From Frank L. Klentz. Supt. (1911-1921)
Holly Sugar Corp., Santa Ana, California,
1946

F. L. Klantz

T R A N S L A T I O N S

FROM EUROPEAN SUGAR JOURNALS

ISSUES OF 1911-12 and 1913.

COMPILED BY
TRUMAN G. PALMER, SECRETARY,
UNITED STATES BEET SUGAR INDUSTRY,
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P R E F A C E.

Aside from general statistical matter, the following pages contain translations of such articles as have appeared in European Sugar periodicals during 1911, 1912 and 1913, and it was thought would be interesting and instructive to those engaged in the American beet sugar industry.

The reader's indulgence is asked, especially in connection with the technical articles, for it has not been possible at all times, to have the articles translated by sugar experts. No attempt has been made to edit the articles and the translations are literal, rather than free.

The names of all the authors and the titles of their articles are embodied in the table of contents. The subject index at the back of the volume is cross indexed and will facilitate the looking up of any subject referred to in the book.

It is not to be presumed that this volume contains all of interest and value which has appeared in the European sugar periodicals and as it is intended to follow this volume with others of a similar nature, suggestions as to the character of articles in this volume which the reader considers as being the most valuable and also as to subjects of value not herein touched upon, will be appreciated.

TRUMAN G. PALMER.

Washington, D. C.
May, 1914.

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BEET SUGAR IN FRANCE FROM 1800 to 1900.

CULTIVATION OF THE BEET

- by -

JULES HELOT.

HONORARY SECRETARY-GENERAL OF THE ASSOCIATION OF SUGAR MANUFACTURERS OF FRANCE; VICE PRESIDENT OF THE CHAMBER OF COMMERCE OF CAMBRAI, 1900.

"It should be stated, moreover, that if the cultivation of the beet contributes in an indirect but undeniable way to increase the richness of the soil by the fertilizers and the beneficial means of cultivation which it necessitates, in contrast with every other crop, it does not take from the soil a single one of the fertilizing rudiments.

"The elements that go to make up the sugar of the beet - carbon, hydrogen and oxygen - are not taken from the soil but from the air, and those are the only elements taken from it. All the matter, on the other hand, which enters into the composition of the beet, the vehicle of the sugar, and which proceed from the soil, are completely restored to it either in that they are left immediately upon the very ground where the beet has grown, as in the case of beet tops (leaves), or in that they are later paid back indirectly in the form of manure, as in the case of the dregs from the manufacture of sugar, or in that they serve as feed for cattle whose dung fertilizes the soil, as in the case of the pulp of the beet."

DEUTSCHE ZUCKERINDUSTRIE

August 15, 1913.

(As published in 1812, in the "Allgemeine Zeitung" Augsburg)

COST OF PRODUCTION AND PROFIT IN BEET SUGAR

FACTORIES 100 YEARS AGO.

Count de Chanteloup in a report to Napoleon (1812) gives a summary of the cost of Production of sugar beets, and profits made in the sugar factory.

"This root is sown in March and April. The fields where beets are planted increase in fertility when other cereals are planted. Beets can be planted in fields where previously grain was planted by which the lying fallow is avoided.

The total outlay for 1 Morgen (8.416 acres) of sugar beets is estimated at 176 francs ($33.96)

The average yield per Morgen is 200 centner (11 short tons) beets.

One centner at 1 franc (19.3¢) and the profit for the farmer is thus greater than that which he could get from the same field if planted with grain.

Careful observation has shown that beets from 1 to 5 pounds are richer in sugar and contain less water than those of a greater weight.

One centner beets (110 lbs) yield 3 poundsof syrup, market price 50 ctms (9.6¢), 2 lbs raw sugar, market price 4 francs (77.2¢); 90 lbs by-products, market price 1/2 ctms or 45 cts (8.7¢), so that the products from 200 centner beets (11 short tons yield of one morgen amount to the following;

Syrup 6 Centner	(662 lbs)	300 francs	($57.90)
Raw sugar 4 "	(441 ")	1600 "	(308.80)
Residue		45 "	(8.68)
Total		1945 "	($375.38)

150 Centner beets worked over, average 3 centner raw sugar daily; machines, tools and other equipments for this purpose total 25,000 francs ($4825.)

Daily, laborers - 20 men
20 women
2 horses
coal

Freight on one centner beets	1.20 fr	23.16¢
Daily wages, men	1.50	28.95¢
" " women	1.00	19.30¢
Maintenance of horse	2.50	48.25¢
Coal per day	4.00	77.20¢
		$1.96.86¢
Interest on capital, keeping buildings in repair and other overhead charges,	90.00fr	$17.37
Total daily outlay	361.00"	$69.67

Daily production is as follows:

450 lbs syrup

300 " raw sugar

6000 " residue

The cost of production of syrup is 25 centimes equals 4.82¢

" " " raw sugar is 77 " " 14.86¢

We therefore conclude that if there were only enough sugar factories in the country, competition would reduce the profits of the manufacturer to a normal percentage, and beet sugar would not get dearer, but would, perhaps, get cheaper than cane sugar was a few years before the Revolution.

Sugar beets can be worked over during 180 days every year, i.e. from October to April.

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(Translation from French)

EXCERPT FROM SUPPLEMENT OF JOURNAL des FABRICANTS de SUCRE, MAR. 5,1913.

Official report made by the undersigned on sugar-making by M. Crespel-Dellisse at Arras and Refining Sugar extracted from the Sugar Beet.

We, the undersigned having been requested on December 28, 1818 , by the Baron Simeon Prefect of the Department of Pas de Calais to verify the claim made that beets are the only vegetable from which we could extract sugar, we herewith transmit samples of sugar made from the beet by Mr. Crespel of the city of Arras, which samples are to be presented to his Royal Highness the Duke of Angoulime and to his Excellency the Minister of Interior.

We have attended the various operations which M. Crespel has completed in our presence and we send the seven samples of sugar produced in our presence and under our supervision. We saw the beets reduced to pulp - the juice separated from the fibrous substances thereof by means of presses; we saw the juice placed into evaporators, then in boilers and concentrators, and then in suitable vessels for crystallization; when the crystals are formed the remainder - a liquid called molasses - is run off.

This first crystallized product is sample No.1

Sample No. 2 is a loaf made out of sample No.1

Out of the molasses that was clarified a sample No. 3 was made . Out of 52 Kilog. of raw sugar 44-3/8 Kilog. refined sugar of divers grade and 6 Kilog. of molasses was produced. Samples 4, 5, 6 and 7 of different grades accompanying this report. Sugar of the first grade is called Royal Sugar.

Candy is the 7th sample.

The last syrup is manipulated and sold to ginger-bread bakers.

We certify that these 7 samples are the genuine product of the factory which we inspected and superintended the operation from the time the beets reached the factory to be washed, rasped, pressed, crystallized and refined, and we have executed this report in quadruplicate and remitted one copy along with the said 7 samples of sugar to Baron Simeon, Prefect of Pas de Calais.

Mr. Crespel has likewise attached his signature to this report.

Arras, Saturday, 17th April, 1819.

(Signed) Sigaud, Chief Engineer Roads and Bridges.
Terminek, Councillor City Administration.
Garnier, Engineer at the Royal Mines.
Letombe, Architect for the Department.
Martin and Crespel - factory owners.

Mr. Crespel is ready from patriotic motives to give freely all information tending to help establish factories and teach them, based on 8 years experience, how to extract the sugar from the beet, all this worthy citizen wishes is to see factories spring up in large numbers so as to call the attention of this government to the vast importance of beet culture and sugar production for the furtherance of our national prosperity.

(Translation from the French)

EXCERPT FROM THE HISTORIE CENTENNALE DU SUCRE de BETTERAVE.

OLIVIER de SERRES b. 1539 - d. 1619.

A great French Agronomist, called the father of Agriculture, Olivier de Serres was able to find out that the beet-root contained sugar long before Marggraf set about to extract sugar from this root. Olivier de Serres wrote:

"The beet (mangold) which being cooked yield a syrup of sugar which is beautiful to look at on account of its vermilion (ruby) color".

Olivier de Serres was born at Villeneuve de Berg in the Vivarais. A militant Calvinist, like his brother John, he had in consequence of his studies and struggles no liking for agriculture; it was rather in order to forget the religions wars that he retired on his estate of Pradel near Privas, that he devoted himself to the service of Agronomics.

He laid down rules for the proper treatment of the soil, drew the attention upon pastures and artificial meadows, made people acquainted with the proper planting of mulberry trees and their utilization for the purpose of raising silk-worms.

Responding to a desire expressed by Henry IV, he wrote in 1600, "Le Theâtre d'agriculture le mesnage des Champs" from which the above quotation on beets is an excerpt.

This book caused a great stir and it was successively published in nineteen editions between the year 1600 and 1675.

EXCERPT FROM THE HISTOIRE CENTENNALE du SUCRE de BETTERAVE.

ANDREAS SIGISMUND MARGGRAF.

1709 - 1782.

The great discovery which was to immortalize Marggraf was not the result of a lucky accident, but the fruit of patient labor and scientific sagacity as well as a methodical mind which only a thorough education in chemistry can impart.

Marggraf was born in Berlin, adopted the career of his father and studied pharmacy, then chemistry in Berlin, Strassbourg, etc. He made a name for himself by his first work and finally procured the honor to become a member of the Academy of Science of Berlin, where later, in 1760, he was given the chair of Physics.

For his research work in 1740, on the formation of phosphoric acid on the extraction of potassium of tartar and salt of sorrel, on formic acid, etc., he would deserve to be famous in the annales of science; but his writings and research work whilst at the Academy of Berlin in 1747, had such tremendous consequences that they have remained as monuments of the characteristic genius of Marggraf.

The following title of one of his writings does not by any means reveal its monumental importance: "Chemical Experiments made with the object to Extract Real Sugar from diverse plants that are growing in our own Country".

Marggraf was, in 1877, appointed corresponding member of the Academy of Science, France.

(Translation from the French)

EXCERPT FROM THE HISTOIRE CENTENNALE du SUCRE de BETTERAVE.

FRANCOIS CHARLES ACHARD.

1754-1821.

The scientific career of Achard was exclusively devoted to apply the discovery of Marggraf (about the beet) to industrial uses.

Born in Berlin, of French descent, Achard in his early manhood carried on bis cultural and industrial experiments at Caulsdorf - then at Bachholz, near Berlin, and finally at Cunern, near Steinau, lower Silesia, where he founded in 1802, the first sugar factory; he founded in 1806 the Krayn factory near Strehlnen, Silesia, a factory which belonged to Mayor Koppi.

Achard was encouraged first by Frederic the Great, then by King Friederich Wilhelm III. to whom in 1799, he presented Sugar loaves that were in every respect comparable to the best cane sugar.

The King granted him 9000 Thaler, then in 1803, he loaned him 50,000 thaler without interest, taking a mortgage for it on Achard's Cunern property, and afterwards released him entirely of this obligation, donating to him the said 50,000 Thaler.

Notwithstanding these subsidies Achard had to incur, in connection with his work, factory and fields, expenses that handicapped him in his efforts to success. From England, Achard received an offer of 200,000 thaler if he would repudiate his process of making sugar, but his noble patriotism made him indignantly refuse the English offer.

Achard wrote a treatis on beet sugar which appeared at Leipsic, and later was translated into French by Copin, Desertine and by Angar, in 1812.

(Translation from the French)

EXCERPT FROM THE HISTOIRE CENTENNALE du SUCRE de BETTERAVE.

C. J. A. MATHIEU de DOMBASTE

Inventor of the Process of Maceration - Diffusion.

b. 1777 - d. 1843.

Until 1832 the industrial extraction of beet sugar was effected exclusively by pressing the juice out of the beet, but in 1820, Matthieu de Dombaste (Facts and Observations) pointed out the defects of this system by presses which only yielded 80% of juice when the beet contained 96 to 97%. Dumas advised to heat the beet slices in water spiked with sulphuric acid before submitting them to pressure.

In 1832 Dombaste published his first pamphlet "Bulletin de Maceration" in which he describes his process called "Maceration" the success of which depends on two conditions: Deduction by heat of the principle of vitality 50°, 60° or better 80° Reamur, and that macerating action should continue for a time sufficient to make it effective.

His battery had six double bottomed vats heated by a serpentine or a specially constructed furnace. The contact in each vat lasted half an hour, then the juice drawn off was poured into the second vat. The beet slices were 6 millimeter thick.

In 1833 Beanjeu describes thie "Maceration" by a continuous process carried on at his factory at Arcé, near Angers.

In his battery of 8 vats the juice passes from one into the other by gravity, the communicating tubes are filled automatically and a serpentine heater supplies direct steam.

(TRANSLATION FROM THE FRENCH) Page 144

EXCERPT FROM THE HISTOIRE CENTENNIAL du SUCRE de BETTERAVE.
1812 - 1912.

Mr. J. B. Dureau, founder of the Journal des Fabricants de Sucre in his earlier years was at the head of a sugar refinery in Nantes, France; was a sugar planter in Louisiana, was also successively manager of sugar factories in Arras, Bourdon. Sarlieve and Roye (France). He is not only a practical sugar manufacturer, but also a brilliant writer on sugar questions.

Being a man of impartial views and of an independent turn of mind, he has only one object in view and that is the advancement of the sugar industry.

If the law of 1884 was finally passed by the French Goverment and improved processes of sugar extraction were introduced in the French factories, and if a complete transformation in sugar beet culture in France took place, all this is mainly due to the vigorous and brilliant campaign initiated and carried on for a period of years by

Mr. J. B. Dureau.

BRUSSELS CONVENTION.

CONCERNING THE PROLONGATION OF THE INTERNATIONAL UNION CONSTITUTED BY THE SUGAR PRODUCERS.

5th of Mar. 1902.

Germany, Austria-Hungary, Belgium, France, Luxembourg, Netherlands, Peru, Russia, Sweden, Switzerland, having decided to continue after 1913 the International Union have come to the following agreement.

ARTICLE I.

The above contracting states agree to prolong for a term of five years beginning 1st. September 1913, the Convention relative to the regulation of sugar of March 5th, 1902, as amended and completed by the Protocol of June 26th, 1906, relative to the adhesion of Switzerland by the additional act to the said Convention of August 28th, 1907, and by the Protocol of December 1907, relative to the adhesion of Russia with reservation to the attribute to Switzerland of the right to vote which the Protocol of June 26, 1906, had not accorded to her and with the reservation also of the provision forming the object of Article 2, following.

The said high contracting parties (nations aforesaid) renounce in consequence the exercise of their option conceded to them by Article 10 of the Convention of March 5th, 1902, regarding the renunciation of this diplomatic act.

ARTICLE II.

The quota of exportation of 200,000 tons accorded to Russia by Article 1. of the Protocol of December 1907, for each of the four years included between September 1st. 1909 and August 31, 1913, is maintained for each annual campaign of the said five years. i.e. between September 1st. 1913 and August 31st., 1918.

Taking into onsideration the fact that in consequence of exceptional circumstances a scarcity of sugar exists in 1911-12, simultaneously with a considerable increase of the price in the world's markets, the contracting governments consent that Russia be benefited by a supplementary quota which will be divided as follows:-

		Tons.
Year 1911 - 12 supplementary	....	150,000
1912 - 13	....	50,000
1913 - 14	....	50,000

ARTICLE III.

The present protocol will be ratified and the ratification deposited at Brussels at the Ministry of foreign affairs as soon as possible and in any case before April 1912.

It will take full effect on this date if it will have been ratified by Germany, Austria-Hungary, Belgium, France, Netherlands and Russia.

The contingency arising, the other States signatory to the present protocol that shall not have ratified it before September 1st. of the same year be part of the International Union.

ARTICLE IV.

In the session which precedes September 1st,1907, the permanent Commission will enact by a unanimous vote the course to be followed by Russia in case she should be disposed to continue her participation in the Convention after September 1st. 1918.

In case the Commission cannot come to an agreement, Russia will be considered to have denounced the Convention to take effect after September 1st. 1918.

ARTICLE V.

Each contracting party will be allowed to withdraw from the Union after September 1st. 1918, by giving notice one year in advance. From that time provisions of Article 10 of the Convention of March 5th, concerning the denunciation and tacit continuance will again become applicable.

IN TESTIMONY WHEREOF, the undersigned plenipotentiaries of the respective States have signed the present protocol.

Done at Brussels March 17, 1912, in a single copy of which a conformable copy will be delivered to each of the signatory governments.

Signed for Germany	....	von Flotow, Mehlhorn, Kempff.
" " Austria	....	Count Clary et Aldringen.
" " Hungary	....	Telesky Janos, Leopold Joas.
" " Belgium	....	Capelle.
" " France	....	A.Klobukowsky; A. Delatour.
" " Luxembourg	....	Count Dausenbury.
" " Netherlands	....	O. D. van der Staal.
" " Peru	....	Telemaco Orchuela.
" " Russia	....	Koudacheff.
" " Sweden	....	F. D. Klercker.
" " Switzerland	....	Jules Borel.

(Translation from the German)

EXCERPT FROM HANDBUCH DER ZUCKERFABRIKATION - RUMPLER.(Published 1906)

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In 1573, Patrician Leonhard Roth built a sugar Refinery;

In 1580. " Konrad Roth " " " " at Augburg.

The first Russian Refinery was built in 1702 in St. Petersburg. Later on one was built at Kaluga, still later, another one was built at Moskau.

Frederick the Great was firmly convinced that the best way to advance national prosperity was to keep the money in the country and to tax all colonial or other merchandise imported from abroad (wages constituted even then about 50% of the manufactured product)

Achard was born April 28, 1753, died 20 April 1821.

Marggraf was born March 3, 1709 and died August 7, 1782.

Marggraf wrote in 1747 for the Berlin Academy of Sciences, of which he was made a member in 1738. A treatise "Experiences Chymiques faites dans le dessein de tirer un veritable sucre de diverses plants qui croissent dans nos contrees"(Chemical experiments made with the object of extracting real sugar from various plants that grow in our country).

Only 128 years afterward (1875) this was translated by Scheibler. 52 years elapsed between Marggraf's discovery and Achard's activity in sugar extraction of the beet.

Marggraf wrote in 1747:

"As sugar is a salt that is soluble in Alcohol, I concluded that this liquid - spirits of wine highly rectified - could be utilized in separating dry sugar that a plant may contain. But in order to see how much sugar was dissolved by absolutely rectified alcohol I put 2 drachms ($\frac{1}{4}$ ounce) of the of the purest whitest and carefully powdered sugar in a glass, mixed it with 4 ounces of purest alcohol and subjected this mixture to a continued digestion until it reached the boiling point; in this way the sugar was thoroughly dissolved. I filtered this solution before it cooled - poured it into a glass receptacle, closed it hermetically with a cork stopper and noticed that after a lapse of eight days the sugar was thrown off the alcohol in beautiful crystals. But it must be borne in mind that only good rectified alcohol must be used and that the glass receptacle as well as the sugar must be in an absolutely dry state and that only absolutely pure and highly rectified alcohol be used, otherwise no crystallization will take place.

"After having carried out this experiment, I took round slices of the white beet, dried them carefully, so that no burning odor adhered to them, then I pulverized them coarsely. This powder I again dried to prevent it from getting moist. After being dried and whilst still in a warm state, I put eight (8) ounces of this powder in a glass receptacle and poured to it sixteen ounces of alcohol rectified to a degree where it would easily ignite gunpowder; this glass receptacle was thus half filled . I closed it lightly with a cork stopper, placed it for digestion purposes in a sand bath which I treated until the alcohol began to boil and from time to time I stirred that portion of the beet powder that settled at the bottom of the vessel. As soon as the alcohol commenced to boil, I took the glass from the fire and the sand bath, poured the mixture quickly into a linnen bag, expressed the liquid contained therein, filtered it whilst still warm and poured the filtered liquid into a flat bottomed glass receptacle, closed it with a cork stopped and placed it in a moderately warm place. The liquid assumed a cloudy appearance and in the course of several weeks a crystalline pure salt was formed consisting of hard crystals which had all the characteristics of sugar. These crystals I again dissolved in alcohol which I fully described in S. IV. This is therefore the fundamental experiment by which sugar content of any plants (that are supposed to contain sugar) can be verified."

(See also Sheibler, Aktenstuecke zur geschichta der Rübenzuckerfabrikation in Deutschland während ihrer ersten Entwickelung. Festschrift zur Feier - Berlin, 1875)

(Also Friedrich Wilhelm III. and Achard see page 18).

Rumpler's Handbuch der Zuckerfabrikation. Excerpts from Archival Records, Prussia.

After having made considerable sacrifices in time and money, Achard was enabled on 11 January 1799, to present to his King, the first sample of beet sugar weighing ten pounds and at the same time he petitioned the King to grant him, for his services to be rendered, the exclusive privilege of manufacturing beet sugar for a period of 10 years and the grant of an area of land sufficient for his purposes. Achard also requested the Ministry should set aside some land 8,264 square morgens (5213 square acres) for the culture of beets under the supervision and guidance of Achard and to make experiments in making sugar with beets harvested.

Achard was promised a royal reward for his important discovery - but the King declined to grant him the exclusive privilege of manufacturing sugar for a period of ten years as this might have brought about the ruin of the then existing sugar refineries. On the 19th of January, 1799, the King ordered the Director-General of Industries to negotiate with Achard and see whether he (Achard) would be in a position to make a proposition for manufacturing sugar on a large scale, convincing the Director-General that the manufacture of sugar on a large scale would be such as to produce all the sugar that the country would need for consumption. In this case the King was ready to place at the disposal of Achard an estate to the value of 100,000 Thalers (one thaler equal in size to our silver dollar and compared to our present gold standard - worth more About 10,000 acres of land could be purchased with 100,000 Thalers) for the purpose of beet culture to be carried on under proper government supervision.

The Director-General is to expedite these negotiations and make a fair and impartial report to the King.

Based on this Royal command, the Director-General appointed a commission consisting of Privy Councillor Gerhardt, von Borgstede, von Schietz, Eschmann and Chief Health Councillor Klaproth, under whose supervision the necessary experiments were to be carried on.

On the 26th of January, Achard bought seeds from a Mr. Sobe of Halberstadt who had planted beets in accordance with Achard's method. At the same time Achard bought beets in Halberstadt but they arrived in a frozen condition in Berlin. Nevertheless, Achard was able on March 28, 1799, to make a favorable report to the Director-General about the sugar manufacture, but he pointed out that the successful manufacturing of it depended entirely upon <u>right method of beet culture.</u> and as he (Achard), wanted to see beet culture extended in the country, he offered to make his experiments known free of charge, and requested that they be officially published so that the results of these experiences should be immediately available; by a Royal decree of April 1st, these experiments were published.

The commission above referred to made a favorable report to the King (23 November 1799), who expressed his pleasure at the thoroughness with which this important matter was handled by the Commission, adding that in view of the great advantages that were to accrue for the State from beet culture and sugar and syrup manufacture, it is advisable to extend beet culture as much as possible.

Achard did not get the exclusive privilege of manufacturing sugar and syrup, as by Royal command, manufacturing was made fred to all.

The King contemplated establishing a small factory of his own in order to be able to appreciate more fully the discovery of Achard and find out for himself what were its practical advantages for the State as a whole. Achard was to get an adequate compensation for his services and a proper increase in his salary.

The projected Royal factory was not built, but during the winter 1799 - 1800, Achard came to Berlin, made more extensive experiments, producing a total of 1600 pounds of raw sugar - and instead of 4 pounds of sugar produced 6 pounds per 100 Berlin pounds of beets.

For the services which Achard had hitherto rendered, the King gave him a reward of 120,000 Thalers, which he used for a payment on account for an estate Upper and Nieder Cunern, District Wohlau, Silesia, where he immediately started to plant beets and to build a factory, and in April 1802, he commenced the first beet campaign, and with it, the first world campaign.

However, Achard soon got into financial difficulties. By reason of fire, but mostly in consequence of costly experiments extending over many years, he drifted deeply into debt. The agricultural department of Cunern demanded considerable outlay; the sugar factory experienced some losses in consequence of frozen and rotten beets, and soon Achard was so heavily involved that he could only be saved by the King coming to his rescue. At Achard's request, the King investigated his financial affairs, assumed the mortgage of 50,000 Thalers on Cunern himself, in his own Royal name, renounced all interest, and ordered that no attachment on Achard's salary be made for floating debts. This was made possible by Achard becoming Academy Director and ipso facto an employee of the State drawing a fixed salary. Thus Achard was relieved of monetary worry and could devote himself energetically to his life object.

But in 1807, a new misfortune befell him. On the 21st of March between 10 and 11 A. M. his factory was totally destroyed by fire. In 1810, the King again came to the rescue and annulled the mortgage of 50,000 Thalers on condition that a plant be erected at Cunern for the instruction of sugar manufacturing. Consequently, the "Sugar Manufacturing Institute" was opened on January 12, 1912; this Institute has been a great factor in the advancement of the Sugar Industry for not only did native students attend but many students came from abroad.

If the King, who in ordinary matters was usually very economical did spend sums of money considered very large for those times, it was due entirely to favorable reports that reached him about Achard's personality and his activity; the authorities of Strehlin (Strehlen) Silesia, confirming this good opinion, when they saw the good results in the sugar factory of Mayor von Koppy at Krain, Strehlen, Silesia, which had been erected in 1805, according to Achard's plans and specifications.

