it was soon exhausted. It proved a much more valuable food than we or any one here expected. The best results appeared when fed to milch cows. In no instance did it show an increase of less than half a gallon of milk, and in many cases two or three gallons per day, within ten days after being fed. Sheep and lambs also did well. We had no trial with beef cattle, hence we are desirous to know your results. I know when I fed the pulp to some milch cows already dried up, so that we might fatten them, it started the flow of milk again, and we had to abandon the idea of fattening them, and did not until the pulp was exhausted."

The value of pulp for beef cattle is well illustrated by a lot of twenty steers, as they would average on the Arizona range, which Mr. Gird put in a corral on the 16th of December, 1893, feeding them about 70 pounds of pulp per day each, and about 5 pounds of hay, hay being fed simply to give them a cud. When placed in the corral they weighed 40,465 pounds. After forty-eight days they were again weighed, and they had gained 2,660 pounds, or 133 pounds per head. A great number of tests show a gain of from 100 to 160 pounds a month. This year Mr. Gird built a silo capable of holding 20,000 pounds of pulp. It is simply an immense trench in the ground, 60 feet wide, 10 feet deep, 500 feet long. Over this he built a railroad track, and cars are loaded at the factory automatically as the pulp leaves the diffusers, and then run down to the silo and dumped. This silo is drained by tiles laid underneath to carry off the moisture that accumulates. The pulp soon settles and solidifies into its natural siloed condition. They are taking it out and feeding it now, and it seemed to cut like cheese, and looked very much like soft clay. This has been tested now, so it is safe to calculate better results from the siloed pulp than when fed direct from the mill. You can keep it from year to year. When the pulp is laid away they sprinkle salt among it, and the cattle will eat it as readily as they would corn mush. The feed improves rather than loses any of its virtue, for at least a year after it is siloed.

Mr. Gird has from 500 to 700 head of cattle in his corrals all the time. It is very easy to discover the effects of this feed by examining the cattle and the time they have been eating this pulp. The worst old Arizona cows and steers will, in from sixty to ninety days, make good beef. He makes no effort to sell these cattle; buyers come here, take them by the corral, and pay half a cent more per pound than they do for any other kind of cattle that have been fed any other way. They claim that pulp-fed cattle make a firmer, tenderer, and better colored beef.

Hogs have been fed on sugar beets here and have done well. The raw beets with the tops are worth, it is claimed, in the field about $2 per ton for hog feed, depending, of course, upon the price of pork.

Those who have carefully watched the feeding of beets to hogs and used the pork afterwards, say that it makes it as solid and firm as that from corn-fed hogs of Iowa.

I think sugar beet raising has been reduced to a better business proposition on the Chino plantation than in any other of the localities that I have visited where there are sugar factories. I also think the pulp product from the factory is made more valuable. This is largely due, however, to the very industrious interest taken in the business by Mr. Gird himself. I think beets are raised here on an average for $20—that is largely owing to the special machinery contrived and put into practical use by Mr. Gird. So far as the factory here is concerned, as I have said before, they have gradually increased the factory until they have now facilities for treating 800 tons of beets a day. They have erected what is known as the Steffens process, at a cost of $150,000, for treating one of the by-products (syrup) of the factory. I am inclined to believe that a small still connected with the factory whereby to convert this "syrup" into vinegar would be much more profitable. The Alvarado factory disposes of its "syrup" to the vinegar manufacturers in San Francisco, and it nets to the factory, I am inclined to believe, fully as much as is realized here from undertaking to get sugar out of it in a crystallized form. There is a plan on foot, which I believe is headed by Mr. Gird, and which assures its success, to build a pickle factory at Chino. This would be successful at Sacramento, for no county furnishes better soil for raising cucumbers, cauliflower, beans, onions, and there are now some olives, and will be more in that neighborhood. No doubt considerable of the vinegar could be sold at wholesale from so important a distributing point as Sacramento. Then some alcohol can be made for use in the oils.

C. C. HOWELL.

*Chino*, December 1, 1894.

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**PRODUCTION OF SUGAR.**

**The Total Product of the Rest of the World as Compared With That of the United States.**

Sacramento Bee, December 8, 1894.

*To the Editor of the Bee*—SIR: Few people realize what the sugar business of the world means. That your readers may get an idea of its importance in commerce, I will give them a statement of facts to study, gathered from authentic information that I have found in different localities between New York and the Pacific Coast, and it may enlighten them somewhat regarding this important staple. From July

1, 1893, to July 1, 1894 (a sugar year), there was produced in all countries of the world tons of sugar as follows:

| *Cane Sugar.* | Tons. | |
|---|---|---|
| Cuba | 649,236 | |
| Porto Rico | 59,636 | |
| Trinidad | 47,870 | |
| Barbadoes | 71,373 | |
| Martinique | 36,022 | |
| Guadalupe | 47,527 | |
| Domarara | 116,114 | |
| Brazil | 150,000 | |
| Java | 331,851 | |
| Philippine Islands | 116,170 | |
| Mauritius | 123,985 | |
| Reunion | 36,375 | |
| Jamaica | 30,000 | |
| Lesser Antilles | 28,000 | |
| Peru | 30,000 | |
| Egypt | 35,000 | |
| Hawaii | 125,000 | |
| United States | 227,525 | |
| Total | | 2,261,684 |
| *Beet Sugar.* | | |
| Germany | 1,331,965 | |
| Austria | 753,076 | |
| France | 787,986 | |
| Russia | 456,711 | |
| Belgium | 221,480 | |
| Holland | 69,765 | |
| All other European countries | 66,000 | |
| United States | 13,542 | |
| Total | | 3,700,525 |
| *Sorghum, Etc.* | | |
| United States (sorghum) | 502 | |
| United States (maple) | 16,000 | |
| All other countries (sorghum and maple) | 56,000 | |
| Total maple and sorghum sugar | | 72,502 |
| World's total production | | 6,034,711 |

The world's population was 1,600,000,000 during the sugar year above mentioned, and they consumed 7.54 pounds to each individual, at a cost of $482,776,880. The United States consumed of this amount about 2,000,000 tons, and, assuming that we had 65,000,000 people, we consumed 61 pounds to each individual. (I notice that some statisticians give as high as 65 pounds to each individual in this country.) Sixty-one pounds, at 4 cents a pound, would be $2 44 per capita, or $158,000,000 was paid out by the American people for sugar. Of this amount we produced $20,009,120, and imported $137,990,880 from other countries.