Achard died on the 20th of April 1821, at the age of 69, soon to be forgotten by his contemporaries. Germany, whilst in the throes of Napoleonic wars seemed to have given up the industry called into existence by Achard and to which he had devoted his whole life.

Only ten years later what Achard had sown seemed to bear fruit, and his King, who had done so much for him and for the Sugar Industry had the satisfaction before the end of his reign, to see the sugar industry come back to life again.

(Translation from the French)

EXCERPT FROM THE JOURNAL des FABRICANTS de SUCRE, FEBRUARY 12, 1913

EXTRACTS FROM OLD BOOKS AND DOCUMENTS.

One of our friends who constantly makes investigations in Libraries, has found a copy of the "l'Estafette", which was reproduced in the "National" 30 January, 1840 (he resuscitates Olivier de Serre and makes him live again under the Duke of Orleans). Such as it is, reproduced, we give it here for the edification of our readers.

In one of the large salons, one day, after the royal supper was over, Louis XVI. was standing before a marble table upon which a porcelain sugar bowl was placed; he took two pieces of sugar which he dropped into a cup of boiling coffee and amused himself by watching the tiny yellowish bubbles that rose to the surface, as the sugar melted and made the gases generated escape.

Monsieur de Maurepas approached the King and asked him, how do you like your coffee this evening? Fine, said the King. Does your majesty find some strange taste about it, has the sugar sweetened the coffee properly? What do you mean? Do you know of any better coffee than that served on this table? No, Sire. But your Majesty has put two lumps of sugar into the coffee? How much do you think that these two lumps cost?

The King said: Well, the sugar costs 4 livre 6 sous six deniers at Paris.

I suppose in a pound of sugar there are 80 lumps, similar to those which are in my cup, which makes the price come to a little more than one sou a lump, but as I am King of France, and as such I am likely to pay more than my subjects, my two lumps of sugar used in this cup of Moca will cost me a maximum of 8 sous.

Those two lumps of sugar cost you, your Majesty, nothing; the sugar of which these two lumps are a portion were presented to your Majesty as a token of esteem from one of your subjects - to whom the cost of production was about 24 francs a lump.

You are joking, Monsieur de Maurepas, said the King, why that would be 80 louis (1600 frs.) a pound - if we are eating sugar at that price I would soon have to sell the Castle of Rambouillet so as to get enough sugar for the food of our Baby Dauphin. Please explain —? With pleasure, Sire, said Monsieur de Maurepas - and counting the lumps contained in the sugar bowl found that there were 43 — if you add the 2 lumps consumed in your cup of coffee, there will be 45 lumps which will bring the value up to 1080 francs. Please look at this sugar; how sparkling! how light! What exquisite taste! How sweet! How it melts in the mouth!

Very well, said the King, who respecting the gray hair of M. de Maurepas did not wish to get mad at him - , I admit that this sugar is sweet - what do you think should it be bitter like aloes powder?

Your Majesty would never guess how this sugar was made.

Well, said the King, this sugar was made from Cane; — but, M. de Maurepas, let us speak of something else - Parlement, for instance.

Sire —— this is Beet Sugar,

Beet sugar!.

What does a beet look like?

Sire, remarked a little Duchess who had listened to the converaation, beets are roots, which my servants slice, and mixed with vinegar eat as a salad.

The King laughed.

Sire, said M. de Maurepas, the beet is a root, grown in France, and sugar is made out of it.

The attention of all present was attracted to the lively discussion going on between the King and M. de Maurepas. They had seen the Minister pour out the sugar and carefully examine it, whereupon a courtier, hastily told the Queen that the King had been poisoned.

Marie Antoinette rose hurriedly from the card table and went to see the King.

Sire! Sire!

The captain of the guard came and whispered to the King that all doors were locked and the guilty party has already been arrested.

They are bringing him in, - 8 to 10 guards brought before the King a man dressed in a suit of brown cloth, his coarse leather shoes were ornemented with silver buckles; his plain dress and his face showing signs of fright contrasted strongly with the surroundings of gold embroidery and diamonds that sparkled everywhere.

M. de Maurepas told the guard to leave the man alone, andpresented him to the King. Sire, this is the man who filled your sugar bowl this evening. He is the man who makes sugar out of vegetables.

The King entered into conversation with the man. The Queen asked M. de Maurepas what it was all about. What kind of sugar is this? Madame, said the Minister, a learned man by the name of Olivier de Serres - who experimented with retorts and stills until one day after trying to make wine out of the red beet, he found at the bottom of one of his condensers, some sugar.

At that time Madam, we were rich; we owned the shores of the Mississippi;

we got sugar from abroad and we did not trouble ourselves about making sugar and Olivier de Serres died after making a memorandum about his discovery.

A Prussian chemist, Achard, always on the lookout for new things, got wind of the discovery and according to the indications given by M. de Serres made sugar from the Beet, and today, the man whom you see talking to the King has made new experiments and you see the sugar he has produced.

Marie, took a lump of the sugar and ate it. The ladies-in-waiting each took a lump and in a twinkling all the beet sugar was gone.

Monsieur de Maurepas called out: Take care, gentlemen and ladies, each lump costs 24 francs. It is ruinous luxury to eat such sugar. True, your Majesty, said the Minister, this sample is dear, but if you give the inventor enough money to enable him to make sugar by the ton, he could furnish it at ten sous (about 10 cents) a pound.

The King asked the manufacturer to accept in token of his Royal appreciation, a gold snuff box, - our coffee was well sweetened by your Beet Sugar - but the 2 million francs you ask to establish your factory is too much money - for the State is too deep in debt already. Sire, said the manufacturer, sooner or later, the Beet Sugar will come into its own.

E X C E R P T S.

(From von Lippman).

The only four names at that time recorded that came into public notice were: Vilmorin 1775 (Made the beet sugar known)

Abbe Rozier, 1782(introduced methodical culture)

Commercelle, 1784(experimented)

Delessert, 1801(experimented and established a factory)

but we are not certain. however, which one of these knew Maurepas, Minister to Louis XVI.

Page 336 Frederick the Great made efforts to promote the sugar industry in Prussia.

" " In Vienna and Klosterneuburg sugar refineries were built under Joseph II.

" 389 In 1?60 Madame the Seveigne advised her daughter to use sugar in her coffee.

" 403 Olivier de Serres (A. D. 1600) says "The beet has come lately from Italy, is large, red, has many leaves and has a pleasant taste; - it requires a soil well plowed, so that its root can reach deep down in the soil, the root has a tender meat and yields a juice that tastes like sugar syrup. It is beautiful in appearance.

Page 404 The beet root, originally called beets of Burgundy, was brought by emigrants into Saxony, Silesia, the Pfalz, and the rest of Germany.

" " The sweetness of the beet juice induced Marggraf (1709) (1782) to experiment with it and not only the "red mangold" but also in the "white mangold" did he find sugar and produced in a solid state.

" 404 Riem of Dresden (in 1775) prepared a beet syrup which he used for feeding bees; and soon after, Achard (1786), solved the question of making sugar from beets which he himself planted in Caullsdorf, near Berlin.

Vilmorin made (in 1775) the sugar beet known in France. but Abbe Rozier, was the first who cultivated the sugar beet regularly for food purposes, but Achard in 1798, was the first who made the first raw sugar out of the beet and sold it to the Havelberger Sugar Refinery Co. of Berlin, who made Kandies, powdered sugar and syrup.

Page 405 Later, the Silesian Mountain Refinery of Hirschberg got about 1600 pounds of raw sugar from Achard which they refined.

In 1800, the Hisrchberg Refinery presented to Frederick William III. a loaf of excellently refined beet sugar which so pleased him that he bestowed the great Art & Industry gold medal on the Hirschberg firm.

Lampadius following in the footsteps of Achard made, in 1799, out of 100 pounds of beets 4 pounds of white sugar in the shape of loaves eight inches high, which he presented to the Elector Prince of Saxony - and later Lampadius - extracted from 100 centners of beets 200 pounds of raw sugar which he refined into 180 pounds of white crystallized sugar.

The first real beet sugar factory was built by Achard in Cunern Silesia. The King financed him and started operations in 1802; the King likewise interested himself in the factories of Hermstadt and Freyer, Borgstede, von Grothe, von Karmer and von Koppy, and these enjoyed the royal patronage in every way.

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A commission composed of eminent chemists was appointed in France and investigated Achard's data about planting of beets and sugar extraction, and as a result, two factories were erected in Chelles and St. Ouen which, however, were not coming up to expectations because of lack of technical knowledge in the matter of treating the juice, and only in 1808, Delessert (who had established a factory in 1801) applied himself diligently to beet sugar making and by following the method of Bommatin (who had received the Government prize for extracting sugar from the beet) and using extensively charcoal for clarifying purposes, he at last met with success, (Bommatin adopted the method of clarifying the juice by liming and to neutralize the excess by sulfurous acid).—

" "

Chaptal made a report to Napoleon who in 1812 paid that historic visit to the Passy factory which had such an important bearing on the future of the French beet sugar industry; during that visit Napoleon pleased with Delessert's success commissioned him to build ten new factories. See "Eloge Historique de Benj. Delessert" Flourens Memoires de l'Academie 1850 - 119, 145.

England made it a point to prevent the establishment of Beet Sugar , as beet sugar was to be taxed as heavily as Indian sugar.

But also in other countries the beet sugar industry had to struggle against opposition as even the great Liebig did not attach any importance to it,and the struggle for existence continued against colonial and fiscal interests, and as late as 1842, the French government asked the Chamber of Deputies for a credit of 50 million francs with which to buy in the 389 existing factories with a view of stopping the manufacture of beet sugar, and in 1850, Schulze proposed the buying in of the 213 German factories by the German government, for which purpose a credit of 10 million Thalers (dollars) was asked to indemnify factory owners and the workmen engaged therein.

PLINY 400. The Romans consumed beets boiled, preserved and baked, Aquila-Verona and Norikinn beets were favorites.

Page 401. Dioskorides declares the white beet to be good for digestion and the raw and the boiled juice as being used for medicinal purposes. (Mat. Med. II. 149)

Arab doctors used to prescribe beet juice.

Charles the Great ordered beets to be planted on his estates.

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The word Sakchari which is the equivalent to the Sanskrit Carkara means sugar in grains found on and in reeds. cane and rushes.

Page 81 Plinius the elder mentions (XII. 17) Sakcharon comes from Arabia but the Indian Sakcharon is preferable which is honey hardened of the size of filberts, gathered from cane, is white, like gum. and easily breaks when taken between the teeth.

Seneca 1 - 65 A. D. in his 84 letters says we are creditably informed that in India there grows a reed rush which exudes a kind of curdled honey, which is formed either by the dew of heaven or by the thickened sweet juice of the cane.

Page 402. Gil Vincente a Portuguese poet saings (in 1500 A. D)

Oh, if he only his head were rich in brains
As in Sugar is the top of a Beet!

Page 287 1588 Tabernamontanus of Berzzabern composed New Plant book.

1498 - 1554 his teacher Hieronymus Bock 2500 Illustrations, 5800 plants describing sugar contents of plants.

" 355 Duhamiel de Monceau 1764 l'art de raffiner le Sucre

Page 201. Megasthenes Nearchos and Onesekritos, generals of Alexander the Great 327 B. C. reported that in India there grew reeds producing without the aid of bees, a honey like substance. In many languages about the

the same:

Sokksr,	Zocra,
Zucker,	Zucara
Chuchra	Ssachar
Sycara	Cukier
Sacarium	Cukorus
Sucrum	Czukor
Zachara	Schiker
	Schakara
	Schaker
	Scheker
	Schukar.

With Arabs, Egyptians, the cradle of sugar making: Persians

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#125 Herodrotus mentions the beet as the plant given to workers on the pyramids as being found fit to keep up the energy of hard work. (Coupling this information with the reports of recent experiments made with soldiers rations in Federal and German armies)

Hannibal in 218 B. C. gave up the siege of Casilium because the inhabitants kept large fields planted with edible sweet beets supplying them with ample food. See Hannibal "Alpen übergang" by J. Fuchs.

Hannibal, Carthaginian general and statesman, son of Hamilicar Baria born 249 B. C.

North Africa. Carthage was founded in 822 B. C. by the Phoenicians and destroyed by the Romans.

(Translation from French)

R U S S I A.

SOURCES OF INFORMATION:

Mr. E. Saillard, Professor at the National School of Agriculture, President of the Commission of Inquiry on Sugar Beet Culture in Russia. August - September 1911.

Josef Natanson, Warsaw, Russia.

Ministry of Agriculture, Russia.

Mr. Frankfourth, Director of Agricultural Research; Government of Russia.

Shoultz, Moreau, and Fudakowsky, Beet Experts, Russia.

The sugar beet farms of Russia, especially those in the southwest and Trans-Dnieper districts, have, many of them, an acreage of (600), (1000), (5,000), (12,000), (25,000), and even (120,000) hectares - (a farm of 120,000 hectares means a 35 kilometer diameter of a Circle)

Please bear in mind:

1 verst equals	....	1,067 metres
1 Sagene "	....	2 metres 13
1 Deciatine	....	1,09 Hectares
1 Poud "	....	36.113 Pds.
1 Berkowetz	....	10 Pouds.
1 Rouble,	....	51 cents.
1 Copec	..........................about	1/2 cent.

When we speak of Russia proper, let us remember that Russian Poland belongs to it - having been partitioned in 1773 - 1793 and 1795, between Prussia, Russia and Austria.

When the Tsar publishes a Ukas he does so as Emperor and Autocrat of Russia, Tsar of Moscow, Kiew, Vladimir and of Poland. The Polish manufacturers are members of the Central Association of Russian Sugar Manufacturers who in 1908 - 9, produced 1,200,000 tons; and in 1910 - 11, 2,100,000 tons, having surpassed the most sanguine expectation.

GEOGRAPHICAL ZONE:

The Russian sugar beet zone lies between 54 to 48 degrees of latitude and 19 and 38 degrees of longitude; from west to east it extends for about 2,200 kilometres.

Kiew is, so to speak, the center of the Russian sugar industry. Kiew lies in the same degree of latitude as Brussels and Amsterdam. An annual congress is held there in about February or March, when contracts for the ensuing year are made, not only for the supply of beets by the farmers but also for coal, limestone, coke, installation of new machinery, building construction, etc.

The sugar beet region is divided into four districts:

1)	Kingdom of Poland,	49	Factories,
2)	Southwest of Russia (Dnieper),	144	"
3)	Trans Dnieper District,	67	"
4)	Central Russia.	16	"
	Total in 1910	276	"

The two ports that are mainly utilized by the Russian Sugar Industry are the port of Libau on the Baltic, and Odessa on the Black Sea.

The two following comparative tables will show the importance of the Russian Sugar Industry.

1908-1909

	Area Sown.	No. of Factories	Raw Sugar Tons.	Bags pr. Factory	Av. Kg. per Hec. Beets. Harvest	Raw Sugar Extracted per 100 Kg. Beets.	Raw Sugar Extracted Kilograms per Hec.
France	214,780	251	775,100	31.000	28,181	12.84	3,611
Germany	434,886	358	2,080,000	58,000	29,670	15.49	4,577
Austria-Hungary	330,230	204	1,390,000	68,000	24,206	15.02	3,638
Belgium	57,250	81	257,000	37,000	30,340	13.97	4,228
Holland	48,450	27	211,500	78,000	26,499	14.47	3,830
Russia	556,200	277	1,262,250	45,000	14,465	14.00	2,025

COMPARISON: 1901-2	No. of Factories.	Area Cultivated. Hectares.	Beets in Million Kgs.	Beets Kgs. pr. Hectare	PRODUCTION. Raw.	SUGAR. per 100 Kg.	per Hec. Kg.
1901-2	274	545,150	6,406	11,750	893,500	13.95	1,639
1910-11	276	667,400	13,083	19,600	2,108,760	16.11	3,159

Beets are grown by three classes of people:

By the factories themselves, by landowners, and by peasants.

	Poland. in Hectares %	Southwest Russia. in Hectares %	Trans Dnieper in Hectares %	Central Russia. in Hectares %
Sugar Factories	3.1	25.4	52.8	57.7
Landowners	61.1	51.9	31.3	28.7
Peasants	35.8	22.7	15.9	13.6
	100	100	100	100

N O T E.

(Out of
(130,000,000
(Russian inhabitants,
(100,000,000
(make a living
(in agricultural
(pursuits.

In 1906, the Russian Government made:

1) A grant of land of 4,000,000 hectares.

2) Crown lands.

3) Lands of the Russian Emperor. These lands are granted to an agricultural bank which sells and leases it to peasants at a very low figure, to be paid in annual installments. A local commission fixes the price and the number of years for life of mortgage on land granted to communities, and, by request, an individual peasant can get title so that he can leave it to his heirs.

On large estates, the wages paid are:

To men, 50 copecs, (about 25 cents)

" women 30 "

They bring their lunches with them.

Value of land for sugar beet culture $200, to $250.00; 1000 to 1250 francs per ~~acre~~ hectare; Rental .... $9. to $10.00 per ~~acre~~ hectare, per annum.

COST PRICE OF 100 KGS. OF SUGAR.

1906 - 7. (Average of 51 Factories.)	1.	Cost of Beets	17.29	
	2.	Cost of Manufacturing same	6.25	
	3.	General Expenses	4.86	
	4	Commercial Expenses	0.48	
				Francs.28.88
1909-10	1.	Including cost of transportation ,		
	2.	Wages, Salaries, Lighting, Bags, Lime, packing, etc.		
	3.	Administration, Schools, Hospital, Buildings, Machinery, Insurance.		
	4.	Sending Sugar to Railroad, Insurance, Brokerage		" 24.54
1910-11		ditto, ditto, Cost of Production		22 Fr. 30 (about 2¢ a pound)

100 Kg.	Average price paid for pulp in Russia	4 fr. 50
	" " " " Molasses "	3 " 50

In addition to paying them the market price for the beets, each farmer gets free of charge, 450 Kg. of pulp for every ton of beets delivered, also, he gets free of charge, 8 to 10 Kgs. Molasses.

LEGISLATION BY RUSSIA RELATING TO HER DOMESTIC SUGAR.

The Russian government does not give an export bounty, but the Industry is put under a regime of rules which permit it to enjoy the advantages equivalent to bounties. Each year, the Minister of Finance determines (fixes) the quantity of sugar to be supplied to the domestic markets, or after paying an excise duty of 1.75 rouble, about 80 cents per poud — this is what is called the "Interior Contingent".

The limit of prices is also fixed by the Minister of Finance.

There are two rates: One from 1st.September to 31st December, the second a little higher for the period of 1st. January to 31 August. - These prices have a double purpose: to insure the manufacturer regular and renumerative prices - and the protection to the consumer.

If the market prices exceed during a certain time those fixed by the Minister of Finance, he in that case liberates part of the stock held by factories and brokers.

To make these prices independent from foreign markets an almost prohibitive import duty is put on the sugar.--- 4.50 roubles per poud of sand sugar
and 6 " " " " refined.

The Government practically rules the prices.

In 1909 successively setting free certain stocks did not suffice to bring back the prices to their normal level and import duties had to be lowered in order to facilitate the import.

The Government"Normirofka" is a sort of ideal Government Trust guarantee", and to the manufacturer all the advantages of a private organization, stable high prices, suppression of outsiders, etc. is given. The consumer cannot say that the factories are exploiting them.

The dividends paid by Russian factories prove how advantageous this Government "Normirofka" is.

1) Interior Contingent,

2) Exportation " Convention Brussels

3) " " to Persia.

Each individual factory has a right to contribute its quota to any of these three contingents.

If a factory is not favorably located for export purposes then she can exchange her export quota for equivalent Interior Trade quota.

The foregoing are the principal outlines of the basis for the Russian Sugar Industry.

EXCERPT FROM THE GERMAN BEET SUGAR INDUSTRY, BERLIN, OCT.20,1911. p.789

The American beet sugar industry in its infancy, had to undergo the same trials as did the German beet sugar industry. However, since the year 1896, the American industry has grown in importance. Fifty years after the German industry had taken a firm foothold, the American industry became a great factor in the Agricultural as well as the economic world, and due credit must be given to it. It is fostered under peculiar conditions. It is built up by leaning on protective duties in which the Government aids it, just as the German industry, but the American industry has had to carry on the struggle under widely different conditions. It does not forge ahead like the European Beet Sugar Industry in striving to become equal to the Cane Sugar Industry, but is destined, as far as can be seen, to make the American consumer independent of foreign countries.

The beet sugar industry will be developed and will be based upon the political and commercial relations between the United States and Cuba, which are constantly becoming closer. Whatever Hawaii, Porto Rico, the Philippines and the cane growing states of the Union do not produce for consumption, the Beet Sugar Industry can fully supply.

Whereas, at present, the beet sugar industry supplies one-eighth of the total consumption and the per capita consumption is about eighty pounds, the normal development of the beet sugar industry in the United States cannot attain the position which the German Industry holds in the economic life of the nation. Although the Beet Sugar Industry of the United States is consigned to a second place, it does not mean that it is not to be regarded as an important branch of American rural economy. Many are clamoring for a reduction in sugar duties. Should this take place, European competition would appear in the field, the Refiners'

Sugar Trust would get cheap cane sugar and the American Beet Sugar Industry would become the victim of the Trust's allied interests. They would try to counteract all efforts for the maintenance of the beet sugar industry and would not make any attempt to fight competition from abroad which the beet sugar industry would certainly do if they were as strong as the Trust.

-----OoO------

EXCERPT FROM WOCHENSCHRIFT DES ZENTRAL VEREINS. p. 364
MAY 15, 1912.

Two kinds of molasses fodder have lately appeared on the market. Both are protected by patents and are manufactured in Holland.

Meinheer Berthels mixes in certain proportions hay, oats, beans, linseed and molasses, which mixture is heated to 110 degress C. for a certain period, and is during the heating process mixed with linseed oil. This mixture will make up a fodder that will keep indefinitely. The linseed oil used counteracts any tendency to hygroscopicity.

Meinheer Bloch produces a fodder that is specially suitable for calves; it consists of ....

45%	sesam oil
30%	water
14%	sugar
4%	albumen
2%	sodiumphosphate
2%	calciumphosphate

One per cent of Tragant is added to this mixture and is heated with the sugar in a solution of sugar satiated at first before the totality of the 30% water is added; the oil is first thoroughly mixed with these ingredients before water is added during the heating process. In cooling this mixture will become consistent and is an excellent calves' fodder.

------oOo-----

(Translation from the German) By Vice-President Dr. Emanuel Ritter v. Proskowetz.

EXCERPT FROM DIE OESTERREICHISCH-UNGARISHE ZEITSCHRIFT DER ZUCKERINDUSTRIE UND LANDWIRTSCHAFT.

Annual Meeting of the Central Association of the Sugar Industry, May 23, 1910. (ABAZZIA)

In the year 1891, I received from the Botanical Garden of Trieste, a Beta Maritima and a Beta vulgaris, and in 1893 I received from Dr. v. Marchesetti, Director of the Municipal Museum, seed of the wild Beta; he had made a journey to Istria in order to explore the seashore where he had been told the plant could be found growing.

In the neighborhood of Rovigno on the Island S. Andrea he found the wild beet and from this he gathered some seed which, as above mentioned, he was kind enough to send me and with which I started my experiments.

The principle that guided me was this: I left some seeds to themselves to grow wild, with others, I made an effort to domesticate, to tame, as it were, and by numerous isolated experiments. weighing, measuring, analysing, etc., bring the specimens to a high degree of culture. I likewise went to Abazzia (near Fiume) every Spring, Summer and Fall for several weeks at a time, having the good fortune while there, to get an insight daily, into the life of the wild Beta plants growing there so spontaneously.

I could, therefore, study thoroughly the same plants in the same locality growing in different classes of soil, in different years during different seasons, and at different stages of their development.

I kept a careful record from 1894 to 1910 of my continued studies and uniform manner of observation of the wild Beta plant growing spontaneously in its natural soil and, by so doing, and comparing the results of my observations, was enabled to make such experiments as would domesticate and improve it.

I found that our present sugar beet and the wild Beta plant on the seashore were of one and the same family. I would like to call your attention to the wonderful variegated formation of the foliage, to the root formation, the Epi and Hypo-Kosylus, the gradual assumption of a reddish hue, the downy covering of portions of the skin, the felt-like development of the leaves, the continuous flowering and running into seed, which is a characteristic feature of the Chenopodiaceous plant. If I supply you with data regarding the plant as I found it at Abazzia and vicinity, it will only be to refer you to the past, when the constructive activity had not yet progressed nor the spontaneous flora highly developed, and I will limit myself in giving you only a few details characteristic of this plant.

On the seashore, in the clefts of rocks, on the roadside near the sea, between masses of loose stone detached and carried down from the rocks and between the gaps of weatherbeaten limestone, I found specimens that had all the expected characteristics of the accepted type of the Beta Maritima, some growing isolated from other plants, others growing in bunches as if wedged in clefts of rocks, some peeping out from deep crevices sharing their narrow abode with the Artiplex and other plants, and frequently with appropriate family dignity associating intimately with other Chenopodiaceous plants; but in spite of their proximity to the sea, a healthful resort, I found some of them gnawed by insects over-run with leaf parasites and parasitic mushrooms preying on them. However, I never found Nematodes on any of them.

I arrived about the middle of September 1903, on the southern part of the coast near Lovrana and found almost at the edge of the cliff (26 feet above sea level), a whole colony of small dwarfish, interlaced and ramified specimens creeping over the surface of the rocks, appearing to the eye like a green lace curtain in the shape of a lawn, and now in 1910, I found on a slope near the villa Klein, at Lovrana, a whole colony of the spontaneous Beta Maritima in different stages of development - some just peeping out from the ground, some further advanced, with 5 to 6 tuft-shaped leaves, some leaves of a dark green and some of a reddish hue.

I found one specimen 30 Cm. high (1 foot) with big strong peculiarly ear-shaped curley-edged leaves; right near it, another splendid erect specimen, with strong-ribbed leaves of reddish hue towering 1-1/2 meter - 4-1/2' above its dwarflike fellow plants; this reddish hue of leaves may be ascribed not to intensive light but rather to the lack of nitrogenous nutrition. Again, not far from this about a dozen stunted specimens with drooping stems and leaves, showing an effort towards developing blooms.

In fact, the most wonderful variety of beet plants within the small area of 5.m^2 (15 ft. sq.) so varied in appearance, color, size and shape, that my fellow students who accompanied me on these exploring expeditions would not believe that they belonged to one and the same family.

I found very close to the sea amidst pebbles and disintegrated limestone from time to time lapped by briny laden waves at the entrance of a small bay, some luxurious. richly foliaged specimens with stems shooting proudly up into space as high as thirty inches, and not far from this splendid specimen a colony of variegated specimens barely vegetating in company with miniature thistles and an endless variety of plantlets studding the ground like millions of inverted commas; and side by side, I found on the 12th of September, a young plant along with blooms and seed ripening in various stages, but every one's physiognomy sharply outlined so as to be easily recognized (especially by the leaves) as belonging to the Bata Maritima.

On the 10th of May, 1910, I found, in presence of one of my colleagues, at Lussin piccolo, on a declivity sloping towards the sea, growing out of a heap of rubbish, a fine specimen, tapering into strong and rigid roots; I presented this specimen to our esteemed guest Prof. Dr. Herzfeld.

Close to the sea near Volosca, in red earth mixed with dead seaweed and down sand brought over by flat freight boats, I found on an agglomerated rubbish heap, sturdy specimens growing in company with other cosmopolitan plants, - as the Beta seems to be - a sociable plant.

As I came to Abbazzia with the preconceived notion to find there well defined types of Beta vulgaris Maritima Koch and Beta Maritima, I was soon undeceived, as I found that there was only one species and that all varieties were only the varied expression of climatic, biological and topographical conditions.

As a genuine Halophyte (saltophyte) we can now affirm that the Beta can draw its nutritive needs and water supply from concentrated salt solutions.

Marchesetti has established the fact that Halophytes are to be found growing where the soil contains 0.027% salt, but where the salt percentage is nil, far away from the sea, they will only vegetate; nearer the sea where the salt percentage of the soil reaches 0.052 to 2.066 is the home of the so-called "herbaceous Halophytes".

Theophraste speaks of a Teutlion (beet) that had elongated thick straight sweet tasting meat. The old Greeks called the beet Teutlion in contradistinction with the "Agrion" the wild beet, the Melan black or dark red beet an Leukon the white beet.

Mangold = Greek rapus,
Latin rapa,
Slav Repa,
French rave,
Beet - Betterave . Russian Sveklo, Beet Albanian, Spokle;

the leaves were used like cabbage leaves, later the roots were cooked as a "dish for slaves".

The Egyptians must have known the strengthgiving qualities of the beet (Tsenoanchasar) with which they abundantly fed the pyramid builders (slaves engaged in building the pyramids).

We could branch off into an interminable philological and historical discussion, but we wish only briefly to state that the beet came from the South, was brought by the Romans to Gallia Cisalpina (Burgundy) for culinary purposes; thence to the Pfalz and Schwabia (Wurttemberg, etc.), and finally to Silesia.

The Cradle of our present beet-root or Sugar Beet. Olivier de Serres already in the year 1600 in his celebrated "Theâtre d'agriculture" speaks of the large, red, many-leaved, beet, with a pleasant taste, the juice of which is of a beautiful red that charms the eye.

(Translation from the French)

EXCERPT FROM LE SUCRE de BETTERAVE en FRANCE, 1800 - 1900, BY JULES HELOT, p. 187.

THE USE OF SUGAR IN HUMAN AND ANIMAL FOOD.

---oOo---

Sugar, a hydro-carbon food is one of the best force producers in the human system. It repairs muscle-waste and is a valuable substitute for alcohol, which at best, is only a passing excitant and injurious in its effect to the well being of the body. The fact has been established that abstainers from alcoholic liquids are very fond of sugar.

Experiments were made by an English physiologist, Mr. Waughan Huxley, on individuals to whom a quantity of food, with and without sugar, was alternately given with the result that the working capacity of those who used sugar mixed with their food. increased from 8% to 40%, and in eating nothing but sugar individuals can perform an amount of work equal to that done by persons using ordinary food. If one pound of sugar is consumed by an individual in the course of a working day, 61 to 71% more work can be done.

If 50 grammes (1.76/100 ounces) of sugar were consumed by a workman in the course of an afternoon, it would do away with the predisposition to occasion fatigue which otherwise would ensue at about 5 P. M.

As far back as 1898, experiments were made by the German Army by giving soldiers sugar rations. Ten men from among the weakest of the Company were chosen, and ten others selected at random so as to make a comparative test. At the start, the first batch received 7 lumps of sugar, but gradually the number of lumps were increased to 10 and 12. During army manouevres. it was noticed that the weight of these men increased, whereas, the weight of those chosen at random remained stationary; the physical condition and the appearance of their faces showed a marked improvement; on the march, soldiers quenched their thirst by sucking lumps of sugar.

During the period when they are handling the sugar cane in the West Indies, the negroes consume a great deal of sugar at a time when they are doing the hardest work.

These experiments bear out all the physiological theories advanced on this subject.

The liver, by means of glucogene elaborates sugar; glucose is a substance which is formed in the cells by means of amylaceous elements and of albumenoid substances resulting from digestion of food.

When in the blood of a tired or fasting animal no sugar is found and there is no trace of glucogene in its liver, it proves that glucose furnishes the muscular machinery with its material for combustion.

We therefore can make this deduction: That in sugar mixed with food, the liver gets a substance that has merely to undergo a very simple chemical transformation in order to become the "glucose-carbon" of muscular combustion.

We may therefore maintain without fear of contradiction, that in sugar a valuable substitute for alcohol has been found. With this difference, however: That whereas alcohol has a corrosive action on the stomach bringing about fatty degeneracy of the liver and cerebral atrophy, sugar supplies food to the system and invigorates the muscles.

By gradually increasing the quantity of sugar in the rations of a soldier he will get in the habit of absorbing it in place of alcohol after he leaves the army and returns to his home.

For several years past, fodder given to animals has been mixed with sugar with satisfactory results; molasses sugar is mixed with water, oil cakes, malted barley, and even with substances of no nutritive value, such as peat. Excellent results were achieved; animals fattened in this way showed remarkable increase in weight. For this reason, there ought be a considerable use for sugar in this direction.

For the purpose of advancing the interests of French Agriculture our legislators ought to protect our agricultural population by inducing them to remain on the farms and prevent their exodus to the city to a certain extent, by framing laws which will benefit beet sugar growers and those dependent on them, thus enabling our rural population to make a living from the soil so that they will continue to cherish their homesteads and will not be lured by promises for happiness to be found in the cities, but by remaining on their farms help to safeguard the prosperity of France — our dear Fatherland.

LISTE GENERALE DES FABRIQUES de SUCRE, CAMPAIGN 1911-12.

Raw sugar is treated on the basis established by the Sugar Association of London, an association comprising sellers and buyers of sugar, the headquarters of which are (7 - 8 Idol Lane, London E. C.).

We make an extract from their Rules and Rgeulations.

SUGAR 1st. PRODUCT: Sugar will be packed in bags made of good material weighing not less than 800 grammes (about 28 ounces) and not more than 35 ounces when empty. Weight of sugar will be delivered such as it is at the point of unloading with a margin of 2 pounds per bag - the bags will be weighed in lots of not less than 5 at one time.

The net analysis will be obtained in deducting from crystallizable sugar 5 times the weight of the ashes and three times the weight of non-crystallizable if this does not exceed 0.25% or 5 times the weight if this exceeds 0.25% for the first product (for the after products the coefficient is 3 if the non-crystallizable sugar does not exceed 0.50% and will be 5 if that exceeds 0.50). If the analysis of the sugar differs from that of the seller by less than 1/2 degree for the First Product or less than one degree for the after product, the average of the two ~~analyses~~/is taken as a basis. But if the Secretary or the Association finds a greater difference, the analysis of one of the sealed-samples is made on the spot by the chemist of the Association - at the port of destination, or if absent, by the chemist of the London Association and the average of the two results that come nearest each other, is taken as a basis.

If the analysis of the vendor and the buyer of the Association showthe same difference, the average of the 3 analyses or the foreign analysis exceeds the maximum limit of analysis called for by the contract, the first shall be considered equal to the last so as to determine prices.

Payment will take place in London in exchange for all documents duly signed, bill of lading, insurance policy, carrying freight and insurance-vessel lost or not. Payment to be the amount of invoice less 2%, the balance is paid as soon as the weighing and analysis have been made after unloading a shipment.

The sugar must not titrate less than 86° net, foreign analysis, except in the case as mentioned below; nothing will be paid for degrees above 92°. The sugar which proves to be titrating at the first analysis 86° or more, may be offered again as a delivery even if the new analysis does not reach 86°, but not less than 84 degrees, in which case the degrees below 86 are deducted at the rate of 3 pence per degree, if the foreign analysis is not of recent date, but only a half penny is deducted per degree if a comparative analysis is effected with the buyers. The sugar is kept in readiness at the port of shipment (____ month) in equal quantities (number of bags)

The regulations, usages, statutes mentioned above are considered to be integrally as part of the present contract as if they were integrally embodied therein.

The directors of the Sugar Association of London are the arbitrators upon whom devolves the duty to settle all controversies. Beet sugar after products basis 75%: For these the net analysis is made by deducting from crystallizable sugar 5 times the weight of ashes and 3 times the weight on non-crystallizable if the proportion of this latter does not exceed 0.50. If it is above 0.50 the coefficient is brought to 5. If the analysis of the sugar buyer made with the first sealed sample differs from that of the seller by less than one degree, the average of the two analyses is taken as a basis.

In case the difference is greater than one degree the same rule holds good as with sugar of the I. Product. Sugar (after Products) are treated on the basis of 75% f. o. b. or c. i. f. Each degree or fraction of degree above and below 75% net analysis is credited to the vendor or deducted at the rate of 1-1/2 penny per degree. The degrees below 70 are deducted at the rate of 4½ pence per degree. The contracts are also subject to all the rules and regulations as stipulated by the Sugar Association of London.

Refined Sugar, all kinds of refined sugar received from anywhere are treated in harmony with the usages established by the Refined Sugar Association, the members of which are London buyers and sellers of foreign refined sugar. (See Rules and Contract conditions of the Refined Sugar Association Chesterfield House 98 Great Tower Street, E. C.

PRICE OF RAW BEET SUGAR.

RATHKE'S Adressbuch der Zuckerindustrie. Page 217 - 1911-1912.

Paragraph 3. Prices are understood to be in marks for 50 kg. net, F.O.B. Hamburg, including bags, basis 88% Rendement, each degree or part of degree over or under 88 is to be calculated at the rate of 12 1/2 pfennig for the degree.

Paragraph 4. The rendement is ascertained by deducting from the Polarization the con-

I tainment of ashes 5 times and any eventual non crystallisable sugar 3 times, if the weight thereof does not exceed 0.25 and five times if it exceeds this up to 0.50

II The rendement ought to be between 92 to 96° and should be accompanied by a certificate signed by an official German Chemist or an official Chemist of the country of origin, said certificate to be furnished by the vendor; if the sugar is over 92° further degrees over 92 are not taken into consideration and for the fixing of prices 92° is the equivalent standard.

Sugar that only tritrates 86 to 84° and that ultimately proved to have had originally a Rendement of at least 86° the calculation of degrees between 86 and 84 will be fixed at 25 pfennig per degree.

In the case of deliveries of sugar that tstrate under 84 degrees, as well as that having an invert containment - the Exchange Arbitration Court will determine the price.

III The certificates of analysis must show that the sugar has been tested relatively to non crystallizable sugar and water. Invert sugar under 0.05 is to be indicated in the certificate as if non existing and to be noted by a sign thus: 0.0.

Paragraph 5. The certificates of analysis must be of recent date - not older than eight months - dated from the first day of being used along with 1st bona fide delivery.

Samples which form the basis of certificates of analysis must not be older than three months, from the day they were sampled from the bulk of sugar contemplated for delivery.

(Translation from the German)

EXCERPT FROM DR. RÜMPLER'S HANDBUCH DER ZUCKERFABRIKATION.

pages 401-402.

RAW SUGAR.

(Rendement)

Sugar coming from the Centrifugal Apparatus is hoisted to a more elevated portion of the building (sugar room) where it is prepared for sale.

Let us imagine this sugar to be composed of pure sugar and molasses (100 per cent pure) for in the Refinery this sugar is divided into "Sugar" and Molasses - the more syrup this sugar containes the more molasses it will yield on being refined.

Although molasses possesses a fixed relatively high marketable value it is not taken into account nor is it paid for as long as it is mixed with sugar. We know that the beet molasses contains on an average, five times as much sugar as it does molasses.

Theoretically, the trading people will only pay for chemically pure sugar and they therefore deduct from the sugar content of raw sugar five times the amount of ashes contained which corresponds to the quantity of sugar contained in the shape of molasses.

Formerly, when the export bounty was refunded by Excise authorities twice or three times as high as the price of molasses, traders found it advantageous to leave as much as possible of the molasses in the sugar, today, if any molasses is left in the sugar, it is practically donated to the refineries.

Sugar obtained from the original massecuite is called 1st. product; sugar obtained from the syrup is called after-product and so on, 2nd and 3rd product.

As mentioned before, the refinery as well as the middle-man when they buy raw sugar pay only for that quantity of sugar which they consider as obtainable in a chemically pure state and deduct from the sugar content that had been ascertained by polarization, five times the quantity ofashes contained in the sugar; the figure that remains is designated as Rendement.

This Rendement fluctuates naturally between certain limits; all sugar people therefore have agreed to take as a basis for the calculation of prices for the two most important classes of sugar - an average of rendement and to pay a basic price for it.

For a"plus or minus" a "special" rebate of 12½ Pfg. for each per cent per 50 Kg. is allowed (2.97 cents for every 110 lbs) equal to 2.7 cents for every 100 lbs.

This mean rendement is fixed on the basis of 88 per cent for the 1st. product and on the basis of 75 per cent for after products.

These figures form the basis for price calculations; it is therefore commonly said, we trade for 1st. product on the basis of 88;
" 2nd. " " " " " 75;

For instance a I. product has 95 per cent of sugar and 0.84 per cent ashes - its rendement is therefore 95 minus 5 x 0.84 = 90.8 and let us suppose the basic price for 50 Kg. agreed on is 10.85M($2.58) the price would be calculated as follows:-

Basic price	10.85	
Add 90.8 - 88 = 2.80 plus Rendement at 12.5	0.35	
	11.20	= $3.09 per 110 lbs.

For sugar traded in on the basis of 88, no payment (unless the buyer chooses) can be demanded if it has a lower rendement than 86 - sometimes sugar of a high percentage is traded in on the basis of 92 but must not be delivered below 91:

<u>Example:</u>

Basic price (basis) 92	11.30
Rendement 93.6 = 1.6 plus Rend. at 20	0.32
	11.62 Mk. = ($2.76)

Invert sugar and alkalinity have to be considered. Sugar that contains 0.05% or more Invert Sugar is not to be considered as being normally marketable. The buyer has the right to accept delivery of such sugar; should he, however, consent to accept it he must be credited with five times the amount, i.e. five times the amount of Invert Sugar has to be deducted.

5 x 0.05 = 0.25% to be deducted from the Rendement.

Sugar that under such conditions has been refused has to be made good by the seller in making delivery of sugar that comes up to the required standard.

Now let us consider its external qualities that may influence the price and that may be due to the method employed in its manufacture. The grain of the sugar ought to be sharply defined, glistening - and to be as uniform as possible.

1) Mealy particles adhering to the crystal and dull grain are liable to render the sugar entirely unfit for the refiners use.

2) Its color should be light and merge into a yellowish tint - a reddish, reddish brown or grey tint, indicates iron in the sugar and a faulty saturation.

3) Good sugar must be dry to the touch and not sticky. Viscosity to the

touch indicates an unfavorable composition of its non-sugary elements.
(A lot of sugar is called 500 bags at 100 Kg. a bag)

Two lots of equal rendement may each have a different value for the refiners according to the contents of organic non-sugar - and the composition of the latter - and this may influence the basic prices.

A refinery will grant a higher basic price for bright glistening dry sugar than for grey, dull and viscous sugar.

The usual difference between I. & II. Product is as follows:

Basis 88: If I. Product is 11 marks, then II. Product (basis 75) will cost 9 Marks, or a II. product basis 88, will be M.10.625 = ($2.53)

The quality of sugar that is kept in stock for a long time diminishes until finally it will contain an appreciable quantity of Invert Sugar.

Phenolyphtaleinic alkalinity diminishes in sugar kept in stock, as long as phenolphtalaleinic Alkalinity is present in the sugar, little Invert sugar will be found; but as soon as an acid reaction occurs, the capacity for reduction increases. The diminution of Alkalinity and the phenomena of disintegration and decomposition are due to the presence of Micro-organisms which are found in sugar and are able to resist a low degree of alkalinity.

It is therefore important, if we wish that sugar should keep - to take care whilst manufacturing to impart to it a sufficient degree of alkalinity seeing that the sugar possesses a sterility that will prevent the development of ever present fungi. This is in a large measure attained by keeping the sugar store-room clean also by letting the freshly made sugar cool rapidly. Experience has taught us that sugar will keep better in bags that stored in loose heaps; it should be bagged as soon as feasible and stored in a warehouse that is well ventilated, and it will keep better if stored in this way, because the rapidly changing temperature prevents the development of fungi. In wooden warehouses it does not keep so well and it is worse when stored in stone buildings

(Translation from the Italian)

EXCERPT FROM ANNUARIO STATISTICO ITALIANO 1911, PAGE 102.

Why do statisticians differ about acreage quantities of beets? Because the Ministry of Agriculture reports the number of acres planted to beets: then the acreage harvested and beets weighed in the field, then the sugar factory weighs the beets again, and then the Minister of Finance gets them weighed so as to calculate the excise tax. But if you take the two reports and take the average, you will be correct.

EXCERPT FROM BLÄTTER FÜR ZUCKERRÜBENBAU, FEBRUARY 28, 1911. p.61.

IS BEET CULTURE THREATENED AND BY WHAT?

By

Dr. von Rümker.

The labor question is one of the elements endangering beet culture. Laborers who used to live near the beet fields have gone in large numbers to the cities to work in the various industries and this was the main cause that forced us to bring laborers from a distance for the season, also, as beet culture was extended, we had to get large numbers from abroad. Ever-increasing wages had to be paid to "season laborers" and could not be withheld from native laborers working by the year and even in that case they could not be induced to stay permanently on the farm.

It is getting more and more difficult to get laborers - breaches of contract occur more frequently - and the cost of procuring labor becomes more and more exorbitant, and it is therefore out of the question to reduce the expenditure in connection with cultivating beets by approved methods. What should worry us most is the fact that we are becoming more dependent on foreign countries for our labor supply - and at that, we have serious competition to contend with. If our neighboring countries should, for some reason or another, decide to close their frontiers preventing immigration to our beet fields, disastrous consequences would ensue not only for German beet culture but for German agriculture in general, and our whole economic life would be subjected to a great upheaval.

It is one of the most important and weightiest questions which confronts not only German agriculture, but the whole nation and forms an important item in National social problems. Another danger threatens the Beet Sugar Industry, and that is the difficulty of marketing the sugar.

This is the situation: We produce far more sugar than we consume and foreign countries take little of our sugar, it being dislodged by competition. On account of material losses and interest on capital invested, we cannot indefinitely store our sugar, and the question naturally arises: Can we effect a decrease in our beet acreage? It is not desirable that this be done, for the revenue for the government would be diminished and agriculture in general would be prejudiced by a decrease of other crops - to prove this we must ask: "Why is beet culture an important factor to Agriculture?

Not only was the fear that the extension of the area for beet culture would diminish our chances to feed our population with home grown cereals, without foundation, but the introduction of beet culture has even contributed to increase the yield of the following cereal crops:-

Increase over Normal.

(per acre	1764 to 2,425	pounds	Wheat,	800 Kgs.	...... 1100 Kg.	per ha.
(" "	1322 to 1,764	"	Rye,	600 "	...... 800 "	" "
(" "	2204 to 3,086	"	Barley,	1000 "	...... 1400 "	" "
(" "	1322 to 1,764	"	Oats,	.600 "	...... 800 "	" "

This has proved to be the case on the average of numerous farms investigated. This is explained by the fact that beets require a great deal of care, diligent work, fertilizer and constant attention; also by the fact that with beet culture, nothing but the hydrates of carbon, sugar starch, etc., all consisting of carbon, hydrogen and oxygen, are carried away from the farm, all of which are drawn from the atmosphere. Whereas, the nutritive mineral elements absorbed by the plant from the soil in the shape of by-products and residue from agricultural and industrial establishments who manufacture sugar, alcohol and starch, are returned to the soil and the grower gets also the benefit of the residue from slices, molasses, scum, beet leaves, tops, pulp, etc. This static element leads to a permanent improvement of the soil preventing its exhaustion and indirectly enriching it; all the fodder obtained from by-products being rich in nutritive substances it enables the beet grower to keep live-stock and get an abundant supply of manure. Not only the acreage planted to beets, but also the acreage planted to cereals, could thus be fertilized with more and better manure. By adopting a rotation of hoed crops with cereals the soil became more fertile and yielded cereals more abundantly.

Hoed crops, especially beets, required deeper ploughing and were the cause of steam ploughs being introduced, causing a flourishing industry for a special class of agricultural machinery to grow up. Beet culture has not only industrialized agricultural estates on which it is carried on, but as said before, it has been the main factor and nucleus for manufacturing agricultural machinery.

In consequence of deep plowing for beet culture a richer fertilizer was needed so as to prevent the subsoil from being starved, and this was not only beneficial to the beet, but to all cereals planted in rotation so that when the turn of the beet came again, a vigorous soil and not an exhausted one was there to receive it.

Thus, in fertilizing richly for the beet, other crops benefited by it in rotation. The many improvements introduced into the technique of agricultural production put nature in the background and brought the other two productive factors, namely, work and capital, prominently forward. To this preponderence of labor, aided by capital over Nature, was due a higher and more uniform, also a surer harvest of all cereals and to an increase in the general yield. But not only agriculture was furthered, cattle raising, owing to the vast quantities of fodder furnished, increased in number.

The extraordinary demand for draught horses and oxen brought about the raising of powerful oxen and horses that had to be procured from a distance.

Thus the influence of beet culture was very far reaching, prompting stock raising, increasing meat production; beet culture helped to increase freights in coal, beet slices, molasses, sugar lime fertilizers of different kinds, machinery, seeds, meat and cattle.

Organized farm management and new methods of agriculture have been favorably influenced by beet culture.

Capital and labor went hand in hand, resulting in astonishingly high yields which in favorable beet and sugar campaigns brought in respectable net profits. A beet farm assumed the character of a busines or an industrial establishment.

A complicated method of book-keeping had to be adopted by agriculturists in connection with the principal branches of farming. Farmers learned to take advantage of favorable markets, errors of the past were recognized; they learned to avoid losses and grasp profits, in fact, farmers became alert, versatile, and got rid of old-fashioned methods to which they had been clinging so long with bucolic tenacity.

Germany made vast strides in beet culture, for whereas, in the beginning 18 to 20 centners of beets were required to produce one centner of sugar, only 5 to 6 centners are now necessary to produce the same amount of sugar; that is to say, the sugar content of beets were in the beginning

5 to 6%, whereas, now, in consequence of scientific culture, they have been so developed that they contain 20 to 25% sugar and nearly every factory asks for beets of 16%.

Side by side with beet culture on a scientific basis, technical improvements in the manufacture of sugar make it possible to vastly increase the amount of sugar extracted from the raw material.

If we take all this into consideration we find that sugar beet culture was doubtless one of the most important levers in bringing about a tremendous progress of German agriculture as a whole, and even now, sugar beet culture is, as it were, the high school of intensive agriculture, or rather beet culture is an agricultural industry and is the foundation and strongest support for cultivating heavy soils.

For lighter soils, potato culture is one of the same importance. Whosoever therefore attempts to put the ax to our hoed crops endangers our whole agricultural production and the possibility to supply at home our need in bread and meat.