California has sufficient territory possessed of the proper soil and the climate to raise sugar beets, particularly to supply all the sugar that is now imported into this country.

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SUGAR CONSUMPTION.

It may be interesting to know how the sugar consumption has increased per capita in this country. In 1830 we consumed approximately 20 pounds; in 1840, 25 pounds; in 1850, 30 pounds; in 1860, 35 pounds; in 1870, 40 pounds; in 1880, 45 pounds; in 1890, 53 pounds; in 1893, 61 pounds.

On all sugar imported into this country, except that from Hawaii, there is imposed an ad valorem duty of 40 per cent. Say raw sugar in Germany costs 2.5 cents per pound, 40 per cent ad valorem plus 1 per cent (coming from a country paying a bounty to her sugar producers), the freight and hauling, marine insurance, weighing, exchange on the money in paying for it, broker's commission, etc., .75 cent, equal 4.35 cents per pound for German unrefined sugar laid down at the refinery in Eastern seaboard cities. To this you add the refiner's charges and freight to the consumers; the total is the cost of sugar to our people when imported from Germany. Prices of sugar at this time at the seaboards and in the East are very much interfered with, from the fact that the world scraped together and dumped upon this country all the raw sugar it was possible to get for months before the present tariff went into effect, and the market is very much disturbed. This will soon regulate itself, as the amount of sugar manufactured in the world is not in excess of the demands of its people.

MARKET PRICE AND IMPORTS.

The consumer in the interior of the country has to pay freight to his particular locality. Sugar usually rules one cent per pound higher on the Pacific than on the Atlantic coast. The market price of refined sugar in California and at all intermediate points is based on the New York price with freight added, ranging from ¼ to 1¼ cents per pound. The total receipts on the Pacific Coast in this sugar year which we are considering was shipped (raw sugar) from the Sandwich Islands, China, Central America, and all other countries, aggregating 139,430 tons. Adding what was produced on the coast and you have only about 7½ per cent of the sugar consumed in the United States for that year.

C. C. HOWELL.

*Los Angeles*, December 2, 1894.

## SUGAR IN BEETS.

**Another Paper by C. C. Howell on the Manifold Advantages of Beet-Growing California Well Adapted to that Industry—The Average Yield Per Acre.**

Sacramento Bee, December 13, 1894.

*To the Editor of the Bee*—SIR: The sugar beet, being a biennial plant native in the Mediterranean States of Europe, transplanted from the warm, dry region of Southern to the cooler and moister States of Northern Europe, and from these States to the North American States, grows more successfully in California than in any other part of the world. This is surely gratifying, and it is especially so when this locality is one of the best in California for such a staple industry.

Such is the condition of your climate, from your average rainfall, your dry and wet seasons, and the quality of your soils, that you can produce sugar beets to better advantage than anywhere in this State.

The European Commissioners, who were expert sugar beet growers in their own countries, visited all the States that were growing beets during their stay while attending on the World's Fair at Chicago. They said, on their return home, that California was the country that Europe had to fear from competition in raising beets for sugar. They also reported that we were raising beets as high in sugar and as cheap as they were raising them.

Some went so far as to advocate that they should not furnish us any of their choice seed. That measure, however, was abolished, and most of our seed comes from Germany and France. In time we will grow our own seed. It is a slow process, however, as all the mother beets are selected as to their proper form and size during the harvest, and sometimes as high as twenty thousand assays are made before enough beets are selected to reset one acre of land—none being used but the sweetest.

Sugar beets are white and parsnip-shaped, ranging in weight from one to two pounds, and grow wholly below the surface of the ground. The saccharine richness has been attained by building it up through a long period. A ton of sugar beets of to-day, in the improvements in quality and process of extraction, produces as much sugar as did three tons twenty-five years ago. Herein lies one of the elements of success of the sugar beet industry, and the other is the knowledge of manufacturing.

Sugar is a carbo-hydrate, and it is claimed that the sugar is taken from the sun and atmosphere; nothing is taken from the soil but moisture.

Cereal crops in Europe have increased very much since the introduction of the beet industry. The soil is well cultivated for beets and thus is brought to the surface the subsoil moisture and nourishment which would not be reached by the other crops; as only moisture is taken from the soil, and the crops are rotated, giving beets one year in three, they get two excellent crops of grain. In this country beets have been raised

on the same fields for twelve years, and the lands are in as good condition as they were when first used; but the land should be rested after a few years by planting it to some other crop of roots or grain.

Sugar, being very soluble, makes the beet very sensitive during the time it is ripening and after it is ripe, if left in the ground. The climate here is especially an ideal one for raising beets. You always have the necessary rains in December, January, February, March, April, and May to prepare your land properly to plant your beets, which will become well started before the dry weather comes; and then the dry, sunny weather sets in in July and August. They have absorbed the sugar during the maturing and ripening period, so that when they are harvested you have a beet high in saccharine matter. I have carefully examined your soils, the tables given of your rainfall and temperature, going back several years, and I am ready to prove that almost all your land can be used for beets. There are varieties of seeds well adapted to your low lands, your grain lands, and your uplands. Fifteen tons of beets, running 15 to 16 per cent in saccharine matter, with ordinary care can be raised on these lands; and on your bottom lands, when once properly fitted, I believe twenty-five tons will be the average if planted at the right season.

Getting the farmers to go into beet raising has always been dreaded by the factory owners, but when the farmers once get started and understand the business there is no trouble. It takes about three years to get them properly educated.

Growing beets means much labor to the county. Like any other plant it requires close attention. It is an industry well adapted to families, and adds an interest to diversified farming, which is really the only kind for the prosperity of an agricultural country like this.

Among the many hundred sugar plants there are but four that are profitable to consider: Maple tree, sorghum, beet, and tropical cane. It is well demonstrated that the beet is going to produce most of the sugar in a few years. The others cannot compete with it. If the same improvement goes on in the next twenty-five years as there has taken place in the past twenty-five years, there will be no other kind of sugar but beet. All nations in the world, as they become civilized, are increasing the quantity of sugar they use per capita. Great Britain uses as much as we do, and other nations are following with a regular increase of consumption annually.

Sacramento's prosperity and great growth must come from filling up the country north, east, and west of her. She is the natural metropolis for that section. This can only be done rapidly by creating occupations for people you may attract here. The most desirable are those who can work and have some money; but if there is no market for what they raise disaster must follow. As Sacramento would expect to get the trade from

these people, she should establish institutions that will make a market for profitable labor. Thirty thousand people over what you have to-day should be domiciled within a trading distance of this city. To insure a successful people for your vacant land can you establish anything that will give a greater industry than that of sugar? It helps all—the farmer, the landowner, the merchant, and the laborer.