Shall we allow this to be done? No, and emphatically no. The Government cannot allow the successful cultivation of beets and hoed crops to be interfered with, for not only would a respectable amount of taxes be lost for the Government - but a general depression in the receipts of the total production of agricultural (raw) material necessary for clothing and feeding people would take place; a consequent diminishing of railroad freights, and small farmers and owners of large estates all over Germany would feel the effects of an attack on beet culture and hoed crops.

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BEET HARVEST

- By -

K. BURGTORF.

EXCERPT FROM BLÄTTER FÜR ZUCKERRÜBENBAU, JUNE 15th, 1911.

Raw sugar factories require at the outset (the beginning of the campaign) that sufficient beets be delivered so as to have a continuous supply on hand.

Whether they be factories that use beets exclusively that are planted by themselves, or use shareholders' beets, or as the case may be, operate with purchase beets, in any case the beet planter has to start pulling the beets whether the proper stage of maturity has been reached or not.

There are many reasons why the beet sugar factory cannot delay the campaign until all the beets have reached maturity because climatic conditions have preponderating influences on the ripening of the beets - which the factory cannot take into account so as to work over the quantity at hand at the proper time. On the other hand, planters are compelled to start pulling beets early so that if bad weather sets in they may finish the work before winter. Often, the rotation of crops, clearing up of the fields for work on the following crop, the gathering of leaves and topping, are items which induce the planter to start the pulling of beets regardless of the stage of maturity which has been reached. Of course, weight of beets will be naturally reduced; if harvested too soon and if the weather during the summer was unfavorable.

The beet, by reason of its luxuriant foliage absorbs during midsummer, vast quantities of water; if this is lacking, then many nutritive elements will remain in the soil that otherwise would be utilized by the roots; nutrition of the beet through the root becomes more active towards the Fall in consequence of an abundance of humidity,and a vigorous growth sets in at a time when pulling is in full swing.

The increase in the size of the beet between the middle of September and the end of October, is very noticeable.

Professor Gerlach shows in the following table the development of the beet between the 17th of September and the end of October.

		Sugar Per Cent.	Dz. Sugar.
Harvest 17th Sept.			
A	318.8 Dz. Beets per Ha.	17.4	55.4
B	314.1 " " " "	18.1	56.8
C	319.5 " " " "	18.4	58.6
D	358.1 " " " "	15.6	55.9
Harvest 7th October.			
A	391.0 Dz. Beets per Ha.	16.6	64.9
B	373.1 " " " "	17.2	64.0
C	359.1 " " " "	18.5	66.3
D	420.8 " " " "	15.4	64.8
Harvest End of October.			
A	424.6 Dz. Beets per Ha.	17.5	74.1
B	422.2 " " " "	17.9	75.4
C	399.9 " " " "	18.8	74.9
D	430.2 " " " "	15.4	66.3

Thus, an average of 17.8 per cent beets and 14.7 per cent sugar is obtained between 17th September and 7th of October.

27.9% Beets and 282% sugar between 17th Sept. (end Oct.)

8.6% " " 11.8% " " 7th Oct. to end Oct.

These are figures which require careful consideration.

The majority of the raw sugar factories in Central Germany start operations with beets about the middle of September or beginning of October. Although beet pulling has started, yet it is in the power of the Overseer or Manager to so arrange the pulling that only the quantity necessary for immediate purposes is pulled and to emnloy his laboring staff on other farm work. with the view of putting all his available laborers to work later on in the beet fields and use them exclusively in this direction.

The pulling of beets is considered as one of the most laborious tasks to be done in the filed; - by reason of the frequent changes of weather this task is rendered still more difficult, so that a fair and adequate remuneration has to be given to them (the laborer). Most of the time, this work is done by contract; the men are employed in groups of 3 and 5, and they are of about the same build and equal in physical capacity. it is not advisable to let stronger and weaker laborers work together, as the stronger ones will not exert themselves to the fullest extent, and the weaker ones, may, through over-exertion, become sick or incapacitated for a considerable time.

Where whole families are employed in pulling beets, it would be well to let them work together as there is a possibility to utilize the children for some of the lighter work. With a little experience, larger children may attend to the topping, help in the siloeing, collecting leaves. etc.

Beet pulling has been done most satisfactorily by women and girls; even men experienced in other branches of agriculture do not reach the degree of efficiency as manifested by girls, so that a goodly number of strong able-bodied young women are valuable assistants to a farm manager who has a considerable area under beet cultivation.

It is very important that good seed should be used so as to insure a satisfactory harvest; there is no other crop in which greater care is required in the purchase of seed than the sugar beet. Beet growers should insist upon getting the seed of the last preceding season accompanied by a customary certificate of seed testing station and always inquire into the reputation and standing of the house from which you intend to buy the seed.

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(translation from the German) Page 211.

EXCERPT FROM BLÄTTER FÜR ZUCKERRÜBENBAU, JULY 14 & 15, 1911.

LECTURE BY

. K. Stoermer, Saxonia-Thuringia
Association of the German Sugar
Industry. .... Halle.

MEASURES TO BE TAKEN TO SECURE HEALTHY BEETS AND A GOOD YIELD PER HECTARE.

Gentlemen.-

We all know that we follow with great anxiety the development of beet culture not only because the Industry is intimately connected with any success that may attend it, but because of complaints made on all sides regarding decreased yield and the fear of that great bugbear, beet fatigue.

Formerly, a great deal more than 200 Ctr. per hectare was produced, but at present, 180 Ctr. is the average, and 22046 pounds per acre is seldom reached. This is true in many regions, and it will be interesting to analyze the causes of the diminished yield.

We must consider three stages in beet culture. In starting to plant beets on virgin soil the yield during the first year will not be very high, but as soon as the soil is properly prepared, the yield increases and remains on a level during a number of years. Sooner or later, however, an altitude of production is reached, and then the yield decreases notwithstanding that no change was made in manuring and fertilizing the fields.

A striking example is furnished by Hungary. I had an opportunity to compare the yields obtained there during a period of 20 years and found that the first 10 to 15 years enormous yields were obtained from virgin soil, without the aid of manure or fertilizer (over 200 Ctr. per Ha.), but lately, this yield has decreased and the farmers there feared the occurrence of beet fatigue. But this fear is not well founded because the diminished yield is due to exhaustion and if the beet cannot draw from the soil nutritive elements the yield will naturally be low. However, this does not affect the yield of other rotatory crops.

My conclusions are, and I may say I am almost convinced, that three periods are easily noticed in all beet districts.

1) The rapid rise in yield to the highest point;

2)) A relative short period for the highest yield reached; and

3) A gradual decrease in yield.

We must however, not lose sight of the fact that within the last 15 or 20 years we have made considerable progress in improving the beet and getting it richer in sugar content from year to year. By the introduction of new methods in culture and by careful selection, we have been enabled to produce a beet with 16% to 18% sugar as against 13 to 15% in 1890.

It must be pointed out that there is a possibility that a periodical increase and decrease of the yield may occur. This fact has been established in connection with other hoed plants and we may safely assume that this would be the case with beets. It all depends on periodical climatic conditions, especially in relation to the amount of rain-fall.

Every 30 to 35 years, there occurs a maximum and a minimum rain-fall, and if we were to construct a 5-yearly chart, we would find that the sugar beet yield would move within this curve. There is a well founded reason for attributing this periodical fluctuation in climatic conditions to a simultaneous periodical recurrence of spots in the sun. It is therefore likely that we may just have passed a period of the minimum yield and that we shall have better harvests in the near future, if it is true that we are to have a period of greater humidity from 1918 on.

Each experiment station is making efforts to raise a beet that would attain its maturity easily; but it has been found out that the quicker the beet matures the richer it will be in sugar. My own experiments have proved that beets raised under different climatic conditions such as are grown in Hungary, and southern Russia, will have differing stages of growth.

Now let us turn to the quality and characteristics of the Beet seed. What are the latest results obtained in relation to the healthy condition of the seed and the yield of sugar beets to be obtained therefrom?

It is well known that the sugar beet harvest depends largely upon the qualities inherent in the seed. I have been able to prove this point in the case of potatoes; in the case of sugar beets we have not been able as yet to give exact proofs, but we have no doubt about being able to furnish them in the near future. A healthy beet seed is equivalent to half the harvest, especially when its germination is rapid, vigorous and healthy. It has also been pointed out that the beet balls are afflicted with parasites and that it would be advisable to kill these parasites before sowing the seed.

It has been established long ago, that there are germs of certain fungi on beet balls that later produce diseases in the beet; we have learned recently, however. that there are millions of germs of the Phoma Betac fungus on the healthiest beet balls. If conditions in regard to soil, fertilizer, water and nutritition in general, and the weather, are favorable, the presence of a fungus on beet balls is of no consequence, but if these conditions are unfavorable. then there are in every soil. enough parasitical germs so as to discount the number of fungi that may exist on the beet ball. Consequently, we consider the question of disinfecting the beet balls or the shelling thereof more from a physiological point of view than on account of its value as a germ-destroying means.

Kühle Gunsleben were the first to shell the seeds, but of late, sev - eral firms have done it. It is well known that a beet ball contains several germ producing units that are intimately grown together with its pericarp and are surrounded by a cork-like cover; the layers of cork have a physiological importance, for they serve during the germinating period as water-storing organs, and are not essential to the life of the seed and may be removed without danger to the germ, itself. This removal takes place mechanically by means of a set of wire burshes or crushers, or chemically, by means of concentrated sulfuric acid. But I, for myself, doubt whether the absolute germinating capacity of seeds can be improved thereby.

It is true that seed thus treated will germinate more rapidly, especially in dry ground, but few of the growers have as yet used shelled seed. Our own experiments have shown us that we contribute likewise towards a rapid germination, if, before sowing, the beet balls are allowed to soak in water say from 12 to 20 hours. For prevention of root blight, the seed is often treated with a 1/2% solution of carbolic acid. We found that seed thus treated showed better results than an equal quantity of seed that had not been so treated, but we proved at the same time, that the health and the development of the plant was still better if the seed was soaked in pure water only.

If, as is often the case in Saxony, the soil is dry, then seed that had a preliminary soaking in water is to be recommended.

Professor Hollrung, characterizes the importance we may attach to root blight as an infantile disease peculiar to beet culture, and that we find it more frequently in the early stages than after a certain development. In some books we find assertions that root blight occurs exclusively in a soil poor in lime, and that it disappears as soon as the necessary amount of lime is introduced; but this assertion has only partly been verified by experience.

It is absolutely necessary to fight off this disease, and I will give you a practical example so as to show you how to proceed. A beet grower, having land with a clayey soil, at Eisdorf, near Lützen, had hitherto fertilized as was customary - with stable manure, Chilean Nitrate and Hypophosphate; potash and lime were not considered. He was successful in raising crops on all his land - only his beet fields were attacked by root blight. Although the beets germinated well, the young beetlets were almost decimated by root blight and the development of such plants as were not attacked was defective. Dr. Euchinger, at present scientific assistant of the Biological Institute at Amani, German East Africa, has helped greatly in carrying on these experiments which proved that when a plot of ground only yielded 74 Kg. without lime and potash - on a neighboring plot of the same dimensions and similar soil with lime and potash 193 Kg. of beets were obtained; but in addition to lime and potash, phosphoric acid and nitrogen was necessary.

We therefore conclude that the lack of any element of nutrition permits the occurrence of root blight and that this is entirely neutralized by the mixing of potassium and lime with other fertilizer and a good supply of all elements of nutrition are necessary to eliminate this blight and that lime also eliminates soil acids that would be favorable to root blight. Where in addition about 600 pounds of kitchen salt per acre was used it has been found that the yield increased by 3,967 lbs of beets per acre.

Another important fact must be mentioned, that on a given plot of ground 8800 beetlets came up. Where kitchen salt was omitted, only 6 - 7000 plants came up. The effect of kitchen salt is explained by the fact that the beet in its wild state is a saline plant and one that prospers at a short distance from the sea shore and develops into a healthy beet if surrounded by salts in solution or floating in atmospheric vapor. The beet requires salt for its normal vitality and this physiological need for salt must be considered when fertilizing beet fields along with its need of potassium, phosphoric acid, nitrogen, etc.

The effect of lime may be explained in two ways: On the one hand, gypsum is contained in sea water and therefore necessary for the development of saline plants, and, on the other hand, gypsum introduced into the soil will help to eliminate pernicious, noxious, alkaline effects. I call carbonic acid, lime and gypsum, the health regulators of the soil and wish to indicate thereby that lime containing carbonic acid counteracts noxious soil acids, and that gypsum eliminates pernicious soil alkali. The pernicious effect of soil acid - lack of lime - is well known, but the noxious effect of soil alkali has been fully demonstrated by the Bernburger experiments and we ourselves have this year observed the same thing.

Therefore, as far as the beet is concerned the gypsum fertilization takes place from a phyto-physiological point of view and in consideration of this fact we must bear in mind that the beet, apart from its ordinary need of nutritious substances characteristic of each plant, has a well pronounced craving for potash, natron, magnesia and lime in its sulphurous and chlorine combinations. Chemically speaking, we may say that the beet primarily needs electra-positive ions of natron, kali, mahnesia, lime. in abundant quantities, for the purpose of showing a healthy growth. if one of these substances is lacking in the beet, the law of minima asserts itself.

The yield therefore is regulated in proportion to the quantity of nutritive substances that the beet needs and where these are lacking, the plant becomes strongly receptive to disease.

EXCERPT FROM BLÄTTER FÜR ZUCKERRÜBENBAU, JUNE 15th, 1911. p.198

NITROGENOUS FERTILIZATION OF THE SUGAR BEET.

- by -

JOHANN MÖLLER.

It is well known that the sugar beet belongs to a family of plants that are very exacting in their requirements for nutrition to be assimilated from the soil.

Nitrogen, Phosphate and Phosphoric Acid are indispensable substances for nutrition of the beet; lime also plays an important part in connection with beet culture.

We extract from the well known Agricultural Calendar of O. Möntzel and A. v. Lengercke (1911), the following data on the needs of a sugar beet for its nutrition.

The beet absorbs from the soil:

	Nitrogen.	Potash.	Phosphoric Acid.	Lime
1000 Kg. sugar beet roots 2204 pounds	1.8%	2.3%	0.8%	0.6%
1000 Kg. beet leaves with tops 2204 Pounds	4.0%	3.5%	1.0%	1.5%
Total Kg.	5.8	5.8	1.8	2.1
Pounds	12-$\frac{3}{4}$	12-$\frac{3}{4}$	3.96	4.6

We may mention that all kinds of articifial fertilizers may be utilized in beet culture, but the most useful is the nitrogenous fertilizer; in other words, no lucrative beet culture without an abundance of Nitrogen. This does not mean that Nitrogen should form the main nutrition for the beet.

In order to obtain a satisfactory beet harvest in quantity and quality, an adequate supply of all the elements of nutrition is necessary. As far as nitrogen in fertilizing is concerned, too little or too much of it is prejudicial to the development of the beet. If there is a lack of nitrogen the formation of Plasma and Chlorophil is retarded and the growth of the beet will be stunted and a low yield of beets will be the result. On the other hand, an excess of nitrogen affects the continuous formation at harvest time of new Plasma cells and instead of maturing, the beet does not complete its growth, and the result will be a beet unfavorable for use in the sugar factory, that is to say, a beet with less sugar and more non-sugar substances.

All efforts of farmers who cultivate beets should tend towards fertilizing their fields with nitrogenous substances in such a way that, until harvest time, no lack of nitrogen should be noticed, and on the other hand, no excess of nitrogen should make the leaves wither prematurely and thereby retard the maturing of the beet.

The usual nitrogenous substances for beet fields are: stable-manure, green fertilizers, sulphate of Ammonia and Chilian nitrates. Stable manure is rich in nitrogen, and lately, more importance has been attached to it than formerly, when people thought they could dispense with it entirely by substituting an artifical fertilizer.

It is a well known fact, that stable manure puts the soil in good condition for beet culture and that if along with other fertilizer it is put in the fields in the fall, it will benefit the following yield of beets. Stable manure in beet fields must not be too deeply ploughed under, in order not to hinder decomposition. We may however, mention that stable manure helps to increase the quantity, but is somewhat prejudicial to the increase in sugar content. Of great importance is green fertilizer for sugar beets, especially in sandy soil, but in addition, fertilizing with nitrogen, potash and phosphoric acid is indispensable. Without doubt, nitrate is important as a nitrogenous fertilizer, but the same importance may be attached to sulphate of Ammonia.

It is well known that the principal form in which nitrogenous nutrition is given to the sugar beet is nitric acid, which is directly and easily assimilated.

Many comparative experiments with sulphate of Ammonia and Nitrate, respectively, have shown that the first did not give as good results because it was spread out too late. We have to bear in mind that fertilizing with sulphate of Ammonia should be done earlier than that with nitrate. Agriculturists everywhere, have gained the conviction that sulphate of Ammonia can hold its own in competition with other nitrogenous fertilizers in the beet fields. Numerous fertilizing experiments made in Hanover, Saxony, and the Duchy of Brunswick, have established this fact. We will herewith mention a few experiments, especially as our object is to keep the proper time of fertilization in view.

CLAYEY SOIL.
EXPERIMENT SULTMAN ROHRBERG.
I. Plot.
1/4 Hectare.

Stable Manure; & 200 Kg. (441 lbs.) Kainite,
Thomas Meal 150 " (330 lbs.)

YIELD: 197.2 Ctr. (43,474 lbs.) Beets. Sugar Content 18.4%
Sugar Obtained 23.28 Ctr. = 7,997 lbs.

II Plot.
1/4 Hectare.

Stable Manure & 60 Kg. (132 lbs.) Sulphate of Ammonia, to be applied in January.

200 Kg. (440 lbs.) Kainite,
150 " (330 lbs.) Thomas meal.

YIELD: 224.4 Ctr. Beets = 49,471 lbs. Sugar content 17.6%
Sugar obtained 39.49 Ctr. = 8,705 lbs.

III Plot.

Stable Manure and 93 Kg. (205 lbs.) Chilean Nitrate applied at intervals from Fall to Spring;

200 Kg. (440 lbs.) Kainite,
150 Kg. (330 lbs.) Thomas Meal.

YIELD: 211.7 Ctr. (46,671 lbs.) = 16.8% sugar content.
Sugar obtained 35.57 Ctr.=7,840 lbs.

EXPERIMENT JARGAU - GARTSDORF.
Clayey Sandy Soil.
I.Plot ½ Hec.

Fertilizer 250 Kg. = (551 lbs.) Kainite,
150 Kg. = (330 lbs.) Thomas Meal.

YIELD: 204.75 Ctr. = 22½ Short tons. Sugar in beets 18.9%
Sugar obtained 38.70 Ctr. = 8.532 lbs.

II Plot, ½ Hec.

100 Kg. (220 lbs.) Sulphate of Ammonia Applied in January.
250 Kg. (551 lbs.) Kainite,
150 Kg. (330 lbs.) Thomas Meal.

YIELD: 205.35 Ctr. = (45,271 lbs.) Sugar content ... 18.6%
Sugar Obtained 38.2 Ctr.= 8,420 lbs.

EXPERIMENT JARGAU -GARTSDORF (Con'td)

III Plot, $\frac{1}{4}$ Hec.

100 Kg. (220 lbs.) Sulphate of Ammonia partly Jan. partly before tilling,
250 Kg. (551 lbs.) Kainite,
150 Kg. (330 lbs.) Thomas Meal.

YIELD: 209.55 Ctr. = (46,197 lbs.) Sugar Content 17.9%
Sugar obtained 35.64 Ctr. = 7,856 lbs.

IV. Plot $\frac{1}{4}$ Hec.

125 Kg. (275 lbs.) Chilean Nitrate applied gradually during winter,
250 " (551 lbs.) Kainite,
150 " (330 lbs.) Thomas Meal.

YIELD: 208.55 Ctr. = (45,976 lbs.) Sugar content 18.3%
Sugar obtained 38.16 Ctr. = 8,389 lbs.

EXPERIMENT HAGELBERG-TÄTENDORF
Clayey Soil.
Plot I. $\frac{1}{4}$ Hectare.

50 Kg. (110 lbs.) Sulphate Ammonia,
75 " (165 lbs.) Potassium Salts,
100 " (220 lbs.) Hypophosphate.

YIELD: 171.6 Ctr. = (37,830 lbs.) Sugar Content 17%
Sugar Obtained 29.17 Ctr.=6,430 lbs.

Plot II. $\frac{1}{4}$ Hectare.

65 Kg. (143 lbs.) Chilean Nitrate,
75 Kg. (165 lbs.) Potassium Salts (40%)
100 Kg. (220 lbs.) Hypophosphate (18%)

YIELD: 168.3 Ctr. = (37,103 lbs.) Sugar Content 16.8%
Sugar Obtained 28.27 Ctr. =6,232 lbs.

EXPERIMENT SHULTZE WITTINGEN.
Clayey Soil.
Plot I. 1/4 Hectare.

150 Kg. (330 lbs.) Kainite,
100 Kg. (220 lbs.) Thomas Meal.

YIELD: 185.99 Ctr. = (41,003 lbs.) Sugar Content 16.5%
Sugar Obtained 30.69 Ctr. = 6,765 lbs.

Plot II.

80 Kg. (176 lbs.) Sulphate Ammonia,
150 Kg. (330 lbs.) Kainite,
100 Kg. (220 lbs.) Thomas Meal.

YIELD: 216.5 Ctr. = (47,730 lbs.) Sugar Content 16.9%
Sugar Obtained 36.59 Ctr. = 8,065 lbs.

Plot III.

100 Kg. (220 lbs.) Chilean Nitrate,
150 Kg. (330 lbs.) Kainite,
100 Kg. (220 lbs.) Thomas Meal.

YIELD: 209 Ctr. = (46,076 lbs) Sugar Content 17.6%
Sugar Obtained 36.78 Ctr. = 8,107 lbs.

EXPERIMENT LINDLOFF HAMMERSTORFF
Sandy Clayey Soil.
Plot I. 1/4 Hec.

100 Kg. Guano (202 lbs.) and Stable Manure,
160 Kg.Kainite(353 lbs.)

YIELD: 15.0 Ctr. = (33,069 lbs.) Sugar Content 18.6%
Sugar Obtained 27.9 Ctr. =6,150 lbs.

Plot II.

Stable Manure,
80 Kg. (176 lbs.) Sulphate of Ammonia,
100 " (220 lbs.) Guano,
160 " (353 lbs.) Kainite.

YIELD: 201 Ctr. = (44,312 lbs.) Sugar Content 18.4%
Sugar Obtained 37.04 Ctr. = 8,165 lbs.

Sulphate of Ammonia to be applied four (4) weeks before sowing.

EXPERIMENT LINDLOFF HAMMERSTORFF (Con'td)

Plot III.

Stable Manure,
100 Kg. (220 lbs.) Guano,
100 Kg. (220 lbs.) Chilean Nitrate in several doses,
160 Kg. (352 lbs.) Kainite.

YIELD: 197.5 Ctr. Beets = (43,540 lbs) Sugar Content 18%
Sugar Obtained 35.55 Ctr.=7,792 lbs.

EXPERIMENT REINECKE ADERSTEDT.
Humus Clay.
Plot I. ½ Hectare

Stable Manure,
50 Kg. (110 lbs.) Kainite,
100 Kg. (220 lbs.) 18% Hypophosphates.

YIELD: 187.2 Ctr. Beets = 41,280 lbs. Sugar Content 18.6%
Sugar Obtained 34.82 Ctr.= 7,675 lbs.

Plot II.

Stable Manure,
125 Kg. (275 lbs.) Sulphate of Ammonia 4 weeks before sowing,
50 Kg. (110 lbs.) Kainite,
100 Kg. (220 lbs.) 18% Hypophosphate.

YIELD: 202 Ctr. Beets = (44,532 lbs.) Sugar Content 17.9%
Sugar Obtained 36.16 Ctr.= 7,971 lbs.

Plot III.

Stable Manure.
150 Kg. Chilean Nitrate (330 lbs.)
150 Kg. 18% Hypophosphate " ")

YIELD: 192.9 Ctr. Beets = (42.526 lbs.) Sugar Content 17.4%
Sugar Obtained 33.56 Ctr.=7,397 lbs.

EXPERIMENT SHÜTTE KLEINLIEDERN.
Sandy Soil.
Plot I. $\frac{1}{4}$ Hectare.

100 Kg. (220 lbs.) Guano,
100 Kg. (220 lbs.) 40% Potassium salts.

YIELD: 147,98 Ctr. = (32,623 lbs.) Sugar Content 19.4%
Sugar Obtained 28.71 Ctr. = 6,329 lbs.

Plot II.

75 Kg. (165 lbs.) Sulphate of Ammonia before tilling,
100 Kg. (220 lbs.) Guano,
100 Kg. (220 lbs.) 40% Potassium salts.

YIELD: 156.33 Ctr.beets (34,464 lbs.) Sugar Content 18.8%
Sugar Obtained 29.39 Ctr.= 6,479 lbs.

Plot III.

100 Kg. (220 lbs.) Guano,
100 Kg. (220 lbs.) Chilean Nitrate,
100 Kg. (220 lbs.) 40% Potassium Salts.

YIELD: 149,06 Ctr. Beets = (32,861 lbs.) Sugar Content 18.0%
Sugar Obtained 27.73 Ctr.=6,213 lbs.