C. C. HOWELL.

*Sacramento*, December 11, 1894.

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### PROFIT IN BEETS.

**Cost by Items of Running a Sugar Factory—An Average One Would Add 1,000 People—What C. C. Howell Sees in the Beet Sugar Industry for Sacramento City and County.**

Sacramento Bee, December 18, 1894.

*To the Editor of the Bee*—SIR: I am asked what it costs to start the beet sugar business here, and if started how it would help Sacramento.

To start the beet sugar business as it should be started here, there should be a company organized, with a capital stock of $1,000,000, half of which should be subscribed by responsible people and paid in as needed. They should purchase at least fifty acres of ground, well located on the railroad and river, and erect thereon buildings (fireproof) sufficiently large to treat 1,000 tons of beets a day during a campaign of 120 days. Machinery should be placed therein to treat 334 tons of beets each day for the first campaign. After the second year they could increase, and within four years would be able to treat 1,000 tons daily.

After that time diffusers could be erected through the neighborhood, convenient to the beet-growers, the beet juice separated there from the pulp, and by means of a pipe-line conducted to this parent plant. In that way the manufacture of sugar, distilling of the syrup into vinegar and alcohol, cooperage, etc., could be handled at the original plant for the culture of 20,000 acres, and the plant would grow as the acreage did.

Chino and Watsonville, in this State, have applications for more than double the amount of beets for the capacity of their factories for another year, and they have increased every year since they started, except the first two years. On account of the market here, and the well-adapted country for the raw material, a much greater industry could be built up than at any other point in the State.

#### NUMBER OF EMPLOYÉS IN AND ABOUT A FACTORY.

As to how this industry will help Sacramento, I will give a detailed statement of the number of men required in and about the factory during the year and during the sugar campaign; the number of men it will

take to raise the beets and material from seed and used at the first factory, assuming that it will treat 334 tons a day for 120 days, and that the beets only average 12 tons to the acre, and run but 14 per cent in sugar. This conservative estimate allows for bad luck, bad years, and is a little less than the average for California farmers raising beets for the past four years.

*Employed by the Year in and about the Factory.*

| | Per Year. |
|---|---|
| One Secretary and Manager | $4,200 00 |
| One Superintendent | 4,200 00 |
| One bookkeeper | 1,800 00 |
| One chemist | 1,500 00 |
| One night assistant chemist | 900 00 |
| Two foremen | 1,800 00 |
| Two sugar boilers | 1,680 00 |
| One watchman | 600 00 |
| One engineer | 1,800 00 |
| One night assistant engineer | 1,080 00 |
| One stockkeeper | 900 00 |
| One carpenter | 840 00 |
| One distiller | 1,800 00 |
| One assistant distiller | 1,200 00 |
| Eight coopers | 7,680 00 |
| Ten laborers | 6,000 00 |
| One stock superintendent | 1,800 00 |
| One assistant superintendent | 1,200 00 |
| Four cowboys | 2,880 00 |
| Three feeders | 1,800 00 |
| Forty-three men receive as wages | $45,660 00 |

*Employed during the Factory Campaign—120 Days.*

| Beet Delivery— | Per Day. | Per Year. |
|---|---|---|
| One weigher | $2 50 | $300 00 |
| Two bookkeepers | 2 50 | 600 00 |
| One superintendent of delivery | 2 50 | 300 00 |
| Testing Beets— | | |
| One polarizer | 3 00 | 360 00 |
| One sampler | 2 00 | 240 00 |
| Two assistant samplers | 1 50 | 360 00 |
| Factory Hands— | | |
| Four at beet sheds | 2 00 | 960 00 |
| Two at beet-cutting machine | 2 40 | 576 00 |
| Two at diffusing battery, foremen | 3 00 | 720 00 |
| Two at diffusing battery, spoutsmen | 2 40 | 576 00 |
| Two at diffusing battery, pulpmen | 2 40 | 576 00 |
| Two at calorisator | 2 40 | 576 00 |
| Two at first carbonator | 2 40 | 576 00 |
| Two at second carbonator | 2 40 | 576 00 |
| Two at filter presses, foremen | 3 00 | 680 00 |
| Eight at filter presses | 2 40 | 1,920 00 |
| Four at saturators | 2 40 | 1,552 00 |
| Two at evaporators | 2 40 | 576 00 |
| Eight at centrifugals | 2 40 | 2,304 00 |
| Two packers | 2 40 | 576 00 |
| Two lenders | 2 40 | 576 00 |
| Two markers | 2 40 | 576 00 |

| | Per Day. | Per Year. |
|---|---|---|
| Two limekiln men | $3 00 | $720 00 |
| Two limekiln helpers | 2 40 | 576 00 |
| Two lime mixers | 2 40 | 576 00 |
| Four oilers | 2 50 | 1,200 00 |
| Two firemen | 3 00 | 720 00 |
| Four stokers | 2 00 | 960 00 |
| One beet-knife sharpener | 2 25 | 270 00 |
| Four general laborers | 2 00 | 960 00 |

*Totals.*

| | |
|---|---|
| Seventy-seven men during factory campaign | $21,018 00 |
| Forty-three men employed by the year | 45,660 00 |
| Total paid in wages at the factory | $66,678 00 |

To produce 40,080 tons of beets, sufficient for 120 days' campaign, assuming that the farmer produces 12 tons to the acre, which only run 14 per cent saccharine matter, they will have cost him to raise, $2 07 per ton.

Actual cost of labor, 50 cents ton; seed, $2 16 acre, 18 cents ton; rent of land, $10 acre, 83½ cents ton; delivery to factory, 50 cents ton; interest on farming tools, etc., 5½ cents ton; total cost per ton beets, $2 07; 40,080 multiplied by $2 07 equals $82,965 60; total labor account, about $150,000. To this you can add 20,000 tons Ione coal at $1 75, $35,000; 228 tons coke from your gas company, at $8, $2,304; 2,400 tons lime rock from Folsom, at $2, $4,800; total, $42,104.

A sum of $200,000 is not far from what a factory would pay out to labor for a capacity of treating 334 tons of beets each day for 120 days. When this business has increased to 1,000 tons for 120 days, its commercial influence would be more than any other thing that could be procured here for the same money.