Chilean Nitrate is applied in several doses at intervals during the winter.

This data shows that sulphate of Ammonia if applied in the fall and winter spread out and harrowed in, a few weeks at least before sowing, will give good results.

On the cloister lands of Hadnesleben for years past, sulphate of Ammonia has been used applied in the Fall and has given excellent results.

Potassium should be applied in the shape of Kainite as its high percentage of chlorination favorably influences the development of the sugar beet and in combination with sulphate of Ammonia excellent results both as to quantity in weight of beets and sugar content is obtained.

As garden truck, cereals and hoed plants have been manifestly benefited by sulphate of Ammonia which is now used universally for these, it is hoped that beet growers will in the future look upon sulphate of Ammonia as a good nitrogenous fertilizer.

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(Translation from the French)

Excerpt from La Sucrerie Indigène et Coloniale, October 3, 1911. Page 322

Avantage Indirectes de la Culture de la Betterave a Sucre.

INDIRECT BENEFITS OF SUGAR BEET CULTURE,

By Truman G. Palmer.

Last year the author of this pamphlet as Secretary of the American Beet Sugar Association came to Europe to visit the sugar beet districts with a view of studying the economic conditions relating to beet culture and the manufacture of sugar. On his return to Washington, he sent a communication to the United States Senate in which he pointed out the indirect benefits derived from beet culture and sugar manufacturing.

The author cited in a convincing manner the decrees of Napoleon I., by which the first French Beet Growers were granted extraordinary privileges. In his brochure, he goes on to prove that the increased yield in cereals in Germany was entirely due to beet culture.

LAW AGAINST BEET SUGAR CORNERS.

EXCERPT FROM JOURNAL des FABRICANTS de SUCRE, NOVEMBER 22,1911.

We will give here the comments made by M. Boverat and Moutarn on this subject published in the Temps on 17th of November, supplemented by personal statements made to us by Mr. Boverat, President of the syndicate of grain, seeds, flour, oil, sugar and alcohol.

Speculation is not a form of transaction which should escape all criticism, but whether people are in its favor or not it is an indispensable element to the life of a market. When, for instance, an agriculturist sows the beets, what is from that moment going on in his mind? To get in touch with some buyers, distillers or sugar factories, to whom he sells his production at a time when such production is only prospective and is still under ground.

In doing this the farmer gets rid of his "commercial risk" in sugar beet and beet sugar. Having sold his crop at a price considered remunerative he is no longer anxious - except as regards the agricultural risk. namely: Will the harvest be good in quantity as well as in quality?

What does the buyer do as soon as his trade is closed with the farmer? He also tries to insure himself against commercial risk, and thus after having calculated the cost of production of sugar or the TROIS - SIX (proof spirits) to be extracted from the beet, after adding cost of storage. he makes, in his turn, a trade with the speculator.

In the long run this last factor appears to be the most important one as to him the credit is due that each could work, produce, and get remmurated. Well, it is the speculator who would get his head cut off for good by the Minister of Justice, if this bill became law - for Article 420, amended as it is by Mr. Cruppi, is equivalent to abolishing speculation.

The execution of the speculator - there is not the slightest doubt - will be profitable neither to the producer nor to the consumer; it would simply bring about a scarcity of money, would destroy the market - where transactions would no longer take place.

Mr. Boverat, says in a tone of irony, that it would be useless to put a new tax upon the Bourse transations if they were to be prohibited. Was it not said that when Mr. Klotz put a tax of five centimes per 1000 on all transactions, that this tax was to fall on the speculator and not on real bona fide transactions. But then, if Mr. Cruppi abolishes speculation, the tax of five centimes can only fall on real transactions?

The project Cruppi strikes is a blow only at speculation; if his bill becomes law, then good-bye to commercial and industrial liberty.

Mr. Boverat then explains that all commercial and industrial houses and corporations would, by this law, be exposed to prosecution,and he concludes by stating that with the help of Article 420, amended as the Ministry wants it to be, the arbitrary nature of it would enable any Minister to ruin and imprison any merchant who might have incurred his displeasure.

Mr. Montard, President of the general sugar syndicate, considers Article 420 may be all right in theory but not in practice. An extra parliementary commission was appointed to frame a law that would prevent illicit transactions that are equivalent to cornering, that this commission in harmony with the Ministry of Commerce had sent in its report several months ago; and we are not surprised to see suddenly a bill crop up, the tendenoy of which is absolutely the opposite of that which the extra parliamentary commission had prepared after a long inquiry concurrent with that of the Minister of Finance and Minister of Commerce. M. Moutard has documentary evidence - he does not act lightly, but submits the articles of the report of the Commission pointing out that article which corresponds with Article 420, proposed by the Ministry.

The following is the text of the article: There will be punished whosoever will have been convicted of having cornered, accumulated by purchase, or who shall refuse to sell quantities of the same commodity or merchandise in excessive proportions to the actual state of the market.

The President of the Sugar Syndicate emphasizes the difference that exists between Article 420 and the corresponding article of the Commission. The words cornered and accumulated by purchase, or refusal to sell, specify nicely the cornering and its consequences.

The Commission has for the purpose of determining this accumulation of the same merchandise or commodity a real starting point - which is the normal state of the market; those operations are punishable by law if their proportion exceeds in an exaggerated form the normal state of the market.

It is evident that a speculator enjoying considerable credit or having an enormous capital can buy or sell by himself as many bags of sugar as there are offered in the market. By this fact, he might produce a disproportionate influence which might become dangerous for the production and consumption of this commodity - he would in this way have brought about a certain monopoly.

M. Montard, would like to see the bill as prepared by the Commission pass into law for certain speculators that are neither producers nor merchants who could become a real hindrance and danger to a normal market.

But with Article 420, which the Minister of Justice proposes to get passed as a law - the line of demarcation would be missing and arbitrary rulings would be dominating our markets.

The application of this article would paralyze all speculation, if the most lawful, and would damage natural exchanges of commodities, especially transactions made from one market to another. It would even facilitate a real monopoly, such as it existed, before speculation brought about the multiplicity of commercial transactions.

The President of the Sugar Syndicate is of opinion that the law taxing Bourse operations is not less prejudicial to the interests of the general public than the law against monopolizing. The reporter of the "Temps", after branding the new article 420 as equivocal and as opening the door to the most erroneous interpretations concludes: that according to Article 420 a universal toll in the business world will be levied. It is true that the text proposed by the Minister of Justice, before definitely becoming law shall be discussed by a parliamentary commission to whom it will be submitted for consideration, but nobody can foresee what amendments and modifications will be made by this commission and finally by Parliament itself before that article actually becomes law.

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NEMATODES.

EXCERPT FROM BLATTER FÜR ZUCKERRÜBENBAU, 15th SEPTEMBER, 1911.
(page 295)

LECTURE BY PROF. DR. KRUGER, DIRECTOR OF THE EXPERIMENT STATION AT BERNBURG.

A talk on Nematodes and how to prevent or minimize damage done by these parasites in the beet fields.

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Fatigue (exhaustion, poverty) of the soil occurs often where one and the same class of plants are grown year after year, which may be caused by:

1) Lack of nutritive substances in the soil itself; lack of phosphates or of other substances;

2) By the presence of deleterious substances within the area of cultivation;

3) By parasites.

To this may be ascribed the so-called beet exhaustion.

His Excellency, Dr. Kuhn, has fixed the responsibility of fatigue of the soil upon the thread-like worm known as Nematod; he proved that freeing the beet fields of this parasite they were rejuvenated and became again fertile after a prolonged period of fatigue - . Kuhn has shown us how these parasites feed on the rootlets of beets and those of other hoed plants. He demonstrated that the capacity of the beet for assimilating nutritious substances through its roots is weakened or entirely neutralized by the presence of Nematodes and when roots attacked by these parasites are examined, it will be found that such roots do not develop in the same way as do healthy plants.

Some roots die off. In others, ramifications and bifurcations occur that remain short, not reaching deep enough to absorb the substances necessary for nutrition. We call these roots - bunch roots; even the tap roots of beets attacked by Nematodes may die off and in such a case a so-called celery form occurs where no tap roots but several side roots are developed.

Today, I wish briefly to call your attention to the characteristic symptoms of a typical, highly developed Nematod invasion of the beet field, especially to the nematodic influence exercised upon the development of roots. When the roots are thus attacked the leaves wither and die, and the so-called beet consumption phthisis, sets in, the heart only retaining its vitality - which, however, ultimately rots and perishes.

To counteract this nematodic affliction we have to study how to prevent the increase of nematods as much as possible which necessitates a rotation of crops; for by not planting in the same soil successively the same plant, the nematodes will be deprived of the nourishment that favors their development. Nematodes will not increase in a field where rape seed follows the sowing of beet seed.

Certain classes of weeds give shelter and food to nematodes; amongst the number of weeds are bank-cresses, hedgemustard, etc., in which nematodes are found in large numbers.

Therefore, our fields should be freed from weeds, notably - because they absorb some of the nutritive substances which our plants need, but also because they harbor nematodes, and by fighting the increase of weeds we likewise prevent the increase of these parasites.

We must also take care that the waste from the sugar factory is not promiscuously dumped along with manure onto the beet fields; especially earth and scum coming from the washing and cleaning of roots in the factory. A treatment of earth and scum with an alcaline solution will prevent Nematodes from living and developing in either stored earth or scum.

Gentlemen, these are some of the measures to be adopted for preventing the increase of Nematodes. However, there are other measures and remedies to fight off these parasites. Hitherto, only remedies of a chemical nature were used; salts, etc. Lime has been used successfully, but Kuhn's experiments proved that it would not be expedient to use large quantities of salts and lime and combinations of which they are constituent parts, as the development of young beetlets is hindered by the presence of an excess of lime or salts.

Sulphurous carbon introduced in the soil will exterminate the Nematod as experiments made at Bernburg have proved, and normal beets can be raised in fields that were considered as "Beet fatigued". This remedy however, is rather costly; it may be used however, in places where nematode nests are known to exist; by its use the nests will be destroyed and further tendency to increase the beet fatigue (exhaustion) in the field will be counteracted.

Kuhn, by closely following the development of Nematodes has found that a nematode after leaving the egg, finds its way into the root of the beet. Larvaue thus emigrates and develops into male and female; their presence is noticed by a swelling of the roots.

These swellings increase; they appear at first as small knobs, the size of a pin's head

Kuhn recommends sowing in the vicinity of beets, catch-plants, such as favor the nematodes. Rape is one of these, and when such plants are developed to a certain stage, they should be destroyed. However, the development of the nematode should be watched; the destruction of the plants must take place before the eggs of females have had time to develop into larvae.

The Bernburg experiment station has, since the year 1882, thoroughly studied the question of fighting the nematode pest that does so much damage in the beet fields; conditions surrounding the nutrition of beets have been studied and ways and means devised to combat a nematodic invasion of the beet fields of Germany.

Growing of beets in pots has been experimented with; some people expressed the opinion that growing beets in pots is of no practical value; but permit me to tell you that by such experiments two important discoveries were made, the cause of the heart rot of the beet and the further discovery of showing us the way to minimize ravages on the part of nematodes.

We are now in position to raise plants - beets especially - in pots, under such conditions as are similar to those existing in the fields as far as size, foliage, etc., are concerned.

Through judiciously supplying a given quantity of nutritive substances to raise a beet of a given weight, say 400, 500, 600 g. or as we choose, heavier or lighter, we are in a position to keep the beets in a healthy condition.

After finding the best method of growing beets in pots, we likewise set to work and studied how to get rid of the enemies preying upon the beets. The fact was established that a beet required a certain quantity of phosphoric acid, Calcium, Nitrogen, etc. Under certain conditions surrounding nutrition we tried to study the nematodic influence exercised on the beet.

For instance, we take a beet, supply it with all the nutritive substances needed for its development In order to get a 500 gr. beet, a proportionate weight of phosphoric acid, phosphate, nitrogen, magnesia and other substances are necessary. Magnesia, Calcium, etc., were supplied in fixed quantities. Only the doses of the three most important substances were varied in quantity, such as phosphoric acid, nitrogen and phosphate.

We found that a beet is weakened by the presence of Nematodes that absorb part of the nutritive substances intended for the development of the beet. The first thing to learn is how much of each nutritive substance is necessary to enable a healthy beet to develop normally. If, with the presence of Nematodes we give the beet no more nutrition than would actually be needed in the absence of these parasites, no lack of nutrition would take place, as the nutritive elements absorbed by nematodes, would not endanger the normal development of the beet.

This discovery could only nave been made by experimenting with pot plants, for after ascertaining the presence of Nematodes, more phosphoric acid, more phosphate and more nitrogen was supplied than would suffice for normal development of leaves and roots - and both did develop normally.

If, however, there is a surplus of Nematodes that steal the nourishment intended for the beet, it is stunted in its growth and the leaves soon show typical symptoms of lack of nourishment. Symptoms indicating lack of nourishment, such as nitrogen, appear sooner in nematodic beets than in normal beets. Symptoms indicating lack of phosphoric acid and those indicating lack of phosphate, can easily be ascertained.

We tried to apply our experience gained by raising beets in pots to experiments carried on in the beet fields themselves, for our object primarily, in experimenting, was to ultimately benefit beet culture in general.

We started our field experiments in 1908, in fields where beets alternated with barley. We have also systematized our methods of fertilizing so that the damage done by nematodes was very insignificant. In some cases we gave no phosphates, in others, we diminished the nitrogenous substances. On the other hand, in some cases, we increased the quantity of nitrogenous substances, in fact, we took care that all nutritivo substances were applied in abundant quantities.

These experiments were carried on in five different localities:

4 in Anhalt;
1 in the province of Saxony in 1910;
In 1908, we planted our fields with beets;
In 1909, we planted our fields with barley;
In 1910, we planted our fields again with beets.

1) We obtained with an abundance of nitrogenous substances in the soil without phosphate ....313DZ. beets.

2) With very little nitrate and 2 Dz.. phosphate and salts per hectare, we obtained ....304 Dz. beets.

3) With equal quantities of nitrogen and phosphates, ...368 Dz. beets.

4) With abundance of phosphate and nitrogen, ...374 Dz. beets.

And with an application of a superabundance of fertilizer, we obtained ....400 Dz. beets.

All our experiments were started on so called exhausted beet fields. We are therefore justified in concluding that by supplying the beet with nutritive substances a little in excess of what they require for their assimilation and development - a normal yield of beets will be obtained.

I wish to emphasize the following point, namely, has the soil in consequence of climatic or other conditions the capacity of always to dissolve nutritive substances imparted to it by fertilizers?

A soil that for a long period was deprived of phosphoric acid or phosphates and then is fertilized with them, was found to be in that event, not always effective.

A field fertilized with 660 pounds of Chilean Nitrate without phosphate gave a lower yield of beets per hectare - than 220 pounds of Chilean nitrate with 220 pounds of phosphates per hectare.

Although our experiments are not yet completed, we maintain that considering our past experience, the ravages from Nematodes can be sufficiently neutralized, if not entirely prevented, and we hope that our future experiments in this direction will be a blessing to German Beet Culture

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MEETING OF GERMAN SUGAR MANUFACTURERS AT MAGDEBURG.

Page 706.

EXCERPT FROM DIE DEUTSCHE ZUCKERINDUSTRIE, SEPT.15,1911.

- by -

ZSCHEYE.

The German Sugar manufacturers had a meeting at Magdeburg at which the question of sulphuring juice was discussed. It was shown that juice sulphuring was a mistake, as a deposit is formed in the juice pumps which may subsequently cause a general stoppage of the pipes connecting with the effect, the removal of which cannot readily be accomplished; such being the case, the syrup only should be sulphured causing an improvement in the color as well as the eliminating of calcic salts. Sulphuring has a tendency to modify the constitution of sugar and allows an easier washing in the centrifugal.

The hitherto greyish color no longer exists, that color was due to glucic acid soluble and having a violet color which was transformed into an insoluble ferris salt and decomposed.

As sulphurous acid has the characteristic properties of an acid which is stronger than those acids which neutralize the alkalinity of carbonated juice and are organic acids, these organic salts will decompose in alkaline sulfites which will immediately combine with the liberated organic acids to form a colorless combination.

There we have an explanation of why the decoloration of alkaline syrup and the precipitation and decomposition of calcic organic salts take place. It may sometimes happen that even in sulphuring syrups there follows a clogging of the filter presses in which case sand filtration offers special advantages.

EXCERPT FROM DIE DEUTSCHE ZUCKERINDUSTRIE, SEPTEMBER 22, 1911.

BEET SEED QUESTION.

20 pounds of seed per Morgen is the usual quantity, and 21 to 22 pounds is often used on large estates.

The small farmer uses only 10 pounds because he sows the seed by hand and even as little as 8 pounds per Morgen is used and the beet crop is quite as good as the crop on the large estate where 20 pounds is used.

What the small farmer does the large farmer ought to be able to do; of course it is impossible to sow several hundred Morgen by hand, but with the modern improved cultivators there ought to be no difficulty to economize with seed on large estates, and with the increased price paid for it, the saving of half the seeds is no small item.

INDUSTRIAL USES OF SUGAR AND USES THEREOF APART FROM INDUSTRIAL ENTERPRISES.

EXCERPT FROM "LaSUCRERIE BELGE", DEC. 1st, 1912, PAGE 156.

LECTURE BEFORE THE SUGAR ASSOCIATION AND DISTILLERS OF ALCOHOL IN FRANCE, JANY. 1912.

- By -

M. A. VIVIEN.

UTILIZATION OF SUGAR IN ARTS AND INDUSTRIES.

At present, the production of sugar is limited in quantity, sufficing for the actual needs of consumption.

According to provisional statistics there will be available during 1913 - about 18,740,000 tons (short tons) for the whole world's consumption (1,700,000,000 inhabitants), or about 22 pounds per capita.

This proportion in consumption will gradually grow as mankind is apt to consume more and more of this commodity, pleasant to the taste as it is, as well as being very nutritive, and by increasing muscular activity gives the human and animal body a power of resistance to fatigue which has been proved by many experiments made lately by numerous scientists.

If production of sugar increases beyond the needs of consumption there will naturally occur a fall in the price of sugar which may not please either the Sugar Cane or the Sugar Beet growers.

To forego the decline of the Sugar Industry and of Beet Culture, but above all to help in the development of both, new industrial outlets will have to be found for sugar, that is to say, the use of sugar for other purposes than that of consumption.

Alcohol is used for heating, for fulminates of ether, explosives, celluloid, artificial silk, vinegar, the addition of alcohol to wine, all of which absorbed in 1909, 20,500,000 gallons equivalent of pure alcohol. which is about a third of the total production of 64,106,930 gallons.

There ought be found some industrial uses which would absorb about the same proportion of the sugar production, and let us hope that such will be the case, sugar constituting a pure crystallized hydrate of carbon, without water, at a low price, much lower than farina, starch or the amylaceous extracts of plants, dextrine and glucose, the respective prices at this time of writing being as follows:-

		Frcs.	Dol.& Cents.
	Farina	38	$ 7.33
	Starch	47 to 58	11.19
100 Kgs.	Dextrine	59 " 62	11.96
	Glucose as a mass of syrup 43°	45	8.68
	44° as crystal syrup	56	10.80
100 Kgs.	When sugar, white crystallized No. 3 costs in France only 35 Francs (about 3 cents per lb.)	35	6.75

Sugar can be, and is, largely substituted to the use of above mentioned substances in various industries.

People are still under the impression that an excessive price, as of old, prevails for crystallized sugar, and the erroneous idea prevents them from using, or trying to use, sugar in numerous industries.

CATTLE FEEDING ON SUGAR.

In 1876, at Arras, France, I recommended the use of sugar in the feeding of cattle, also to make more extensive use of it in connection with wine making at grape gathering time, in making cider, beer and perry - and it was only after 28 years of continued efforts that, on July 5, 1904, a law was passed authorizing the use of denatured sugar in cattle feeding.

SUGARING OF VINTAGES.

The law of 29th of July, 1884, and the decree of 22nd of July, 1885, sanctioned the sugaring of ciders and Perry; and in 1885, 8,000 metric tons were used. In 1888, three years later, 39,000 tons were used.

Certain unscrupulous wine growers commenced to use sugar not for the purpose of improving their vintages, but for the manufacture of sugar wine, and by pouring sugary water on the husks of grapes so as to fraudulently produce wine with sugar and exhausted residue of grapes - the Government stepped in and modified to such an extent the above mentioned law that at present, only 7% of the quantity used in 1888 in wine making, namely 3,000 tons, is used.

SUGARING OF CIDER AND PERRY.

About 3,600 metric tons of sugar were used per annum up to 1902, but since that time no available data are obtainable on account of the tax for the purpose having been removed.

The law of the 5th of July, 1904, passed in consequence of the agitation of the manufacturers has exempted all denatured sugar used in beer making with a modest start, France has used now (1910) 1153 metric tons.

Besides, there were used in 1910:-

Equivalent Refined.	For Cattle Feeding - Sugar	5,091,543	Kgs.
	- Molasses	282,090	"
	For wine	509,788,569	"
	" Perry and Cider	3,754,980	"
	A total of	650,450	Met.tons
	or	716,998	Sht. "

On account of the cumbersome way in which Molasses has to be handled, under present commercial conditions it would be preferable to buy pure sugar, make a thick syrup out of it and mix it with denatured elements, but the Government does not sanction the making of syrup by melting crystallized sugar even in establishments where government supervision exists.

A prize of 100,000 francs is offered to any one inventing a new process whereby sugar must be used in a new industry, which does not include any industry carried on for providing animal or human food.

An advisory committee on Arts and Manufactures, has decided as to what constitutes a purely industrial item, thereby preventing any of the sugar allowed tax free, from ultimately entering into human or animal food.

Such industries include shoe blacking substances, indigo, dye-stuffs and a preparation for protection against boiler incrustation, etc., etc.

<u>EXCERPT</u>: Decree of April 15, 1910.

Any manufacturer who desires to take advantage of this decree, in order to get glucose, molasses or crystallized sugar free of duty, must apply to the Director of Internal Revenue in writing - stamped paper must be used, in which the nature of the article to be manufactured has to be specified, the method of manufacture and quantities of the manufactured articles to be produced, etc., etc.

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COST OF GROWING BEETS IN RUSSIA.

COMMISSION OF INQUIRY BY FRENCH SYNDICATE OF SUGAR MANUFACTURERS WITH REGARD TO SUGAR BEET CULTURE IN RUSSIA. FROM REPORT OF EMILE SAILIARD, SECRETARY OF COMMISSION (1912).

COST PRICE PER HECTARE OF BEETS: (p. 42)

Sugar interests in Russia are so vast, that it is almost impossible to state the exact cost price to run a beet farm. Therefore, only an approximate idea as to the average of running a beet farm can be given. i.e.:

DISTRICTS BEYOND THE DNEIPER:

	Francs.	
Renting value of land	41.45	
Fertilizing	40.09	
Heavy work	30.61	
Seed used	18.05	
Sowing by Cultivator	11.93	
Ploughing	3.35	
Hand Hoeing	43.59	
Other work	9.93	
Pulling	47.43	
Freight	48.30	
Incidental expenses	3.28	
Expenditure for office, superintending administration, repairs, insurance, hospital etc.(') .	142.60	
T o t a l	440.70	= $85.05

RUNNING EXPENSES ON FARM.

The harvest per hectare was, on an average, 21,124 kilos (46,570 lbs.) per hectare, (2,471 acres) about 9 tons per acre.

$$\frac{440 \text{ fr. } 70}{21.124} = \$4.03 = \$4.03$$

The selling price of beets amounted to (per ton) 23 fr. 40 = $4.51

23 fr. 40 - 20 fr. 90 = 2.50 = ...fifty cents.

Therefore, per hectare 50.53 (in round figures) = ...$9.75

(') Expenses for small farms are less than those on large estates.

N. B. One franc equal to $0.193 cents.

(b) GOVERNMENT OF KIEW.

On one estate of the Government of Kiew the cost price of land was mentioned as being 300 francs ($57.90), not including the renting value of the land in connection with a harvest of 20,700 kilos of beets per Hectare.

(c) On another estate we were told that during the last few years the average profits on cultivated lands were 50 francs per hectare ($9.65) = $3.90 per acre.

VISITS TO THE PROPERTY OF COUNT BROBINSKY.

Cleonus, a malady which, when it attacks the beet, is counteracted by solutions of chlorum of Barrium at 5 - 7% which is spread upon the plants by means of a pulverizer invented by Vermorel, and in digging ditches around the fields of 10 inches wide and 10 inches deep.

BEET SEED RAISING.

Some farmers merely plant foreign seed, as purchased, others make a methodical selection. To the fields that receive the seeds, nitrate is given and a little more phosphate is added than to fields with ordinary beet culture, about 90 Kg. (198 lbs.) of nitrate and 200 Kg. (440 lbs.) of superphosphate. Rows are sown 0.38 centimeters apart from each other and in each row (5 to 6 inches apart) a plant is allowed to develop. In the Fall, the selection is made according to appearance of the subject. The seed is beaten out by hand. 1400 (3086 pds. per hectare) (or 1243 pounds per acre) to 2000 Kg. (4409 pds. = to 1383 lbs. per acre) of seed is harvested per hectare. The harvest of seed is made successively according to the degree of maturity of the stems - the coefficients of germination are in this way higher and more regular.

17, 18, 19 and often 20% of sugar from 15,000 (33,069 pds) to 21,000 (46,297 pds.) Kg. of beets per hectare are obtained.

VALUE OF THE LAND.

Considered as farms, land is worth about 1000 francs per hectare, ($78.50 per acre) and is leased at 48 to 50 francs ($9.26 - $9.65) about 5% on the capital value. But a distinction must be made between the renting values of land in general and the actual rent paid for selected land improved by beet culture. The rent paid frequently amounts to 80 or 100 francs ($15.44 - $19.30) per hectare per annum.

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FARM LABOR IN RUSSIA.

FROM EMILE SAILLARD'S REPORT, AUG.-SEPT., 1911.

Farm labor is abundant in the country; farmers in the vicinity of beet fields supply the need. However, the Russian workman is less energetic than the French farm laborer. It was surprising to see the vast number of men, women and children, employed in threshing grains, beet seeds and other work in the beet fields. In France and Germany, much of this work is performed by primitive machinery and manipulated by hand.

In these regions, families as a rule, have a large number of children. The houses are built of clay, have no upper story and are thatched, with a 4 layer thatch, strongly plaited to the rafters and ridges of the roofs. The house is divided into two parts - in one part are the living rooms, in the other, the stable. The living apartment is divided off into four spaces (called rooms), low ceilings; no doors or walls dividing these so-called rooms, and only a curtain is provided to make the subdivision.

As each peasant bakes his own bread, he has a large oven or stove in the house, which occupies a considerable space in the living apartment. Near the house is a cellar, or one might say a vault, dug in the ground, wherein is placed all sorts of vegetables, such as potatoes, etc. Being covered with earth, a rather mild temperature exists in this vault, and even in the coldest weather the contents in this so-called storage vault are not frozen. A barn, where the products of the field are stored completes the dwelling.

PRICES FOR LABOR IN SUGAR DISTRICTS:

Men, ...1.30 Francs.
Women, ...1.05 per day without food.
Children, ...0.80 Francs.

When food is furnished 7 - 8 cents per day, per person, is deducted. (')

HAND LABOR.

Farm labor is abundant, and is relatively speaking, cheap, although their work is less intensive than that of the French laborer.

At the time of hoeing, they receive 50 kopeks per day - say, 1.325 - or 25 cents, without board, or 0.92 francs or about 18 cents with board.

(') Farmers who live in the vicinity in addition to their own farm work, increase their incomes by performing the extra work in the fields and factories during the beet season.

STOCK FEEDING.

For 1908, figures were obtained relating to fattening of oxen on 8 farms, as follows:-

Average weight of a lean ox	500 Kg.
" " " " fattened ox	610 "
Price of 100 Kg. on the hoof	45 Francs
" after fattening	58.40
Cost of 116 days fattening	102.20
Net profit realized in fattening one Ox	30 Francs
Fodder per ox on non-working days, costs	1 " 28
" " " " working days costs	2 " 46

(Translation from the French)

EXCERPT FROM THE JOURNAL DES FABRICANTS de SUCRE, JAN. 1, 1912.

According to report, Italy has given notice that she will withdraw from the Brussels Convention September 1st, 1913. She maintains that she is justified in her action on the ground that the Convention refused her request to be allowed to export as much sugar per annum as Russia. She wants a free hand, so that she can export sugar anywhere she pleases in the future. She also states that her subjects derive no benefit from the Brussels Convention.

RUSSIAN SUGAR.

EXCERPT FROM DIE DEUTSCHE ZUCKERINDUSTRIE, JAN.26,1912. p.71

(Matter in Parenthesis inserted by Truman G. Palmer)

At a general meeting of the German Beet Sugar Industry held in Berlin, Imperial Councillor Koenig, who is also the President of the organization, made the following remarks:

We ought to do everything in our power to limit Russia in her efforts to increase her export trade before 1918. Russia is planning to rid herself of the vast stocks of sugar she has on hand, not merely for the purpose of enhancing her position, but primarily to fill her coffers with millions of roubles. She is very anxious to strengthen her position and increase her production from year to year, which means, of course, a larger increase in her exports to non-convention countries.

Should we, the German beet growers and German sugar trade permit this? If so, Russia would be able to capture the markets of the world, and, ere we are aware, crush our export trade. We must therefore take heed and do nothing which might in any way help to advance Russia's position, especially is this true with regard to preventing her in increasing her production, for, according to the agreement she has with the Brussels Convention she can only expand in exports outside of convention countries in competition with us. Sugar, as you all know, is a world commodity, and Russia will make every effort to compete with us in all directions of the compass. We must not second Russia in her desire to further her exports and rid herself of her surplus production, as the German Sugar Industry and beet growers are already feeling the effects which have been produced by her anxiety to get all the export trade she can gobble.

Let us look into the future and see what harm will come to us on the part of Russian competition. When I say us, I mean the German Sugar Industry, the Beet Growers, and commerce generally. Gentlemen, the three factors, are of one mind, not to help in strengthening the capacity of Russia's output.

Gentlemen, I have faith in the German government; faith in the German law-givers, that they will do their duty and give us, regardless of Convention agreements, a duty which will give the German beet growers and sugar factories such protection as to effectually keep any and all foreign sugar out of the country.

If we can carry on the fight of competition in non-convention countries and our hands be not tied by the Brussels Convention as far as markets of the world are concerned, we do not fear the oncoming struggle with Russia in her desire to gain supremacy. But to sharpen her sword so that she would be able to dislodge us from the sugar markets of the world, that would be asking too much.

What the German Beet Sugar people want is not to have their hands tied too much by the Brussels Convention, but to be able to carry on a war of competition with Russia, whose sugar exports in the near future to non-convention countries we have to fear.

After Russia will have exported all that the Convention allows her; after having sold to England all that country will take, and having gradually increased her production, she will be confronted with the fact that she has large stocks on hand and does not know how to rid herself of them. Russia's sugar stocks are growing tower-like, and there is a danger that Germany will have to suffer from the stones that will fly to all points of the compass.

Russia's acreage since 1904/5 has increased from 478,000 hectares (1,181,138 acres) to 787,000 hectares (1,194,677 acres) in 1912, and her production of raw sugar has increased from 591,000 (in 1894) to 2,080,000 tons. The Government is doing everything possible to further and encourage beet culture, and on March 4th of this year, the Minister of Finance brought in a bill which has since been enacted into law, whereby government aid is assured and facilities granted for the extension of beet culture and the building of new factories. The Cologne Gazette of February 26th, 1912. says:

> "It is Germany's duty to put on her armor and be ready for energetic competition in the world's sugar markets".

If you picture to yourself that from 591,000 tons in 1894 Russian sugar production has risen to 2,080,000 tons in 1911-12, we have no guarantee as to the limit that her production may reach. We will have a war of competition on our hands and we will have to fight that war under unfavorable conditions.

Mr. Secretary of the Treasury and Gentlemen:

I have here a report, informing me that large quantities of Russian sugar are now stored at Vladivostock, Port Said, Le Havre and Hamburg, and we must be on the lookout that this sugar does not reach the European markets - in which the eleven (11) convention countries are interested. The steamers "Vladimir", "Moughieff", "Mars" and"Cerena", each with a wagon load of 200 tons are now on the way to increase the stocks of Russian sugar at above points.

Our sugar factories and allied industries give occupation to 270,000 workmen in addition to field laborers engaged in beet culture.

Now let me illustrate as to how we are likely to be inferior to Russia in competing in the western world (United States). Odessa, not long ago, quoted 5.08 roubels per pud for (consumption inland) sugar and quoted export sugar at 1.73 roubles; that is to say, 100 Kg. sugar consumed in Russia was quoted at Frcs. 82 ($7.18 per 100 lbs); 100 Kgs. for export Frcs. 28 ($2.45 per 100 lbs.). In other words, considering the high prices obtained in Russia from her 150,000,000 people for sugar consumed in Russia, the factories were able to throw all they did not consume at the heads of foreign buyers at a great loss - that loss being only apparent - for their average profit was considerable. Count Khevenhueller of Austria, has calculated that in reality the Russian law gives Russian sugar a bounty of 17 francs 60 per 100 Kilograms ($1.54 per 100 lbs.), and Count von Schwerin calculated that Russia is now able to sell her sugar (100 Kgs.) about 12 francs ($1.05 per 100 lbs.) cheaper abroad than the price her native consumers have to pay.

Mr. Secretary, if you have the interests of the German Sugar Industry at heart, then co-operate with us in enabling us to manufacture sugar cheaply, so that we may succeed in competing with Russia successfully in the markets of the world.

You are aware of the fact that the United States of America has granted the Philippine Islands to allow sugar up to 300,000 tons to enter free of duty; this quantity however, has not been reached, and it will be a long time before it does reach that figure.

This preferential favor is due to the President of the United States, Mr. Taft, who, whilst Secretary of War, took an interest in Philippine affairs in general.

The Beet Sugar Industry of the United States did not like this and in this respect their interests are identical with those of the beet sugar industries of the world - and it is not likely that within the next fifteen years the Philippines will be able to supply more than 180,000 to 200,000 tons per annum. It would be very unpleasant for us if the Philippines would exceed this quantity, but still more unpleasant for the German sugar people if the North American Beet Sugar Industry should reach a higher development than it has now.

You all know that this campaign has a surplus of about 1,900,000 tons and most of that surplus is in Russia, or in various ports, in bond, for Russian account, speculators and others, and her exports are liable to increase to the East and to the American continent and Canada, and we also know that the English invisible stocks are tremendously large.

The Russian Government in consequence of having a large surplus has reduced the price limit to 5 kopecks per 110 pounds ($1.20 per short ton or about 6 cents per hundred pounds), so as to stimulate home consumption.

We must also note whether the Austrians will export sugar in the raw, as Austria exports annually as much sugar as she consumes.

In the name of the Association I have to thank the first President, His Excellency von Gunther, for having honored us with his presence at this meeting.

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AGREEMENTS RELATING TO BEET PRICES.

EXCERPTS FROM THE WOCHENSCHRIFT DES ZENTRALVERBANDES DER RÜBENZUCKER INDUSTRIE.

Feby. 14, 1912, page 116 & Mar. 13, 1912, page 200.

The Association of the Sugar Factories of Prague have made an agreement with the leaders of the Beet Grower's Associations, relating to beet prices to be paid for the coming campaign, 1912 - 1913. A fixed price (sliding scale, according to sugar quotations excluded) Kr. 2.50 (0.50½ cts.), delivered at Depot Kr. 2.40 ($0.48¾cts.) at any field where a receiving agency is established; the customary grant for cartage (if cartage to the factory) is made to the growers, i.e.

4 Kg. sugar .... 8.81 lbs.
8 " seed ....17.6 " and

60% fresh slices at factory. If the slices are to be shipped to R. R. Station by the factory only 50% of fresh slices are allowed.

The Royal Austro-Silesian Department of Forestry and Agriculture in Troppau publishes the following statistics relating to beet prices:

On January 27, 1912, representatives of beet growers and sugar factories Troppau, Freiheitsau and Warsowitz, came to the following agreement:

The beet growers have the option to sell beets at a fixed price or to deliver them on the basis of a speculative price. If sold at a fixed price - 100 Kg. beets f. o. b. R. R. Station Troppau, Kr. 2.45 ($0.49¾¢) are recorded and all usual stipulations remain in force, the price at weighing is diminished by 10 hellers = Kr.2.35 (47.7¢); 50% fresh slices at factory given free and 10 Kg. (22 lbs.) of beet seed per 100 Kg. beets actually delivered - any quantity in excess of 10 Kg. desired by the farmer has to be paid for at Kr. 1.20 per Kg. (24.3¢)

Those who wish to speculate with their own beets - receive Kr.2.00 (40.6¢) for 100 Kg. at factory in the shape of an initial price; for each additional Kr. quoted for raw sugar (notice of quotation) over and above 21 Kr. (4.26¢) up to 25 Kr. (5.07¢) an additional hellers (9) per 100 Kg. has to be paid at the factory, for each additional krone over and above 26 Kronen (5.27¢) to inclusive 30 Kr. (6.09¢) 8 hellers (1.6¢) per 100 Kg. will be paid, and from 30 to 35 Kr. and over ($6.09 to $7.10) 5 hellers (One cent) will be paid additionally on every 100 Kgs. of beets.

To avoid misunderstandings, beet growers will bear in mind that only 2 Krs. (40½¢) per 100 Kg. will be paid on delivery and the final adjustment of balance that might have to be paid will only take place in the course of January 1913, and notification of sugar prices for October, November and December, 1912, will serve as the basis of adjustment.

MEMORANDUM.

The factories grow some of the beets themselves. Some are provided by the shareholders. The greater part, however, are those used in sugar-making in Germany, these are generally called purchase beets. They include beets grown by shareholders and others in excess of what they had contracted to furnish, also include beets from fields not owned by shareholders.

As a general rule, beets are bought by contract made in advance (about sowing time) - in conformity with such contracts certain conditions must be adhered to, one of them being that the beet growers have to sow a given quantity of seed which is furnished free of charge by the factory or furnished by the latter at cost price. In Germany, the Kleinwanzleben is the favorite seed.

TRUMAN G. PALMER
SECRETARY
UNITED STATES BEET SUGAR INDUSTRY
901-903 UNION TRUST BUILDING
WASHINGTON, D. C.

TECHNOLOGY OF THE CHEMISTRY OF SUGAR.

EXTRACTION OF SUGAR FROM THE BEET.

Translation from the "Journal des Fabricants de Sucre," February 28, 1912.

Scheinberger Szegedin, Hungary. The strips of beets are placed into the diffuser and exposed to the action of a cold diluted solution of sulfurous acid. The extraction of sugar is made more rapidly and more completely than with ordinary diffusion. Sulfurous acid coagulates albumenoid substances that remain in the pulp, thereby increasing its nutritive value. The cellulose of the beet is disintegrated and the incrusting substances are dissolved. This increases the organic substances contained in the juice but does not cause any difficulty as lime will precipitate all these substances during the carbonation.

The work is simplified by this process and a loss of heat is avoided. The diffusers ought to be covered with a layer of varnish so that the partition walls may be protected against the action of sulfurous acid. Wooden tanks may be used. The juice extracted is grayish green and muddy; part of the latter substances easily settle. The juice settles much easier and more thoroughly when submitted to a pressure of several atmospheres. The filtered juice is of a gold or greenish yellow color. It is then submitted to a calcium carbonate clarification and a clear raw sugar is obtained.

The exhausted pulp is colorless and still contains a little sulfurous acid, from which it must be freed so as to be fit for fodder. The pulp is systematically exhausted and pressed. The acid water may be used over again in the work of extraction.

As regards the use of bisulphite of aluminium as a solvent and antiincrustation item in the manufacture of sugar, Mr. O. Dureaux, chemist at Givry, Belgium, recommends the use of bisulphite of aluminium $Al(HSO_3)_3$. This has a strong affinity for water and forms an aluminous congelated coating which absorbs the organic matter, thus preventing the incrustation of tubes of the evaporating apparatus.

The following process is used: Carbonated juice, which is neutral to phenolphthalein, is filtered, then to every 10 hectoliters of clear juice, 300 centimeter cube of the aluminium salt are added. This mixture then passes into the storage vat for evaporation. The bisulphite of aluminium is immediately broken up or hydrolized (dissolved).

The sulfurous acid formed destroys part of the organic coloring matter, while the alumina attacks the surplus lime to form an aluminate of lime which is insoluble. This latter material coagulates in the shape of a gelatinous substance. The juice is now subject to evaporation and prevents, by reason of its being kept boiling, the adhesion of mineral substances on the heating tubes.

Using bisulphite of aluminium, it is not necessary to clean the evaporation apparatus during the whole period of the campaign; furthermore, the evaporation is easier, the juice having a greater fluidity at the point of ebullition.

Syrups coming from the third body of the evaporator at 27–30° baume, continues Mr. Dureaux, pass through Dausch filters where the aluminium jelly is retained. In passing through this gelatinous mass, the syrup undergoes a decolorization due in a large part to the absorption of some of the organic coloring substances.

The syrup thus treated is rid of almost all of its impurities and may pass on to crystallization. Alkalis in the shape of saccharates of potassium and additional combinations are completely eliminated and crystallization in the crystallizer takes place more readily. Mr. Dureaux says that this process was used with success during three campaigns.

Bisulphite of aluminium has been known in the sugar factories as a clarifying agent since 1838. Several times this salt was recommended to sugar factories but somehow only a few used it.

EPONITE, CLEANSING PROPERTIES OF SAME: EXPERIMENTS MADE BY M. F. STROHMER, DIRECTOR OF THE CENTRAL LABORATORY OF THE AUSTRIAN SUGAR INDUSTRY.

Very favorable results have been obtained by Mr. Strohmer in the use of this new discoloring agent, eponite, as a substitute for bone-black.

Mr. Prinsen-Geerligs also has made experiments with eponite and has published the results in the "Archief." He finds that there is a good decolorization but a quantity of the fine particles of eponite pass the filters, so spoil the decolorization effect. The particles of eponite pass through the best and most closely made filtering paper.

The tests made at the refinery of Amsterdam by Mr. Spakler confirm the laboratory results of Mr. Prinsen-Geerligs as regards the passing of eponite through filters. A large quantity of eponite remains in the filtered products, as the cloths of mechanical filters in factories are not as densely woven as the best filtering paper. As regards the decolorization properties of this new vegetable carbon, Mr. Spakler concludes that the cost of discolorization considering bone-black as 1, amounts in the case of eponite to 1.7 and in the case of blankite to 2.0. Eponite, according to Spakler, can not be properly used for manufacturing white sugar as too much of it passes with more or less facility through all the filters.

According to Spakler, bone-black is the most useful and the least expensive of all the decolorization substances hitherto brought forward.

ECONOMICAL FILTRATION.

Translation from the Supplement "Journal des Fabricants de Sucre" November 20, 1912.

From the standpoint of a chemist, filtration in sugar factories and related industrial enterprises, is carried on by means of filtering substances which either act in a purely physical capacity or combined with a chemical process.

Bone-black is one of these substances which proved very useful to the French sugar industry while it was in its infancy and was one of the factors which helped this industry to pass beyond the first stages of its industrial life. But its use was rather costly; in 1860 the expense for bone-black per bag of sugar was 58 cents. This expense was gradually reduced as improvements were made in the machinery employed and also in proportion to the increase in the sugar content of the beets.

Bone-black was ostracized in France in 1880 after having been continuously used during a period of 70 years, and filtering bags were substituted. Then substitutes for bone-black, such as silex, sand, mineral carbon, etc., were tried and highly praised. Filters of these substances were used in colonial and native sugar factories and in other industries, but on account of the construction of the apparatus, the process was slow, yet good results were obtained.

A great many years passed without appreciable progress in this branch of industrial activity.

For a long time chemists have been looking for an appropriate method of energetically clarifying sugar juices; the writer has resumed the study of this question and from a technical point of view has placed a new light upon it.

The apparatus, the filtering substances and the liquid to be filtered being the correlated factors in all filtering processes, a methodical system of filtration has been found depending upon a method of automatic washing out and regeneration of the filtering substance in the filter itself. This system necessitated the use of a filtering base that would prove its efficacy when brought into contact with sugar containing liquids. The search did not last long, for the hitherto banished bone-black was again brought into the foreground. This choice was a fortunate one.

Under the old regime of sugar extraction, bone-black was the slave of many manipulations and played many parts in a sugar factory—it was simultaneously used for decanting, filtering, clarifying and decolorization; in the future its work will be less arduous—it will be used for nothing else but for clarifying juices and syrups

As far back as 1866, the fact was established that color was no obstacle to the formation of white crystallized sugar. From that moment on it was not necessary to rely on the decolorizing power of bone-black.

This and other considerations which are due to the adoption of a methodical system, have enabled us to minimize the quantity of bone-black required to achieve an intensive clarification of the sugar containing juices.

I here give an example of my method of application of bone-black:

A factory which works over 300 metric tons (of 2,204 pounds per ton) of beets every 24 hours is provided with a battery composed of 3 units. Each unit is charged with 1056 quarts of granulated bone-black equalling 1102 pounds. During 6 hours the unit works on the syrup, then during the next 11½ hours on juices, so there are constantly 2 filters in operation with juice and one filter with syrup. During the rest of the 24 hours the cleansing of the filtrating substance takes place. This operation comprises desugaring, viz: washing out and regeneration, which is also done automatically and requires about 30 minutes.

Two cleansings are made every 24 hours, causing a waste of about 22 pounds of bone-black, which quantity is replaced every day from the reserve supply.

Expenses entailed are as follows:

10 kg. of black used, 25 centimes = 22 pounds of black used, equalling 5 cents.

Cost of regeneration, fr. 1.50, equalling 29 cents.

Expenses calculated on 300 metric tons of beets, 4 francs, equalling 77.2 cents.

As each metric ton produces on an average 110 kilograms (242½ pounds) of sugar it follows that the expense connected with 100 kg. (220 pounds of sugar) will be 0 fr. 01.15 centimes, equal 0.00219, equal ½ cent for every 220 pounds, equal $\frac{2}{10}$ cent per 100 pounds of sugar.

The method of regeneration applied is less costly and more complete than the ordinary revivifying process in the hot chamber; this latter process has serious drawbacks, for in burning off the carbon the filtering channels of the bone-black are destroyed and in a short space of time the bone-black presents the appearance of small pebbles that have lost all the chemical and physical characteristics of the original bone-black.

Before concluding I wish to give the expenses connected with the use of bone-black at different periods:

In 1860, with the old filters, per 100 kg. of sugar	0.58	ct.
In 1880, with the old filters, per 100 kg. of sugar	0.29	ct.
In 1912, with the methodical system, per 100 kg. of sugar	0.0022	ct.

This last figure being so extremely low will be a great surprise to chemists and engineers, but it proves that the old method of using bone-black was faulty and the expense connected with its use very high.

Freed from antiquated methods bone-black can now unfettered follow the new economical path mapped out for it.

(Signed) L. Wackernie.

RENDEMENT IN THE FACTORY.

- By -

EMILE SAILLARD.

EXCERPT FROM THE JOURNAL des FABRICANTS de SUCRE, FEB. 28, 1912.

Amongst the soluble substances which the beet contains there is an azotic element (such as asparagine, glutamine, aspartic acid, glutamic acid), that has a rotatory tendency and that is not precipitated by sub-acetate of lead.

Asparagine which was discovered in 1805, by Vanquelin and Robiquet who found it in Asparagus, was likewise discovered by Rossingnon, in the Beet by Clerget in 1851.

In a very able paper in which Pasteuer(points out the crystalline relations and the rotatory tendency in 1851,) made a special study of Asparagine, acide aspartique, malic acid, malates, formiate of Strontiane and glucolate of marine salt, he shows particularly that Asparagine and acid aspartique (aspartic acid was discovered in molasses by Scheibler in 1866) have a rotatory dextrogyric tendency in an acidulated medium acidified chlorhydric acid and a rotatory levogyric tendency in a medium alkalised by potash, soda or ammonia.

According to Pasteur, chlorhydric acid, azotic acid and above all sulfuric acid, do not exert the same quantitative action in this connection and nitric acid has a much weaker influence than the mineral acids above mentioned. Based on this data, Clerget has somewhat modified his method of inversion to the sugar beet juice. (Analyses of Sacchariferous substances by Clerget).

He made it a point to take his reading from the left, after having with soda, neutralized the inverted liquid (at that time the influence of sugar concentration and of acidity upon the rotatory power of invert sugar was unknown). The way paved by Clerget was worthy of careful study. Clerget's method was employed with all sorts of varying modifications - as regards the duration of heating - and concentration of the liquid. Clerget's method, pure and simple, was not employed, and therefore the results published were misloading.

In order to determine the quantity of dextrogyric substances other than sugar contained in the beet, an ascending scale from dextrogyric substances of molasses was followed to reach the raw beet. (Difference between direct polarization and Clerget).

The opposite should have been done after inspecting the Dextrogyric substances of the beet, those substances that remain in purified and evaporated substances should be analyzed and inspected. We did this in two factories. During ten hours, we took diffusion juiced which immediately were mized with the usual quantity of sub-acetate of lead. We also took a sample of boiled virgin mass, and of the corresponding mother residue.

In the Syndicat's Laboratory from each sample we obtained the direct polarization and polarization after inversion, according to Anderlik's method, that is to say, in a medium of the same chlorhydric acidity we succeeded in getting results on 100 Kg. beets. It was found that the difference between acidic direct polarization and sugar had diminished from the gauging vats of diffusion to the boiling of the first product. This decrease in difference was not the same in both factories.

Azotic substances contained in the beet (aspartic acid, glutanic acids, Betaine) contain about 10% azote. Although the conventional organic non-sugar of cleansed products contain still 10% of Azote, it must not be concluded that this non-sugar is formed exclusively of azotic substances. It can only be established that the Azotic substances form a goodly part of same. If the total Azote of the beet is divided into albuminoid Azote, Amide Azote, Ammoniacal acid and pernicious Azote, the azote that cannot be eliminated by the calco-carbonic process proper as belonging to the two last groups which represent 40% to 50% of the total Azote, and are developed by substances, then some of these groups will have no rotatory tendency.