Perhaps it would be well to consider how much profit there would be to the producers of these beets. At $3 50 per ton for 12 per cent beets, and 40 cents additional for each 1 per cent above 12, would be $4 30 a ton, or a clear profit to the raiser of $2 23 a ton, after paying $10 an acre rent for his land. On the year's crop (40,080 tons) there would be $89,378 40 in profit to the farmers.

On an average I find that one man attends ten acres of beets, and the average for each ten acres is three persons, making about 1,000 inhabitants sustained directly by a 334-ton factory.

Besides, there are some other calculations—new homes to build for these new settlers, agricultural implements to sell, clothing, etc.

But another view of the matter will show that if these people in this neighborhood want to sell their land to the small farmer, see how he will be fixed to pay for this land. He raises this beet crop on a fixed contract from the factory before his seed is in the ground, and is not subject to the market fluctuation. If he has several children he can

perhaps care for twenty or thirty acres of beets. But assuming a man only has ten acres: he gets for his labor, $180; interest on his team, wear and tear of his wagons, $7 60, and $60 for their use in taking beets to the factory. But, after paying for the rent of his land, he has $267 60 profit. And besides the care of his ten acres, if he is industrious, he can support himself and family from his garden, hens, etc., and he has much time at many seasons of the year to earn other money.

In no place in the world could a poor man make such an independent living as here, if this industry could be once started.

This county could put $5,000 at least each year for taxes from this plant into the treasury, and at least another $5,000 from the taxable property that would be added by new settlers.

C. C. HOWELL.

*Sacramento*, December 18, 1894.

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**PRICE OF CHINO VALLEY BEET LANDS—SUGAR BEETS vs. FRUIT.**

C. C. HOWELL, ESQ., *Sacramento, Cal.:*

DEAR SIR: In reply to your favor of the 2d inst., making inquiries as to the extent to which the sugar beet and beet sugar industry have increased the value of land in this vicinity, and the comparative value of sugar beets and fruits to farmers, I have to say:

In giving a comparison of the price of land here at present with that before the establishing of the sugar factory, the correct figures must be those of actual producing value, and not fictitious boom prices. Several years before the location of the sugar factory here this country was treated to a real estate boom, which inflated the prices of all land far beyond its productive value. The intrinsic value of land, however, should be taken as the price at which the products which are or can be raised, marketed, or sold from the soil, will pay a reasonable interest on the investment.

Prior to the establishment of the sugar industry on the Chino Ranch, the products of our soil were hay, grain, potatoes, corn, etc., with a large area (now farmed in beets) used for grazing. These products went upon the market in competition with the same articles produced from the general farming lands all over California. Every farmer knows that such a market is uncertain, fluctuating, and often unprofitable. I believe that a fair and liberal estimate of the value of the Chino Ranch lands made on this basis would be not exceeding $60 an acre.

At the present date, after our farmers have had four years' experience in raising sugar beets, this land sells for and is considered worth from $100 to $200 an acre—averaging fully $150. At this price our farmers are not only making a comfortable living, but calculate on and are pay-

ing the purchase price of their farms in from three to four years from the products of the soil. The sugar beet offers to the farmer a certain market and a certain price for the product of his labor, on which he can calculate with some degree of certainty the possibilities of successful home-building. I consider the increase in the value of Chino Ranch lands, as indicated above, to be directly and entirely the result of locating the sugar industry here.

A comparison of the profits of sugar beet growing with those of fruit raising is somewhat more difficult to arrive at. There is, however, a much greater degree of certainty in the production of a crop, in the market, and in the price of beets than in ordinary fruit crops.

One considerable advantage which the beet farmer possesses over the fruit grower is that in six months after planting the seed he realizes on his crop, and does this without the intervention of middlemen.

During the past two months applications have been made by farmers here for leases on several hundreds of acres of land more than could be furnished them.

I feel entirely safe in saying that the average beet farmer on the Chino Ranch would not be willing to exchange his prospects here for fruit growing with an equal capital invested.

Please call on me for any definite information I may be able to furnish at any time. Trusting you may be able to establish a beet sugar factory at Sacramento that will be a blessing to hundreds of people, and wishing your Association ample success in its commendable work,

I remain very truly yours,

EDWIN RHODES.

*Chino, Cal.*, January 7, 1895.

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**PROFESSOR HILGARD ON THE FAILURE OF THE BEET-SUGAR FACTORY AT BRIGHTON, SACRAMENTO COUNTY.**

C. C. HOWELL, ESQ., *Manager Sacramento Industrial Improvement Association, Sacramento:*

DEAR SIR: Answering yours of the 2d inst., I state that I have no personal knowledge of the quality of the beets that were worked at Brighton, but did assay those grown at Isleton, and found them to be of the very highest quality, as stated in my report made at the time. None better anywhere.

I feel quite confident from what I heard at the time that the factory failed for want of proper management. At that time the idea was not so much to make sugar as to sell the stock of the concern and "unload." The machinery, moreover, was poor and was managed by incompetent hands.

The idea that the heat of July and August would forbid beet growing is based upon the conditions under which beets are grown in Europe, in

a totally different climate. To exemplify: In 1892, a five weeks' drought in Germany caused most of the fruit in the orchards to fall, and the beet crop was badly damaged. With us, a five *months'* drought does not cause the fruit to fall, as we know pretty well by this time. I have had good sugar beets from Fresno, grown by irrigation; but so much depends on the right handling of the water that I would not for the present advise growing beets, otherwise than experimentally, where irrigation is required. But in the naturally moist sediment or bench lands of the Sacramento Valley there should be no more difficulty in growing good beets than at Chino.

Very truly yours,

E. W. HILGARD.

*Berkeley*, January 25, 1895.

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**MONEY IN SUGAR BEETS.**

**California the Place for Factories—The Beets Produce Better and Are Sweeter—The Industry Gives Employment to Hundreds of People—Why Some Factories Failed.**

Sacramento Bee, February 23, 1895.

*To the Editor of the Bee*—SIR: In closing my articles on the beet sugar industry I wish to lay before your readers a few facts that may be important for them to study, especially those who are interested in building up the country upon a solid basis, which can only be done by creating lucrative employment for people.

I have said that California can produce beet sugar cheaper than any other State, on account of her climate and soil. Not that her soil is so very much better, but the meteorological conditions are better; her temperature, sunshine, and rainfall, coming as they do at certain seasons, exercise the most pronounced influence, not only on the yield of her beets in tonnage, but also on their saccharine quality. At Vacaville I am told that the land is worth and has paid double what any other land in the State has paid in profits by raising the apricot. This is owing to certain practical conditions and scientific causes, the same as there are practical conditions and scientific causes why the Sacramento and San Joaquin Valleys are superior to any other portion of the State for raising the sugar beet.

I may be better understood in this article by referring your readers to the Government report on the average number of tons of beets treated to produce a ton of sugar (of 2,000 pounds) for the years 1891, 1892, and 1893—those years that the beet sugar factories were licensed by the Government, under the McKinley law, which was passed by Congress October 6, 1890: 6.56 tons beets treated at Chino, California, produced 2,000 pounds sugar; 8.40 tons beets treated at Watsonville, California, produced 2,000 pounds sugar; 9.09 tons beets treated at Alvarado, California, produced 2,000 pounds sugar.

This practical record for the sugar years, from actual results of these successful factories, verifies my assertions. The Government paid a bounty on these figures, and there is no mistake as to the fact of my statement. I know it will be said: "How does this prove that the Sacramento Valley is superior to any of these other localities in California?" My answer is because:

First—You have the same dry, sunny, even temperature at the right period of the year that they have in Southern California for ripening and maturing beets rich in sugar, and without the liability of early rains, as they often occur, to affect the beet crop on the coast, at Watsonville, or around San Francisco Bay. For instance, look into their troubles this year, and you will find that such early rains have not existed here but once in twenty years sufficient to injure the sugar in the beet.

Second—You have all the necessary rainfall at the proper season for preparing the land and giving the best life-strength for a perfect growth before it is ready for constant daily sunshine—a condition in the southern part of the State that but frequently occurs. This last year's crop fell short in acreage one half. A study of the physical data compiled by the engineering department of the State of California will furnish you facts to prove that there has been no year in the past twenty that a full beet crop could not have been raised on the bottom or moist lands of this valley from lack of sufficient rainfall.

Third—Sugar beets were raised here for the Brighton factory from 1871 to 1876, and the records kept at that time show that the quality of the beets was much better at that early period than the beets are to-day in Southern California, considering strength of sugar and acreage together. True, the management at Brighton did not get the sugar out of the beets, but the beets were produced—the soil and conditions furnished the raw material for manufacturing sugar superior, at that time, to any other place in the world.

Fourth—A great number of persons near here have raised sugar beets for feeding their stock. The letter of Mr. Murphy, of Perkins, already published, shows that for over twenty years he never has failed in raising a large crop, even when he planted them as late as April. At the Government station on Union Island last year the five acres of sugar beets planted under the direction of Professor E. J. Wickson, by authority of the Secretary of Agriculture, averaged as high in sugar as those raised at Chino; besides, their yield was over 40 tons of beets to the acre, while Chino Ranch beets only averaged 10 tons to the acre last year, on account of the small amount of rainfall during the fall of 1893 and the winter of 1894. The beets referred to on Union Island were not planted until June—an unprecedented thing in beet growth; and, as Professor Wickson puts it, "It is very significant indeed" that it

should be so, and would be if the people here understood the conditions as they exist to make this a great sugar manufacturing center.

Fifth—While your climatic conditions are as near perfect here as it is possible to get them, the alkalies in your soils are largely nitrates—those elements for which, in the form of fertilizers, Germany, France, and other States of Europe pay out millions of dollars every year to supply the necessary mineral and alkaline salts which must be had to insure a profitable crop.

Professor Hilgard, of the State University, who has charge of the Government's Southern California Experiment Station, recently made a series of experiments upon beets grown in the moist, damp, black alkaline soils on the Chino Ranch, where heretofore there was much doubt expressed as to the possibility of ever raising sugar beets in such land. These experiments, however, have proved very satisfactory, as well as those in this county.

These alkali lands are entirely suited for sugar beet growth, and there is no end to the time that these mineral elements will last in the soil for the profitable culture of the beet plant. These experiments on the different soils showed a large amount of nitrate of soda, which is the greatest fertilizer in the world. These are only a part of my reasons.

I will now consider California as a whole for producing beet sugar, and will for that purpose consider the beets grown at Chino, Watsonville, and Alvarado. Perhaps I should say that up to the time the present Secretary of Agriculture was confirmed, the Government pursued the policy of promoting all agricultural products, hoping in time to do away with importing that which we can raise as well as our foreign neighbors, and to that end the department, through its Division of Chemistry, sent out thousands of pounds of different kinds of sugar beet seed. They have been sent to hundreds of persons in twenty-eight different States and Territories. These seeds were planted under the direction of the Division of Chemistry, and when they were matured and ripe the beets were sent to some Government station and tested. As to their strength, these results have all been published in bulletins each year by the Department, and from a careful study of these facts as gathered, California stands in the first rank for raising beets richest in sugar and greatest in tonnage. Eastern Washington is second, Nebraska third, Kansas fourth, Utah and Colorado fifth, and so on all along until the States take their proper stand, most of them ranking below a condition where they could grow the beet and manufacture the sugar in competition with the few favored localities in this great country.

But as these tests are not so reliable as practical comparisons for actual results, I will call your attention to the four States that have had beet sugar factories in operation since 1890 and 1891, working under a license

and receiving a bounty of 2 cents a pound until the Wilson-Gorman tariff bill went into effect previous to the sugar campaign of 1894.

*Example.*

7.69 tons California beets produced one ton (2,000 pounds) granulated sugar.
11.36 tons Nebraska beets produced one ton (2,000 pounds) granulated sugar.
13.07 tons Utah beets produced one ton (2,000 pounds) granulated sugar.
13.88 tons Virginia beets produced one ton (2,000 pounds) granulated sugar.

It will be seen from this showing that California and Nebraska have produced the largest quantity of sugar from a ton of beets, taking the beets as they averaged for the three years while the Government had charge of the factory products by keeping the record so that false returns would not be made and the Government defrauded. I will make my calculations from the beets produced in California and Nebraska.

The cost of raising a ton of beets varies somewhat, so I will have to assume that there is but 12 tons of beets to the acre. In that case they can be produced readily for conveyance to the factory for $2 a ton, either in California or Nebraska (that is, averaging the entire crop, covering California and Nebraska). They would average for the run of a factory 50 cents a ton for transportation, and the farmer would make $1 50 net profit on each ton, allowing for all expenses in producing and delivering his beets, at $4 a ton at the factory. Of course, this valley ought to raise 25 to 50 tons to the acre, and will when properly cared for and handled with the same intelligence that fruit is handled where producers have been successful.