On the other hand the beet contains 1.3 to 2.4 of Azote, total for 100% of sugar, which makes 0.6 to 1.2 non-albuminoid Azote for 100 of sugar, that is to say, 0.09 to 0.019 for 100 Kg. of beets = 0.023 to 0.049 for the test sample of 26 grammes of grated beets. And as 0. gr. 15 of aspartic acid are required per 100 c. c. to get a direct acidic polarization of 0.22, it can be seen that the Azotic substances of the beet may cause such a result of direct polarization which cannot be disregarded.

I will, however, add, that if you take into consideration the losses of polarization which we noticed in heating (') certain azotic substances of the beet in an alcaline medium, it will be seen that the ammoniac liberated in the factory often corresponds to losses of polarization more or less important.

(') The heating was effected at 92, 97, 105, 110 and 115 degrees.

PURIFYING MOLASSES.

EXCERPT FROM JOURNAL des FABRICANTS de SUCRE, FEB.28/12.

Mr. A. Pollacsek in Florence has patented his purifying process for molasses which consists in the following:- Molasses is heated in the open air and mixed with the required quantity of soda necessary for that purpose, and all the substances can be eliminated by this reactive agent.

The precipitate is separated by filtration and the filtered mass is mixed with alcohol, which forms new precipitates. The filtered portion of this new precipitate is submitted to distillation so as to recover the alcohol and the two precipitates can be used as fertilizers.

Molasses thus treated is more or less without salts, without asparagine, gummy and pectic substances, without protaic substances, those impurities that have passed into the two precipitates. This treatment can be repeated until no increase in the purity of the filtered molasses is noticeable. The increase in purity having arrived at its limit, purified molasses can now be returned to the factory, sugar factory or refinery, according to its purity.

1 Kilogram of molasses of the factory, treated in the above described manner with twenty-five grammes of silicate of alcaline gave an abundant precipitate, but the filtered portion did not show an increase of purity. After a second precipitation with 500 grammes of alcohol the filtered liquid showed a purity of 72. The purity rose to 85 after repeated treatments by double precipitation.

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(Translation from the French)

EXCERPT FROM THE JOURNAL des FABRICANTS de SUCRE, 13th MARCH, 1912.

SULFICARBONATATION.

(Boczeczki Factory).

The "Westnik Sakharnoë" (a paper published in Russia 12th February 1912) contains an article written by M. J. F. Widawsky, technological engineer, Director of the sugar factory Boczeczki, bearing on his work during the last capaign of 1911-12 (duration of which was a little more than four months), especially in connection with Sulficarbonatation.

"We have been working with this process at the Boczeczki factory since the campaign started, that is to say, for the past three months. The work was carried on without a hitch and with great regularity. By reason of the use of this system, we were able to dispense with the 3rd carbonatation, also with one filtration, and one pump was dispensed with.

It proves therefore, that sulphurous acid accomplishes, in consequence of scientific application, all that could be expected of it. Easy filtration, minimum of salts of lime, syrups in a good state of fluidity, showing very little color, excellent boiling conditions, quick and easy turbinating action, giving an excellent quality of white sugar made up of very brilliant crystals".

These lines were written by the Director of the Boczeczki sugar factory and he emphasizes the fact that the system of sulficarbonatation used in his factory worked like a charm.

We must not omit to mention an item, which will be of interest to those who use sulphurous acid in sugar making. The syrup, leaving the evaporating process and which with the aid of water is brought back to the density of the initial juice, shows less color than this juice; whereas, other syrup manipulated under ordinary conditions, without this sulficarbonatation - shows 2 to 3 times more color than the initial juice from which it was obtained.

Mr. Widawsky therefore, maintains that the theory of Weisberg regarding the action of sulphurous acid and the consequent low degree of solubility of sulphate of lime in the course of the process of sulficarbonatation, is correct.

Mr. Widawsky had, moreover, a very curious experience with "thawed" beet roots; the juice from these beets was very much more colored than that obtained from healthy, well preserved beets.

In studying specially the decolorating action of sulphurous acid upon colored juice he made laboratory experiments upon one and the same juice. In comparing the action of Bone Black with that of sulphurous acid under conditions effected by sulficarbonatation, he found:

a) Coloration of juice after the action of bone black 2-½ times less intense than that of the initial juice;

b) Coloration of the juice after the action of sulphurous acid in sulficarbonatation - 4½ times less intense than that of the initial juice.

In conclusion, we may add that the work of clarifying the juice in the Boczeczki and Lgow factories is a continuous process from the start to the finish, namely, with sulphurous gas obtained from combustion of sulphur. As the liquid Sulphurous Anhydride is under actual Russian Industrial conditions as yet too costly to be extensively applied, it is entirely due to our friend Smolensky, who two years ago inspected the installation of the

Beauchamp factory - "the cradle of sulficarbonatation as he called it" - that the continuous process of sulficarbonatation has been introduced into Russia.

(Signed) J. Weisberg,

131 Place l'Amiral Courbet

Lambersart - les - Lille.

EXCERPT FROM THE JOURNAL des FABRICANTS de SUCRE, APRIL 10, 1912.

\- by -

GEORGES DUREAU.

We wish to urge upon the factories, through the medium of this paper, the necessity of supplying the rural population with an abundance of literature so as to enable them to adopt the most modern improvements both as to beet culture and sugar-making. Such a proposition has already been submitted to the Departments of Agriculture and will receive their hearty co-operation.

Independent of the writings of Messrs. H. Prinsen Geerligs, Noel Deerr, Jones and Scard, we would welcome any good writer who would furnish us with sugar literature, and also any French editor who would be willing to reproduce translations on the cultivation of sugar cane and the sugar industry in general. What our French industrial establishments and colonies are in need of is a good library containing technical works of recent date from which they could gather useful information. In this connection, we would call attention to two books written by Prinsen Geerligs and M. Noel Deerr. The editors of these two books would like to print them in French if the translations were made for them - 5,000 francs would be all that is necessary for this purpose (translations) a year - and a real service would be rendered to manufacturers and agriculturists alike, for it is by reading the technical writings and periodicals of sugar experts that tends to enlighten the people who are engaged in the sugar industry.

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B E E T B A L L S.

(Large versus Small)

WHICH ARE THE BEST?

EXCERPT FROM THE JOURNAL des FABRICANT de SUCRE, AP.10/12.

In many agricultural districts the question has been discussed whether on account of the scarcity of beet seed, it would be possible to economize with the quantity of seeds to be sown.

After a certain number of experiments had been made in germination with seeds harvested in 1911, it was found that one kilogram contained about 110,000 beet balls, whereas, Magdeburger experts consider a seed yielding 70,000 beet balls per kilogram as satisfactory. There are some, who have suggested that the quantity of seed sown per hectare, be reduced by 30 per cent. Is this feasible or expedient? Dr. Stoermer of the Institute for Plant Culture of Stettin has considered the subject in this way: He says, is it possible that the quantity of seed to be sown could be reduced per hectare, because a kilogram of seed this year developed more germs than during previous years?

A fact which cannot be disputed is that last year's seed was made up of small beet balls, because their development was defective and they ripened prematurely. It stands to reason that prematurely ripened seed has not the required vigor and Dr Stoermer basing himself on experiments made during several years past with seeds of varied dimensions, obtained the following results from 7 separate samples of seeds, type Klein-Wanzleben, harvested in 1910:

THICKNESS OF BEET BALLS.

	Over 4 m/m.	3 to 4 m/m.	$2\frac{1}{2}$ to 3 m/m.	2 to $2\frac{1}{2}$ m/m.
COMPOSITION OF SAMPLE.				
1st. Weight (Kilogram):	3.632	6.225	3.189	1.221
2nd. Per Cent:	25.45	33.63	22.36	8.56
No. of beet balls in a Kg. of pure seed	30,000	52,800	91,000	152,000
" " embryos in a Kg. " " "	94,800	134,200	204,100	318,200
Germs in a Kg. of seed (Artificial Germinating test	88,000	97,000	106,000	95,000
Germinative Capacity (percentage) Number of germs x 100 divided by number of embryos	92.6	72.5	51.9	29.8

THICKNESS OF BEET BALLS. (Con'td.)

COMPOSITION OF SAMPLE:

	Over 4 m/m.	3 to 4 m/m.	2½ to 3 m/m.	2 to 2½ m/m.
Weight of germ in a Kg. of pure seed	2,680	2,470	1,820	1,160
Weight of 100 germs	3,044	2.551	1,320	1,222
No. of plants that came up in the field from 1 Kg. seed	51,300	54,000	47,600	33,200
Growth to maturity in the field, percentage of germinating capacity	58.4%	55.7%	45%	34.9%

These experiments show that the seeds with small beet balls give a larger number of germs per Kg. than those having large beet balls and this is on account of there being more small ones than large ones in a given unit of weight.

But if you compare the weight of the germs produced it will be noticed that those coming from small beet balls only weigh 1/3 or one quarter of the germs coming from large beet balls, because being smaller they are less vigorous than the larger ones and if (which is more important from a practical point of view) germinative experiments are made in the fields instead of in pots, it will be found that a Kg. of small seeds produce a smaller number of maturing plants than a Kg. of thick or medium sized seeds.

According to the above experiments, only 40 to 45 per cent of the large beet balls that germinated went to waste, and of small beet balls 55 to 65 per cent did not mature; therefore if a kilogram of well developed seed (say numbering 70,000 at the germinative test) is sown, more plants will come up and mature than from seed having small beet balls of which 100,000 to 130,000 go to make up a Kg.

If, therefore, we can obtain the same number of plants from the two kinds of seed, we ought to sow not a lesser weight (with small beet balls); we ought, on the contrary, sow more.

In the above mentioned experiment 1 Gramme of large beet balls produced 50 to 55 plants; one gramme of small beet balls yielded only 33 to 48 plants; consequently, in order to obtain the same number of plants from the field, it was necessary to sow about 1.5 Kg. to 1.6 Kg. of small seeds for every 1 Kg. of large seeds, that is to say, this year it will be advisable or rather practicable, to increase by 30% the weight of seeds put in the soil rather than to diminish it. However, the present scarcity of seed in the world's market does not very well permit of an increase in seeds per hectare. It is therefore incumbent on us to surround ourselves with favorable conditions and make sure that we get a rapid and vigorous development of the beet.

Every foot of ground should be well supplied with lime, well fertilized, thoroughly worked over, and harrowed several times, in order to have the soil well broken up. Late sowing is advisable, so as to guard the young beetlets against spring frosts.

Shortly before sowing, the necessary quantity of hypophosphate should be applied to the beet field; 65 to 80 Kg. phosphoric acid per hectare; 150 to 200 Kg. Nitrate of soda per hectare. This is necessary in order that the young shoots should get the benefit of the fertilizer supplied. The seeds should not be sown very deep in the ground, still sufficiently so, to provide them with enough moisture to facilitate germination. A space of 40 centimeter or 16 inches should separate the rows of seed sown. Laborers should only use such agricultural implements as they are familiar with.

Dr. Stoermer concluded by saying that a beetlet has a marvelous resisting power especially when properly attended to, when a proper quantity of nitrate of soda is added to other fertilizer and care is taken to hoe the plants methodically.

Mr. M. H. Schmidt, who owns an estate at upper Thiemendorf, having experimented during several years with large beet balls succeeded in getting more beets per hectare than from small ones. It is true that he obtained at first a larger number of germs from small seed balls but they did not reach maturity in proportion to germs from large beet balls. A luxurious growth of foliage was noticed in plants from large beet balls, but plants from small beet balls grown in pots (side by side with the others), were behind in development, were scanty as to foliage, vacant spots occurred in each row and even at a distance the difference between the two was easily discernible.

The yield of beets raised from the small beet balls was 40 per cent smaller than the quantity of beets raised from large beet balls, and Mr. Schmidt concludes in view of the fact that some defective seeds might reach the beet growers, it is advisable to increase rather than diminish, the weight of seeds allowed per hectare.

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(Translation from the German) Vienna, April 17, 1912.

EXCERPT FROM THE ZENTRALVEREINES FÜR DIE RÜBENZUCKERINDUSTRIE OF AUSTRIA, HUNGARY.

PROHIBITIVE MEASURES TENDING TO STEM THE TIDE OF EMIGRATION OF RUSSIAN PEASANTS TO THE HAWAIIAN ISLANDS.

The Russian Government is spending immense sums of money in developing and colonizing the Amur Region , its attention having been called to the activity of the "International Bureau" selling cheap tickets to Russian subjects willing to emigrate, especially to the Hawaiian Islands. Numerous would-be emigrants, holders of tickets for the Hawaiian Islands were forcibly prevented from crossing the frontiers and were sent back to their native villages and indictments against them were prepared, charging them with unlawfully and clandestinely, trying to leave the country - and are to be prosecuted according to certain articles of the Criminal Code that provides punishment in such cases.

It is evident that this step on the part of the Russian Government will doubtless seriously affect labor conditions in the Hawaiian Sugar Cane fields, and indirectly, their Sugar Industry.

LECTURE BEFORE THE SOCIETY OF CIVIL ENGINEERS
19th April, 1912.
- By -
M. A. GILBERT.

ENGINEER OF ARTS AND MANUFACTURES, ACTING DIRECTOR OF THE CENTRAL SUGAR FACTORY OF CAMBRIA, FRANCE.

In spite of disastrous legislation affecting the Beet Sugar Industry our manufacturers never lost confidence in the future of the industry, with the exception of the year 1841, when one hundred of them operating in the Nord Pas de Calais and Aisne, united in a petition to the State to buy out their factories. Others, still having faith in the industry, have continually made efforts to improve their methods. As early as 1813, M. de Koppy, who was acquainted with the work of Achard, and who, as a Cossack officer, had visited the factory of Matthieu de Dombaste near Nancy, had expressed his admiration for our methods and stated that the Germans were far behind the French.

But oh! what progress we have made and what a vast difference there is between the modest factory of Achard and the modern factory of today. Let us pay our tribute to French genius, to whom the honor belongs for having invented the principal technical improvements made in the Sugar Industry.

The principal operations in the factory consist in extracting the juices by diffusion, (which process is now universally adopted in all sugar factories) by Matthieu de Dombaste, and the purifying is carried on on the lines mapped out by Rousseau, Perier and Possoz. Evaporation by multiple effect invented by Rillieux, and continued by Cail; - the work of crystallization regulated by the work of Manoury and Ragot. Let us add the name of Louis de Vilmorin, who was the creator of the rich sugar beet and who was the first to put into practice the rational selection of the industrial sugar beet.

Let us admire French science, which has mapped out for us the essential outlines of a very complicated industry. The raw material of our industry is the sugar beet, we will therefore not consider this plant from a botanical or physiological point of view. It is supposed to be indigenous to the southern part of Europe, and especially to Spain and Portugal.

Olivier de Serres writes that the red beet was imported from Italy into France at the end of the sixteenth century. One hundred years later, Vilmorin Senior and Abbot Commerel introduced it from Germany where the culture of beets had been preceded by a few years.

Ever since the research work of Achard, the sugar beet has been studied very closely; Payen and Dubromfants work showed besides sugar - pectine gelatanizing principles - coloring elements, azotic elements albumen, organic acids and mineral substances.

In his compendium of Industrial Chemistry, Payen gives for the white beet of Silesia the following proportions:

Water	83.5
Sugar	10.5
Cellulose)	
Pectose)	0.8
Albumine, Casein and other azotic substances	1.5
Diverse Acids	3.7

Many agricultural scientists, among whom may be mentioned Louis de Vilmorin and Aime Girard took pains to cultivate the beet rationally and by careful selection gave us a sugar beet (a saccharine containing plant) the root of which had a sugar content which varied with the seasons; we had the same experience the last two campaigns, and the figures given below by M. Saillard do not deviate to any extent from the following:

Dry substances	22 - 24 Kg.
Sugar	15 - 20 "
Potash	0.22-030 Kg.
Phosphoric Acid	0.08-0.12 "
Total Azotes	0.16-0.28 "

It contains 95% of juice and 5% of solids, made up of cellular tissue, the intercellular substance, of which is Cellulose. The juice which is contained in the cells of the beet is not a pure sugar solution; it is a diluted impure solution, and it is the presence of these impurities which complicates the work of the manufacturer, necessitating the process of a chemical purification.

For a long time, the richness of the beet cultivated in France was very slight; - the manufacturer and farmer alike, made efforts to obtain per hectare as big a yield as possible and were able to produce beets weighing as much as 1500 grammes each (about 3 lbs.), but which did not always ripen because they were planted late, and being badly attended, grew largely above ground.

In the beginning of these practices, the results were superior to those obtained abroad, and if Bassett is to be believed, beets with 8% in Germany's yield were 1600 to 2400 Kg. of sugar per hectare, whereas, France produced 2000 to 2800 Kg. of sugar with roots of 6% sugar content. However, this was soon inverted. Associations were formed in Germany for the improvement of the beet and the manufacturers obtained deliveries of beets surpassing those obtained by the French, from 20 to 30% greater in richness.

In 1860, Ferdinand Knauer of Grobers, near Halle, produced a variety called the "Imperial Beet" which yielded 17% of sugar. Koppy obtained on his estate in Silesia, roots of a normal weight, but they contained a saccharine richness of 15.5 to 16%.

What was done in Germany was possible in France, for in 1856, Louis de Vilmorin obtained beets which contained 20% of sugar according to the report of Mons. Sauray. However, a tax was placed on the beet in Germany; the manufacturers meanwhile had taken all the necessary measures to make the plant progress to the limit of its sugar yielding capacity, using the most improved methods of manufacture, so that they could extract every particle of sugar the beet contained. In 1871-72, Germany harvested 20,415 Kg. of Beets and from every 100 Kg. she extracted 8 Kgs. 28 of raw sugar.

The following table shows this progress:

	Kg.	%
1871	20,435	8.28
1872	25,440	8.26
1873	27,240	8.25
1874	20,595	9.30
1875	29,325	8.60
1876	25,200	8.15
1877	27,415	9.24
1878	28,920	9.21
1879	25,200	8.52
1880	32,700	8.79
1881	28,300	9.56
1882	34,400	9.55

In comparing these figures with French figures we find that the factories in France obtained the following quantities per 100 Kg. of sugar.

1871	----	1877	7.20%
1872	5.70%	1878	5.44%
1873	5.91%	1879	5.45%
1874	5.66%	1880	4.77%
1875	7.20%	1881	6.18%
1876	5.00%	1882	6.10%

In France the tax was paid according to the shade of sugar and the manufacturer did not press extraction to the limit. Experiments made in the use of the Osmose process had for instance shown that these methods were not remunerative. The manufacturer had no financial interest, or rather thought he had none, in obtaining rich beets.

Then the law of 1884 was passed, and agriculturists devoted themselves to cultivating rich beets. But notwithstanding our efforts in this direction, our beets are still inferior to those of Germany and Austria. Germany obtained 47.44 Kg. raw sugar per hectare in 1908-09; 44.14 Kgs. 1909-10; 52.32 Kgs. 1910-11.

Austria's yield during these three years was 41.49; 38.12; 42.86 Kg.

The fields of France during these three years yielded only 35.97; 34.11; 30.46 Kgs. of raw sugar per hectare. Of course, we cannot change climatic conditions; our climate is maritime instead of being continental. France has no very keen frosts during the winter, which occur in Germany and Bohemia, that is to say, the countries showing the most sugar per hectare, for you know these great frosts cause a cleavage and subsidence of the strata of the soil, which facilitates the work and kills the parasitical insects. Then the rotation of crops is different from that of Germany where the sugar beet is not so often planted in one and the same piece of ground, as is the case with us. The question of manual labor is also more acute in our country than abroad. There are other points to be considered however, such as the date of sowing, the care bestowed upon the preparation of the soil, which in France should be vastly improved, and the question of substituting agricultural machinery (in place of manual labor where possible) of a modern type, which would vastly increase the yield of our French fields.

The beets arrive at our factories in a dirty condition, with stones and earth clinging to bifurcated roots and must be washed in the factory and thoroughly cleansed of all exterior impurities. They are then ready for work, they are also weighed. This is absolutely necessary, in order to know the exact quantity of sugar arriving in the factory. It is the first item which should be entered in the factory ledger by each manufacturer, so that he may know the exact value of his process and the cost of operating his factory. The beets then reach the juice extracting department, which is now called the Diffusing Department. The raw juice having been obtained, it has to be purified - which is now done by means of lime and carbonic acid, called the multi-carbonatation process of Perrier and Possoz. Every factory now has a lime kiln and utilizes at one and the same time, lime and carbonic acid brought about by the decomposition of the limestone.

The purifying includes liming the raw juice, also a saturation by carbonic acid or a carbonation followed by a careful filtration which separates the clear juice from the precipitate. The juice is submitted a second time, and sometimes a third time, to the same series of operations before submitting it to the evaporating process. With the process at present in use it is not possible to effect a complete elimination of all foreign matter from the juice.

Evaporating or concentration is carried on in a series of apparatus, a multi-effective operation, the object of which is to bring the juice near the point of saturation, the viscous liquid, slightly colored, which is extracted from the last compartment of the apparatus is called Syrup. This syrup is as a rule submitted to a discolorating action of sulphurous acid before transmitting it to the boiling apparatus where this syrup is concentrated in a partial vacuum, it is then brought to a determined super-saturation and the unstable point of equalibrium is broken so as to bring about the formation of crystals. The operation is carried on in such a manner that the crystals formed in the beginning increase in quantity at the expense of the watery mother liquid in which they are, and finally, a pasty mass is obtained composed of about 2/3 crystals within a bath of impure syrup - this is the boiled mass.

By centrifugals, the crystals are separated from the mother liquid, the sugar is gotten out as well as the impure syrup which is called the dregs of first product. These dregs contain all the non-sugary elements that have not been eliminated during the purifying process, but they still contain sugar, as with the one crystallization it was not possible to extract all the sugar. Formerly these dregs were concentrated again and by slow crystallization a portion of the remaining sugar was obtained. This sugar in crystallizing carried with it some impurities and the centrifugal action, gave a product very much colored and some dregs from which, by a new crystallization, the extraction of some more sugar was possible. These repeated operations lasting a considerable time gave sugar that became more and more colored, and finally, a residue from which practically no more sugar could be extracted, and this residue was the molasses. This method is still used now in some factories, but other modern methods are adopted which make it possible to obtain immediately, in a short time, all the white sugar for consumption.

Rapidly sketched, such are the outlines of manufacture, but each and every one of these operations require special care, special attention and mostly the manipulation of apparatus which is of very complicated construction and delicately adjusted. Besides, the variations in the chemical constituent of the beet compel the manufacturer to make each year a more profound study of the beet.

We will now go into the details of these various questions.

In handling the beets the operation of receiving them constitutes the noting down of the net weight and to determine the density of the juice. For the purpose of determining this, the necessary juice is obtained by pressure. The unloading of beets is a difficult problem for our factories, by reason of their magnitude and the difficulty in getting manual labor.

Official documents go to show that the daily work performed by the French factories is 385 tons and there are factories the capacity of which are seven or eight times greater, and in order to keep these factories going, there must be on hand, every day, on an average, not only 385 tons, but more, for the harvest does not last as long as the sugar making, and it only takes 40 or 50 days for the farmer to make all his deliveries.

In all factories different mechanical devices were studied so as to simplify the unloading operations on a large scale and the cutting down of expenses for manual labor, but unloading by machinery is not as yet generally adopted, for the first installation of the plant involves heavy expenses as its work is only carried on during 50 days of the year, the rate of depreciation is high, but nevertheless, we repeat, by reason of the growing scarcity of manual labor, the manufacturers are obliged to resort to mechanical appliances.

The problem for the manufacturer, however, remains complicated, for the reason that he can no longer supply his needs from the surrounding countries; he has to go some distance to look for raw material, which is no longer brought direct to the factory by the farmer, but is shipped by rail, partly by boat, and the means for unloading both these classes of shipment, have to be provided for, also for loads arriving by carts.

We know that when the French grower Jules Linard made his plans for large factories which he built, he overcame this difficulty in concentrating in one spot a large supply and by establishing factories in which no other work but the extraction of sugar juice was carried on. This juice was then sent by a system of underground pipes to the factory called the central factory, where it was worked over. The solution of this problem was a lucky one, especially at a time when there was no such facility of transportation as at the present day.

Objections are now made to this mode of division of labor, which precludes an efficient superintendence and increases the general as well as the operating expenses. The beets are, as a rule, shipped to the factory faster than they are able to work them, a portion therefore has to be stored, and then when required, taken out of store. Each factory therefore, ought to have storage rooms facilitating the drawing of supplies when needed.

The cleansing of roots is done by water; formerly the cleansing apparatus consisted of rotatory drums; these have been replaced by a device which gives better results; there is also a special apparatus for cleaning the beets from the stones.

The number of manipulations to which the beets are subjected, the violent shakings, detach from the roots fragments, rootlets, and the extremity of tap roots; all these have some value, and they are generally utilized. The washed beets are weighed and carried to the root cutter from whence they are carried into the Diffusors.

In fact, at present, the juice of the beet root is extracted by diffusion. The grating process of Achard was done away with entirely when Champonnois in 1861 constructed a modern grater. The presses were imrpoved by Pesqueur, who invented the surface filter press which since 1869, has been still further improved.