*Example.*

| | |
|---|---|
| Cost of 7.69 tons beets in California, at $4 per ton | $30 76 |
| Cost of manufacturing 2,000 pounds sugar in California, at 1¼ cents per pound | 25 00 |
| Freight on 2,000 pounds sugar to Missouri River points, at carload rates | 1 20 |
| Total cost of delivering 2,000 pounds of sugar at Missouri River points | $56 96 |
| Cost of 11.36 tons of beets in Nebraska, at $4 per ton | $45 44 |
| Cost of manufacturing 2,000 pounds sugar in Nebraska, at 1¾ cents per pound | 35 00 |
| Total | $80 44 |

Assuming these figures to be correct, the California producer or manufacturer lays one ton (2,000 pounds) of sugar down at Missouri River distributing stations in competition with his Nebraska neighbor for $23 48 less than the Nebraska man can produce his for f. o. b. at his factory.

You will notice that I have charged 1¾ cents per pound to the manufacturer of beet sugar in Nebraska, and 1¼ cents a pound in California; but you will also observe, to produce a ton of sugar, Nebraska has to treat 3.67 tons of beets more than California, and the less sugar and purity the more fuel and labor used; consequently, there is really more than half a cent a pound difference after allowing them a price for coal at

half the cost of yours, and your lignite coal, where the proper fire-boxes and grates are arranged, can be used to a profit. This problem is figured out from the footings of the factories ending the sugar year for 1890, 1891, 1892, and 1893.

I would be very glad to explain personally at this office, during my stay here, the result of the campaign at all the sugar beet factories in this country that have been operated for the year 1894, so far as they have settled their 1894 business. All factories except the Spreckels or Watsonville factory have closed their works, and I have their reports on the year's business. My relations became such with these managers and superintendents while I personally investigated these factories for the Directors of this Association, that they have freely furnished me with such information as I desired. They seemed to be interested in having the sugar industry placed before the people correctly, and when they found I wished to get such facts regarding the business that would not misrepresent it, I had no trouble getting the desired information. The study of this work has been a most pleasant one, as it is of a high order, and much more so than any other branch of agriculture I have ever studied.

On my return East I should take up this work, but the country east of the Rocky Mountains, as things stand to-day, is not in it with the country west, and none can compare, not even the eastern portion, with California. Eventually this will be understood, and at some place in this valley or in the San Joaquin Valley there will be a great city built up from this industry.

C. C. HOWELL.

*Sacramento*, February 10, 1895.

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**ANALYSIS OF SUGAR BEETS.**

**The College of Agriculture, University of California, will Make Free Analyses of Beet Samples Grown as Tests.**

ED. R. HAMILTON, *Sacramento Bank, Sacramento, California:*

DEAR SIR: In response to yours of the 28th ult., I state as regards analyses of beet samples grown as tests, that they are made free by this Station, provided we receive with them such data regarding location, lay, and nature of the land, soil, etc., as will enable us to make our report of public utility. We also require the date of planting and thinning and of harvesting, together with any other information that may throw light upon the development of the beet crop.

The sample should, as a rule, consist of not less than six beets, selected so as to give a fair average of the crop. In distributing seed the recipi-

ents should be specially instructed that plants should never be more than nine inches apart in the row, and preferably less, in order to prevent their becoming of larger size than two pounds as a maximum; one pound being preferable for high quality.

As a general thing, it is not advisable at this time to plant beets on other than sediment or lands easily worked and kept in good tilth through the season, and with natural moisture to do without irrigation, but not with water closer to the surface than four feet, since too much water deteriorates seriously the quality of the root, and the dryness naturally supervening in California about harvest time (August to October) forms an essentially favorable condition for beet culture in California.

For more particulars on the latter subject, I refer you to an article contributed by myself to the Overland Monthly for December, 1886, from which, though written nine years since, I have nothing to subtract. I could only emphasize my favorable opinion regarding the prospects of the industry in California, which have been abundantly confirmed by subsequent developments.

One unexpected development has been the fact that very high grade beets have been grown on soils slightly tainted with alkali, like some of the lower portions of the Chino Ranch, contrary to the received ideas of the effects of saline lands on the sugar contents and quality of the beets, which are based on experience on seashore soils. "White" alkali, that is, Glauber's salt, does not appear to interfere to any serious degree with the quality of the sugar beet when present to an extent not exceeding two tenths of one per cent, yet I would not advise the use of such lands as a matter of preference.

Respectfully yours,

E. W. HILGARD.

*Berkeley*, December 4, 1895.

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### THE CONSUMPTION OF SUGAR.

[Extract from the article on "The Sugar Beet Industry of California," contributed by Professor Hilgard to the Overland Monthly for December, 1886.]

The tables below,* showing the consumption of sugar *per capita* during different periods and in different countries, may serve to allay the apprehensions of those who fear that sugar will shortly become a drug in the markets of the world:

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*See Bulletin No. 5 of the Chemical Division of the Department of Agriculture: By H. W. Wiley, 1885, pp. 11-13.

*Consumption of Sugar in the United States, Per Capita, from 1867 to 1884, inclusive.*

| Year. | Lbs. | Year. | Lbs. |
|---|---|---|---|
| 1867 | 28.9 | 1876 | 37.1 |
| 1868 | 32.9 | 1877 | 36.2 |
| 1869 | 34.0 | 1878 | 36.0 |
| 1870 | 35.3 | 1879 | 38.3 |
| 1871 | 39.9 | 1880 | 41.2 |
| 1872 | 39.9 | 1881 | 43.9 |
| 1873 | 39.9 | 1882 | 45.7 |
| 1874 | 41.1 | 1883 | 48.2 |
| 1875 | 39.5 | 1884 | 51.4 |

*Consumption of Sugar in England, Per Capita, from 1876 to 1884, inclusive.*

| Year. | Lbs. | Year. | Lbs. |
|---|---|---|---|
| 1876 | 59.0 | 1881 | 64.0 |
| 1877 | 56.0 | 1882 | 63.0 |
| 1878 | 62.0 | 1883 | 67.0 |
| 1879 | 62.0 | 1884 | 67.0 |
| 1880 | 62.0 | | |

*Consumption of Sugar, Per Head, in Various Countries.*

| Countries. | Year. | Lbs. |
|---|---|---|
| United States | 1884 | 56.0 |
| England | 1884 | 67.0 |
| France | 1881 | 25.0 |
| Germany | 1881 | 18.0 |
| Holland | 1881 | 18.5 |
| Austria | 1881 | 13.0 |
| Russia | 1881 | 7.7 |

Two prominent facts are shown by the above tables. The first is that in the United States and in England the consumption of sugar increases in a much more rapid ratio than the population, and similar tables show the same to be true of all European countries at least. Regarding the showing here made, Professor Wiley says: "From 1876 to 1885 the consumption of sugar in England rose from 59 to 67 pounds per head. During the same period in the United States the increase was from 37.1 to 51.4 pounds per head. At this rate of increase in another decade the quantity of sugar required for each inhabitant will be as great in this country as in England, viz., about 75 pounds. But our population is increasing much more rapidly than that of England, and in ten years from this time it will be nearly seventy millions, and the amount of sugar used in this country will be five thousand millions of pounds! This country will be the great sugar market of the world." The only possible flaw in this reasoning might be that there is probably a natural limit to the possibility of sugar consumption, even by the American boy and his elders, but it is not likely that that limit will be reached within this century.

The other point, shown in the third table, is that if sugar consumption is not, like that of soap, to be considered the criterion of the most civilized nations, it seems certainly to follow closely the ratio of their pro-

gressiveness and commercial relations with the world at large. Thus England stands at the head and Russia at the foot of the scale. But if this is true it inevitably follows that as social progress and intercommunication of all nations advance (and that this will be the case no sane person will question) an increase of sugar consumption will be sure to follow. The time between the present and that when the sugar consumption of all nations shall have reached its natural maximum would seem to offer an ample margin of safety against a glutting of the market for some generations to come.

In connection with the above figures of prospective consumption of sugar, it is of interest to consider the possible production of beet sugar in this State. Taking as an example only the region within which the sugar beet is known to attain its highest degree of excellence, viz., the Alameda plains and the Santa Clara Valley within the limits of the two counties of the same names, lying within immediate reach of the bay and city of San Francisco, we have an area of about 380,000 acres, of which (excluding the heavy adobe, saline, and very gravelly lands) at least one half, or 190,000 acres, is well adapted to sugar beet culture, and each acre of which can readily produce 4,000 pounds of refined sugar. This gives for the possible production of these two counties alone the enormous sum of 760,000,000 pounds. The Coast Range valleys could quadruple this production; and if, as is probable, at least the middle and northern portions of the Sacramento Valley can also be counted on for beet sugar culture, California alone could readily supply the entire present and prospective sugar consumption of the United States, and still leave ample room for orchards and vineyards and the production of the home supply of breadstuffs. It is perhaps not probable or desirable that this one branch of production should be pushed to this extent; but it would be strange indeed if, with such extraordinary climatic advantages, it failed to attain a very prominent and lucrative position among the agricultural industries of California.

E. W. HILGARD.

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### SOIL ADAPTED TO THE CULTURE OF SUGAR BEETS.

**What the General Manager of the Chino Ranch Company Says upon This Subject.**

ED. R. HAMILTON, ESQ., *Cashier Sacramento Bank, Sacramento, Cal.*:

DEAR SIR: Regarding the soil adapted to sugar beets, the first essential is a loam that will permit the penetration of the beet root deep into the soil, and also allow the harvest to be made without great loss by what we class as "tare"; that is to say, beets grown in loam are easily extracted from the ground by a beet-puller or plow, made expressly for that purpose. Whereas, beets grown in land carrying very much adobe

or clay are very hard to get out of the ground in the fall of the year, or in mid-summer, when the beet root is ripe, the great loss being made by the beet root breaking off, and an additional expense connected with the harvesting from such soil by the adherence of this soil to the beet, upon which the farmer indirectly pays freight in hauling, or if shipping by rail, he pays railroad freight; hence, I say, the first requisite is a rich loam.

Secondly, a sufficiency of sub-moisture to enable the beet to mature. So far as we have been able to determine, land classed as "cienega" land is the best. In the spring there appears to be on our lands in Chino an almost superabundance of water, and frequently the crop is gotten in under great difficulties.

As quick as the plant begins to develop it exhausts from the land all the water upon the surface, of course aided by the evaporation caused by the sun's direct rays. As the surface grows dry, the tap-root of the plant forces its way down, finding the necessary moisture below, and when the harvest is made the fields, as a rule, are as dry as powder, but the little thin tap-root has penetrated until it has found all the moisture necessary to fully mature the root.

The lack of moisture on the surface also aids in the development of the beet root, because it discourages the tendency of the plant to develop rootlets or spongols (as I think they are called technically) which grow out near the top of the beet, detracting from the general appearance, making more tare (as these are cut off and thrown away), and reducing the saccharine qualities.

We have found that the beet containing the most sugar is smooth and well shaped, tapering to a long, slender point.

Now, it is the contrary with beets grown under a system of irrigation, even in the best of soil. It is, in my judgment, impossible to apply the water at precisely the proper moment, or in proper quantity to keep the land uniformly moist; if there is a little too much water you will check the growth of the plant, and if not enough water the plant will commence the ripening process, when the next application of water will again start a new growth, and the result will be a low percentage of sugar in the beet, so as to make it very unprofitable. Then, again, the application of water to the surface (which is the only way you can irrigate) causes the development of those rootlets growing from the top of the beet as before remarked, as being dangerous to the value of the root. Hence it is very clear to us and to all who have watched the culture of the sugar beet root that naturally moist land is almost an essential. Of course a test can be made, and then the fears we have expressed may all prove to be groundless. I simply throw them out to put you on your guard.

If you undertake to grow beets in any considerable quantity with

sufficient acreage to test the thing thoroughly, it would be wise to plant enough so you could afford to get a good man to superintend the whole thing, so that it might be done in so thorough a manner as to insure success. It is the most "*intense*" farming in America.

The following are the different varieties grown upon this ranch:

Vilmorin Amelioree: A French seed raised by Andrieux Vilmorin, of Paris, France. This is the sweetest sugar beet known, and is best adapted to our loose, moister lands, as it will not grow too large on account of the moisture, and retains its high percentage of sugar.

Klein Wanzlebener ("Improved" and "Original"): Best adapted to the semi-moist sandy loam.

G. D. W. I. (Gebruder Dippe): Also a Klein Wanzlebener, and is the best beet for the heavy, black lands that are harder to penetrate and not so deep, as it assumes more the shape of the turnip, at the same time giving good tonnage and sugar.

This latter beet is the best all around beet we have ever had for all kinds of soils, and when in doubt as to which variety to plant will nearly always give good results.

The only way to be sure of obtaining good seed is to purchase direct from France and Germany. I don't think we will be able to furnish you with any, as our orders placed in Europe some time ago for the crop of 1896 were only sufficient to supply the acreage we intend to plant here—namely, some 7,000 acres. You might be able to get some of Spreckels, at Watsonville.

Soaking seed is not generally done, except where missing places in the rows require replanting, and then it is not always done. In some instances, if the land be very warm and a little dry on the surface, it is well to soak the seed just previous to planting, then the germ will start quickly enough to catch up with the other plants, making a uniform harvest.

For your general information with regard to movements in land of this class, which land is classed by the establishment of this great industry in Chino, I will say that since October 1st we have sold nearly 1,200 acres of land, in small holdings, for the aggregate amount of $192,000. This could never have been done under ordinary circumstances, as the buyers are principally men who have been renters for one or more years previous. It speaks a "library" as to the intrinsic value of the lands and the profitableness of the sugar beet root as an annual crop.

Very truly yours,

W. H. HOLABIRD,
General Manager.

*Chino, Cal.*, December 4, 1895.

## SUGAR BEET CULTURE.

### Circular of Instructions Issued by the Alameda Sugar Company of Alvarado.

The beet demands a soil easy to till, one that is loose and pliable, but not too sandy. It is also indispensable that the soil should be prepared by deep plowing a month or two previous to seeding—one deep furrow of 12 or 14 inches, or with two plowings, one of about 9 inches, followed by a deeper one of 6 to 8 inches below the first by means of a subsoil plow. This work, done in the early winter, has the advantage of allowing frost and atmospheric influence to destroy the cohesion of the soil, and, at the same time, to destroy any insects which may be present. In the spring the earth should be well settled down and rendered homogeneous, but not packed. This may be accomplished by working with roller and harrow.

As it is desirable to have beets with as few rootlets as possible, and of good conical shape, the point of the root must be allowed to penetrate the earth without resistance. Deeply worked and homogeneous soil allows the beet to develop itself to a good size without crowding itself out of ground, and by these means one obtains a large product, both in weight and in sugar.

In many soils, by deep plowing, a sour clay is brought to the surface, which is injurious to the vegetation of the beet, on account of its acidity. This should be neutralized by the use of lime in about the proportion of two tons per acre.

In all wet soils proper drainage is also necessary.

#### FERTILIZERS.

If fertilizers are used it should be before sowing the beets. Stable manure should be spread before winter, in August and September, if possible. It is indispensable that it should be well broken up before plowing. Manure with a great deal of unrotted straw produces, generally, beets which are forked, rooty, and do not keep well. If other fertilizers are used, as superphosphates, they should be in powder, and spread as soon as possible in spring. Nitrogenous fertilizers, such as sulphate of ammonia, nitrate of soda, guano, etc., should only be used a few days before sowing on a warm or sunshiny day.

#### SEEDING.

The quantity of seed used per acre ought never to be less than ten pounds. In many cases, when the soil is cold, or when fear exists that the plants may be eaten by worms, it will be necessary to use a larger quantity. It is desirable that when the plants come up they should nearly touch each other, but there is no necessity to overcrowd, as this

occasions extra labor in thinning out. Or the seed may be planted at a distance of 3 or 4 inches in the rows in groups of three or four seeds. The seed may be planted in rows of 10, 12, or 14 inches apart, if it is intended to weed out by hand; and at 18 and 20 inches when it is desired to use the horse hoe. The sowing machine or drill should be arranged in such a manner that the seed is placed in moist soil below the surface. The least covering of earth is sufficient to sprout it. We cannot insist too strongly on this point; *seeds buried too deep invariably give a poor stand of beets.*

It is well to let the soil get quite dry before rolling after seeding. If it is rolled too soon after seeding, the earth becomes smooth on the surface and prevents the air from penetrating to the seed and destroys its germinating power.

### WEEDING.

The first weeding should be done as soon after the plants have come up as the rows may be distinguished. It is then very easy to destroy any weeds that may have made their appearance. In California this weeding should be followed by a second one after the lapse of three or four weeks. Repeated weedings loosen the soil, warm it, and incite vegetation. Instead of hand labor, a horse hoe may be used to great advantage for the weeding, at the same time acting as a cultivator. The hoe should scarify the soil an inch or two in depth. If, instead of the second weeding, a deeper cultivation be employed, the result will be to prevent dryness, which cannot penetrate, except with difficulty, into soils well pulverized to a certain depth. Each cultivation increases yield.

### THINNING OUT.

As soon as the beets have from two to four leaves, it is necessary to thin them out so that there may be about twelve roots to the square yard. The sooner the thinning is done the better for the plants, as they suffer much less when this work is not delayed.

The method of thinning out is to place a finger of one hand on the plant to be kept, and, holding it firmly in place, remove the others.

### PLOWING OUT.

This is done by means of a particular kind of plow, a sort of thin blade, which splits the soil between the rows. Instead of a share, it has a very narrow blade in the nature of a subsoil point, enough to carry it deep into the ground. The use of a plow avoids that injury to the beets caused by using spades, hoes, or forks, and it is also easier to remove the entire plant from hardened soils.

Beets may be plowed loose from eight to ten days before removing

from the ground. Treated in this manner, the roots ripen and gain in weight and sugar; the earth adheres much less to the root and can be shaken off with ease.

TOPPING.

This is the removal of the leaves with a portion of the crown of the root, generally at the base of the rough portion. It is best accomplished by a single straight cut across the beet without whittling.

VARIETIES OF BEETS.

Of the many varieties, the following are mostly used:
Klein Wanzleben—white.
Vilmorin—white.

SIZE OF BEETS.

If beets are planted at great distances apart they become large in size and freely absorb salts from the soil. To avoid this it is necessary to plant close together, thus dividing the available salts in the soil among more beets. Sugar is formed in the beet from the air through the leaves, and these should be many in number and of fair size.

ALAMEDA SUGAR COMPANY,
Alvarado, Alameda County, Cal.

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SUGAR BEET SEED.

E. R. HAMILTON, ESQ., *Sacramento:*

DEAR SIR: Yours of the 29th at hand. We have sugar beet seed of the following varieties, both white:

Florimond Desprey, L. Z. C. Blanche — Derived from Vilmorin's Amelioree.

H. Mette's Rose Vilmorin—A white beet, with a rose shade at the base of the leaves.

Price for either, 15 cents per pound, including sacks, f. o. b. cars here or Decoto Station; cash.

Yours truly,

ALAMEDA SUGAR COMPANY,
E. C. BURR, Manager.

*Alvarado, Cal.*, December 5, 1895.