In 1832 Matthieu de Dombaste published his first bulletin on Maceration in which he describes his new process. The theory of this macerating operation is based - according to this famous Agronomic Scientist, upon the destruction of the principle of vitality which existing in the beet was antagonistic to a separation of the juice. He cut the beet in slices to the thickness of 6 mm. and boiled them in a battery of six heated troughs or vats. He filled the vats, and effected a methodical washing out in which the duration of contact in each vat was 1/2 hour; his apparatus was not a continuous one, he advised to bring the heat to 50, 60 and even 80° Reaumur, and later to heat the fresh mass by steam; before the arrival of the juice, to heat the vats and transmit water into the last vat. Unfortunately, it was difficult to work over the juice. De Dombaste destroyed the cells in keeping up the heating too long which allowed proteic and pectic substances to assimilate with the juice.

In 1847, Robert introduced the process of maceration of Dombaste; in 1867 he installed a new battery of closed vats and by modifying the treating process, obtained very good results. In 1871, 16.7% of the German factories operated by diffusion - and in 1882, of 358 factories - 343 had the Diffusion system installed and development after that was very rapid. Quarez installed the first Diffusion System (in 1856) in the factory of Villeneuve-sur-Verberie and this system was now extended rapidly to other factories.

Industrial diffusion is really not a dialysis - it is rather an analysis and a washing - or cleansing. In fact to operate this system the beets are cut in strips of 2mm. thickness which are then called the strip mass. "by making these strips" a great number of cells are opened, the juice is extracted by washing, then the juice still contained in the cells is extracted by Dialysis.

For the purpose of getting a pure juice it is advisable to diminish the number of cells opened by slicing; but on the other hand, in order to draw all the juice as large a surface as possible should be accessible to Osmosis; these two items are opposed to each other, but we know that we wish to produce nice looking strips, evenly cut, and not torn or slashed, nor jagged, and this explains the anxiety of manufacturers to choose with care the kind of hopper they wish to employ in root cutters, also the speed of trays and the importance they attach to the shape of knives, the whetting and setting of these on the root cutters.

In order to extract exhaustively the juice of the beet - evenly cut strips (Cossettes) are necessary, but this is not the only condition in managing a battery of diffusion - attention must be paid to the temperature in each receptacle, to the speed of circulation, and to the method of piling the beet strips into the Diffusors.

During recent years experiments have taught us, that the best results, namely the production of rich and pure juice - as well as exhaustive extraction - are achieved by a well conducted diffusion coupled with rapidity and well regulated heat.

The temperature to be applied depends upon the condition of the beets; under normal conditions 76 to 80 degrees is a good temperature and it is advantageous to maintain the largest number possible of diffusors at a high temperature. Methods of Diffusion are superior to the old method of graters and presses both from the point of view of labor and that of sugar yield. Matthieu de Dombaste gives the cost of labor in a sugar factory as follows:-

He used 15,000 Kg. of beets per day and 22 manual workers connected with the graters and presses. Today, only six workers are necessary for managing the Diffusion Department, and the capacity is 1,000 to 1,200 tons per day. Expenses for manual labor connected with 1,000 Kg. of beets were 1 fr.70 - with the old presses - expenses for the same quantity of beets by diffusion are only 0 frs. 50. With the old presses in the extraction of the juice there was a loss of 1-1/2 to 2% of sugar that remained in the pulp - by diffusion we only lose 0.20% to o.15%.

Great improvements have been effected in Diffusion in late years. Garez especially noticing that heating in the front part of the battery gave better results, the strips being more uniform and the maximum of heat in the first diffusion throwing a jet of steam under the tray of the root cutter and to have the diffusor fed with very hot juice. Our colleague Naudet, who wished to obtain the same results at the front part of the battery forced the circulation of warmed up juice.

When a diffusor is exhausted it contains nothing else but water and strips; it is emptied, but the water contains still traces of sugar more or less and to minimize the loss of this sugar there have been invented a certain number of processes which make it possible to use this water again in the course of further operations. In that way, about 0.25% of sugar (on 100 Kg. beets) is recovered and if this method is applied to the water running off from the pulp presses of which we will speak later on the sugar receovered may amount to 0.40 per cent (0.40 per 100 Kg. Beets).

The Austrian engineers Hyross and Rak, have combined an apparatus which has been installed in the sugar factory of Boemish Brod in Bohemia The process is continuous and consists in passing the beet strips into a series of receptacles and to submit them to a pressure between each box - the water is introduced into the last Diffusor; in each case the water followa the same way as the strips- but when the strips pass successively from Diffusor No. 1 to No. 2, and so forth, into the last numbered (6), the water gets into No. 6 and comes out in the shape of juice in No. 1 - a reheating is interspsrsed between the 1st. and and. Diffusor.

The mass of beet strips undergoes a treatment which we may compare to that of a sponge which if dipped into juice we then squeeze out, and then dip again into juice, less rich in sugar than the former, and so on, until it is finally dipped into a liquid that is nothing but water. This process was watched by the Syndicat des Fabricant de Sucre. The extractions were irregular and high 0.8 to 1.5% of sugar remained in the mass of beet strips.

Since then improvements were made, (but the process is not yet perfect) the inventors have complemented (in their recent installations) their devices in making them work on the basis of ordinary diffusion.

Several years ago, Carl Steffen patented a new device for extracting sugar from the beet. He cuts the beets in slices when then fall into a Malaxation Kneader in which they are immediately mixed with juice five times their weight at a temperature of 95 degrees. Then the strips of beet are expressed and separated from the juice and submitted to diffusion in an ordinary battery.

Here is a good field for the engineer to use his ingenuity.

This problem awaits solution, old methods improved lately and new methods recently invented do not as yet meet all requirements; yet the engineer who would invent a process whereby of pure juice, 99% of sugar could be obtained economically, would render an important service to the Sugar Industry.

From the Diffusion Battery two products are extracted:

First the juice and then the pulp which is made up by the dry parts of the beet also by a large proportion of water. This pulp is excellent fodder for cattle, but, in its present condition it cannot be shipped - the greater part of the water has to be pressed out.

According to M. Pellet 85 to 100 Kg. of pulp per 100 Kg. of fresh strips put in work, are extracted from the battery, the weight of pulp varying with the capacity, and above all the height of the diffusor on account of the pressure exerted by the column of beet strips. These strips contain a maximum of 6% of dry substances; by applying pressure this percentage may be raised to 10 or 11%.

Humid pulp loses in time a large part of its nutritive value, as Grandeau has shown; Dried pulp on the other hand constitutes a fodder that is unaffected by time, easily shipped and the work of transportation not burdensome.

The farmer is also interested in this question, but the problem will be solved by and by.

The juice expressed by the battery of diffusion is not pure. Two processes may be kept in view to separate the sugar from foreign matter mixed with the juice; one process consists in letting the sugar be involved in a chemical composition of a specified combination which once extracted could be manipulated so as to get at the product looked for or rather by a series of operations eliminating the impurities in using a process by which sugar substances other than sugar are separated, and which finally leave nothing but a pure juice of sugar containing sugar and water and nothing else. Theoretically speaking, the first of these processes is more practical and should give excellent results; the sugar in combination with lime, well defined composites, some of which are unsoluble, but in practice there would be such a large quantity of lime required that it would be impracticable. Nevertheless, the principle can be applied to draw out completely, the products poor in sugar.

The second process is therefore to be utilized; eliminating the impurities so as to have a pure juice. However, even this process is imperfect, as it is not possible to completely separate the sugar from the non sugar, wherefore not all of the sugar contained is separated from the juice.

Here is also a field for the chemist, who, by his research work, could materially advance the progress in the sugar industry.

Achard, to purify the juice used alcohol, then he used sulfuric acid, which used cold, caused a precipitation of organic matter; he neutralized the surplus of acid by means of lime.

In 1811, Derosne recommended the addition of lime and the saturation of an eventual surplus with alum; to alum, Barruet substituted sulfuric acid or carbonic acid. Kuhlman recommended carbonic acid in pointing out the dangerous nature of sulfuric acid.

In 1849, Rousseau applied a more improved process; he heated the juice to 70 or 80 degrees and added to each hectolitre 1 Kg. of lime, separated the precipitate obtained, and after that made a carbonic acid saturation, but it was very difficult to determine at what point to stop the saturation, and if that point was not carefully considered, the final work was made impossible, or the juice became viscous or was not purified, the impurities continuing in a dissolved form in the juices.

Perrier and Possoz having studied the action of carbonic acid upon the lime washed unfiltered juices put into use in 1859, their process called multi-carbonatation which somewhat improved it and is still in use today. It comprises generally, two lime washings, two carbonatations followed each time with filtration separating the precipitates which were obtained.

Perrier and Possoz had noticed that in letting carbonic acid act upon a lime-washed juice, containing an excess of lime, the resulting precipitate of carbonate of lime, carried along with it by the principle of adhesion about half of all organic matter, but if the action of carbonic acid is prolonged, there occurs a re-dissolution of substances that had been originally precipitated.

Organic acids combined with potash and soda - during lime-washing - creating organates of lime which are almost insoluble in a sugared solution that contains a considerable quantity of dissolved lime, the first carbonatation will be arrested at a desired moment; however, filtration can start, but as the juice containing such a large proportion of lime cannot be worked, and besides possibly purify, by letting the lime and carbonic acid act, a second operation is resorted to.

The addition of lime is made in the shape of milk of lime with lime in pieces or with quick lime in the shape of powder. The temperature at which this operation and that of carbonatation is carried on is very varied. We believe a low temperature is best for the first carbonatation for the raw juices contain salts of lime which like tartarate of lime are more soluble when warm than in a cold state; they likewise containing varied quantities of coagulated albumine which are easily decomposed by heat forming metapectates of soluble lime, finally the solubility of lime in the juice is much greater in a cold than a warm state. In applying the first lime washing without loss of time and the first carbonatation, the re-dissolution of precipitated salts of lime - and a maximum in purifying will be reached; as besides the second lime washing and the second carbonatation will be carried on under the influence of heat - the elimination of salts of lime that are more soluble under cold than heat - such as citrates, sulfates, sulphides - will take place during this second operation.

In a diffusion of juice there will be for 100 parts of sugar, 17 of non-sugar; after the first carbonatation of this juice, it only contains 9% of non sugar; the elimination of foreign matter has been 8% - carrying out the second carbonatation the juice contains only 6.5 to 6.8% of non sugar for 100 parts of sugar.

The work in the first carbonatation brings about the most purifying but we must remember all non-sugar has not, as yet, been taken out of the juice, the proportion has only been reduced; the purified juice is not a pure juice, and elements that adhere to the sugar will be there until the work is ended. In order to bring the juice to the stage where it is called syrup, that is to say to a density of 30 degrees Baume, we have to evaporate 98 litres of water with 100 Kg. of beets; these simple figures will show you the importance of this phase of manufacture.

(Translation from the French)

EXCERPT FROM THE JOURNAL des FABRICANTS de SUCRE, April 24 , 1912.

M E M O R A N D U M.

BIOGRAPHICAL SKETCH ON FRIEDRICH STROHMER.

Mr. Strohmer, Councillor of State of the Austro-Hungarian Empire and Director of the Experiment Station of the Central Beet Sugar Association in Austria, Hungary, celebrated on the 23rd day of April, a double anniversary-the sixtieth year of his birth and the twenty-fifth year of his appointment as Director of the Experiment Station at Vienna.

He was born at Zwickau in Bohemia, the 23rd day of April 1852, and studied at the High School and University of Vienna, and after graduating, became assistant at the experiment station of which he later became a Director, a post which he is occupying now.

He has been a member of the Council for Sugar assessments (duties), since 1902. To reward him for his work, the Emperor decorated him with two orders, the Cross of the Knights of Francis Joseph and the Order of the Iron Cross (1909)

Under his management, the Experiment Station at Vienna has become one of the finest in the world and his research work yielded about 200 reports on important matters connected with the Beet Sugar Industry.

Many foreign associations have made him an honorary member - and his advice on many complicated questions relating to Beet Culture and sugar making is generally followed.

In addition to being Director of the Experiment Station, he is also Editor of the"Oesterreichisch Ungarische Zeitschrift für Zuckerindustrie und Landwirtschaft" which is one of the foremost publications of the world on sugar questions.

It would take us too far afield to enumerate Mr. Strohmer's publications; suffice to say, that his treatise on the nutrition of the beet, migration of sugar in the plant, the storing of sugar in the beet, etc., and his work on determining the saccharine content of the beet, besides other studies on refining methods, have been of inestimable use to the whole world.

Mr. Friedrich Strohmer has devoted his life and his energies, to the development and progress of the Sugar Industry, and we add our congratulations to those of many of his friends and wish him a long life of continued usefulness.

CHEMISTRY OF SUGAR

- By -

EMILE SAILLARD.

EXCERPT FROM THE JOURNAL des FABRICANTS de SUCRE, May 22nd, 1912.

MOLASSES CONTENT:

1) Sugar,
2) Organic substances which are mainly formed by azotic matter.
3) Mineral salts and organic salts with a potash base, of soda and often lime (chloride, nitrates, sulphates, lactites, acetates, etc.)

I do not include substances of a pectic nature, which if heated with chloro-hydric acid at 12%, gives purfurol. We mixed them with the molasses during the last two campaigns.

Generally speaking, there were more in those of 1910 - than in those of 1911 - 1912 - but the proportion is rather wwak in relation to 100. If the molasses only contained sacchorose and azotic matter (azotic matter that is known) the co-efficient of inversions to be applied could be exactly determined in making the pure sugar solutions of the same sugar content, the starting point, provided that the inversion should be made in every case in the same manner.

Only molasses contains salts whereas pure sugar does not contain any - or contains only insignificant quantities.

Even admitting that all molasses salts be inactive by themselves, (this is a supposition), it is not less true that most of them are not acting as strongly on the rotatory capacity of sacchorose than upon thatcorresponding with inverted sugar.

Under these conditions, the sum of A plus B for Molasses being found does not properly correspond with the coefficient of inversion obtained with the pure sugared solution, concentration being the same.

The preceding remarks suffice to bring to the front the question of knowing whether the sugar of the beet molasses can be properly and scientifically mixed by the diastatic or chemical inversion method.

The improvements made by Clerget and by Anderlik in 1907 have the azotic substances of molasses in view. We do not as yet know the effect as a whole, that salts of molasses have upon the Clerget method. With our present knowledge, it is difficult to attach any importance to it.

As regards the method of chemical inversion, Clerget - Herzfeld, the manner and duration of heating as well as the acid mixture is in proper proportion to pure sugary solutions. If, in the sugary liquids to be inverted there is no free chlorhydric acid indicated by the process, the inversion cannot be completed during the time prescribed for the heating (five minutes from the time) where the baloon indicates 69° and the deviation to the left is too weak - unless you prolong the duration of the heating. Molasses contains, on an average about 5% of Potash and 1% soda which are correspondingly equivalent to 5 gr.04 of real Chlorhydric acid H. C'), i.e., 11 cc. 8 of Chlorhydric acid at 22° Beaume.

This represents therefore for the normal French weight of molasses 1 cc.92 of acid at 22° Beaume and for the normal half German weight of molasses 1 cc.53 acid at 22° Beaume.

The French method prescribes 10cc. acid at 22° Beaume for 16 gr. 26 Molasses when the method of Clerget - Herzfeld prescribes 55 cc. acid at 22° Beaume for 13 gr. Molasses. The minimum proportion of Chlorhydric acid which could be fixed by one or more free bases of molasses combined is relatively greater compared with the German method (1 cc. 5 acid on 5 cc.) than with the French method (1 cc. 9 of acid on 10 cc.)

This is why an insufficiency of free chlorhydric acid has much more influence upon the results with the German method than with the French method. With cleansed juice of carbonatation that contains relatively little of any salts, this question would not be important.

In the work which we did on the direct polarization of sugar and the Clerget method with beets of 1911, we have nevertheless provided for the eventual insufficiency of free chlorhydric acid in prolonging the heating by 1 or 2 minutes (according to the German methods). This does not mean to say, that in the case of Molasses, the bases at the moment of inversion are entirely combined with chlorhydric acid and that all other acids are liberated.

(Signed) Emile Saillard.

<u>NOTE</u>: In order to dose the sugar, Clerget from normal beet molasses used the following method which we studied and which may be employed. By this method the direct polarization in an acid medium is avoided.

a) To take 50 cc. of a normal neutral solution of defecated molasses (purified from dregs or impurities) from which the surplus of lead was separated - add 25 cc. of pure chloride of sodium solution. Then add the equivalent if chlorhydric acid was used for inversion; complete the 100 cc.; polarize at 22° c.

b) Take 50 cc. of the same normal solution, make the inversion with a given dose of chlorhydric acidity; let cool; neutralize with a solution of soda; allow to cool at 20° Celsius, complete at 100 cc.; polarize with 20° Celsius.

Whence Sugar Clerget % of molasses = 200 (A plus B) if there is coefficient of inversion minus 1/2 t. rafinose.

COEFFICIENT OF INVERSION:

1) Take 50 cc. of a pure sugary solution having the same polarization as the normal solution of molasses, add 25 cc. of chloride of sodium brining in chlorum the equivalent of chlorhydric acid employed in inversion. Complete at 100 cc.; then polarize.

2) Take 50 cc. of the same solution of pure sugar; invert; let cool, neutralize with a solution of soda, cool at 20° Celsius; complete at 100 cc.; polarize at 20° C.

3) Determine the coefficient of inversion by ordinary calculation; what is said on the subject of salts in Molasses holds good also in this method of double neutral polarization.

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R U S S I A.

The grographical position of Russia's beet districts extends from 54th to 48th degree of latitude and 19th 38th degree of longitude from east to west, on a length of about 2200 kilometers.

Kiew, so to speak, is the capital of the Russian beet industry and is situated in about the same degree of latitude as Brussels. At Kiew, the headquarters of the Central Association of Manufacturers of Russian sugar is situated. The annual meeting usually takes place there in February and March. At that time, contracts are made for coal, coke, lime stone and the renewal of the necessary machinery, also other questions relating to the running of factories for the ensuing year.

From the Journal des Fabricants de Sucre, under date of the 17th of July, 1912.

PRODUCTION OF SUGAR.

	Raw	%	Per Hectare Kg.
1900 - 1	893,500	13.95	1.639
1 - 2	1,076,250	13.13	1.858
2 - 3	1,169,600	13.21	1.956
3 - 4	1,160,660	15.06	2.169
4 - 5	930,600	14.44	1.979
5 - 6	968,500	12.56	1.840
6 - 7	1,433,900	14.14	2,522
7 - 8	1,403,400	16.33	2,259
8 - 9	1,240,300	15.15	2,229
9 - 10	1,144,150	16.61	2,058
10 - 11	2,108,760	16.11	3.159

During Campaign 1911 - 12 Russia exported 518,215 tons SandSugar equivalent.

Note: (Russia had in stock on 1st of September 1912, 35,157,930 puds of Sand Sugar equivalent, equal to 639,837 tons raw sugar as against 535,259 tons of raw sugar on 1st. of September 1911)

During the campaign 1910 - 11 there were

49	factories running	in Poland,
143	" "	" Southeastern Russia,
70	" "	Beyond the Dnieper,
13	" "	in Central Russia.
275		

We found the following percentages - farms cultivated by peasants landowners, and factories in various districts.

	Poland	South West	Beyond Dnieper	Central Russia.
Hect. Sugar Factories	3.1%	25.4%	52.8%	57.7%
Hect. of Landowners	61.1%	51.9%	31.3%	28.7%
Peasants	35.8%	22.6%	15.8%	13.5%

We found estates ranging from 15,000 to over 120,000 hectares.

From the Journal des Fabricants de Sucre, under date of 24th July, 1912.

The rotation of crop is followed in Russia as follows:- -

DISTRICT OF KIEW:

1. Manure on fallow ground;
2. Wheat
3. Beets
4. Oats or similar
5. Winter cereals
6. Fallow
7. Beets with manure
8. Spring cereals.

DISTRICT OF KHARKOW:

1. Fallow
2. Wheat or Barley
3. Beets.
4. Oats or spring wheat.
5. Fallow
6. Beets
7. Oats or spring wheat
8. Luzern (clover)

We have found that beets planted directly after fallow ground being plowed, even if manured during previous summer gives more weight to the beet growing after wheat, therefore the fields were doubly manured.

From the Journal des Fabricants de Sucre, under date of 31st July, 1912:

Another rotation of crop in the Distict of Kiew was as follows:

1. Fallow
2. Wheat with manure
3. Beets
4. Spring cereals
5. Sainfoin
6. Half fallow and sainfoin pasture
7. Winter wheat
8. Beets with manure
9. Peas or Beans,
10. Winter wheat.

As a Spring manure the beet fields get 130 - 150 Kg. of superphosphate at 16% phosphoric acid and 15 - 30 Kg. nitrate of soda. These spring fertilizers hasten the growth. This manure is placed in the ground at the same time as the seed, the fertilizer first being deposited at a slightly greater depth than the seed, and as both are placed in the ground by the sower drill machine or sowing bag, the manure will be separated from the seed by a thin layer of earth.

From M. Emile Saillard's Report, page 41. Enquete sur la Culture de la Betterave a Sucre en Russia Syndicat des Fabricants de Sucre de France.

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Beets are usually paid 21. to 22. per ton F. O. B. factory - about 350 Kg. of pulp per ton is usually given to the farmer free of charge, also 8 - 10 Kg. molasses. Seeds for the ensuing year are also freely given or at a very low rate, say about 10 cents a Kg.

LEAVES ENSILAGE:

Leaves not consumed by cattle on the fields are preserved in silos along with pulp (dug in the ground and covered with a heavy layer of earth). Oxalin acid content gradually disappears from the leaves. This is a considerable factor in solving the problem of feeding cattle during winter.

THE CONTINENTAL COUNTRIES ACCORDING TO A STATEMENT BY THE SECRETARY-GENERAL OF THE INTERNATICNAL ASSOCIATION OF SUGAR STATISTICS CALCULATE THE PERCENTAGES OF SUGAR IN THE BEET AS FOLLOWS: THEY MULTIPLY THE SUGAR CONTENT (SACCHARINE RICHNESS OF THE BEET), WITH ITS QUOTIENT OF PURITY AND THEY GET THE TECHNICAL PERCENTAGES.

EXCERPT FROM LaSUCRERIE BELGE, SEPTEMBER 15, 1912, p.34.

	Sugar in the Beet Per Cent.	Purity.	Technical Per Cent.
1901/2	15.70	82.94	13.02
1902/3	15.57	83.76	13.04
1903/4	16.77	82.82	13.89
1904/5	16.83	84.47	14.22
1905/6	15.11	83.99	12.68
1906/7	16.23	84.21	13.67
1907/8	18.11	84.37	15,28
1908/9	17.31	85.28	14.76
1909/10	18.42	84.89	15.64
1910/11	18.48	85.89	15.87
1911/12	18.60	86.13	16.02

	Sugar in the Beet Per Cent.	Purity.
Aug.	16.97	84.56
Sept.	17,32	85.01
Oct.	17.45	85.23
Nov.	17.25	84.81
Dec.	16.87	84.13
Jan.	16.26	83.12
Feb.	14.76	78.38
Mar.	13,70	75.86
	1701 General Av.	84.43 General Av.

(Translation from the French) Page 268.

EXCERPT FROM LA SUCRERIE INDIGENE et COLONIALE, 18th SEPT. 1912.

Fertilizers That Should be Used for Beet Fields.

Influence of Barn Manure and Liming.

We Frenchmen still have a great deal to learn from our neighbors in order to increase our yields of sugar beets in quantity and quality; that is to say, to obtain a larger production of sugar per hectare.

The following table will give an idea of the yield of sugar beets per hectare.

RENDEMENT IN SUGAR AND QUANTITY OF SUGAR PER HECTARE.

COUNTRY:	Beets. Kgs.	lbs.	Sugar.	Sugar Produced Kgs.	lbs.
Germany	30,070	66,292	16.33	4,895	10,791
Sweden	29,070	64,088	14.90	4,347	9,583
Belgium	28,980	63,889	14.59	4,232	9,329
Denmark	29,990	66,094	13.94	4,191	9,239
Austria-Hungary	25,630	56,503	15.88	4,062	8,954
Netherlands	26,270	57,915	14.95	3,931	8,676
Italy	30,340	66,887	12.15	3,682	8,117
France	26,600	58,642	13.18	3,507	7,731
Spain	28,310	62,412	12.34	3,494	7,702
Russia	15,670	34,546	15.63	2,440	5,379

Italy takes the lead as far as weight of beets per hectare is concerned. Germany produces about double the quantity of sugar per hectare over that produced by Russia per hectare.

Barn manure is the fertilizer, par excellence, in connection with beet culture; chemical fertilizers being used only in a supplemental way.

Now let us see what our German neighbors think about barn manure; green fertilizers and liming.

In France we have extensively used chemical fertilizers; there is no doubt that if these are combined with green substances, good results may be achieved for years, but by and by, the physical characteristics of the soil undergo a change, organic elements in reaction are exhausted and gradually the yield per hectare diminishes.

German agronomic stations have for years made cultural experiments on a large scale, and it is interesting to learn what are the effects upon sugar beet culture of chemical fertilizers as compared with barn manure and vegetable fertilizers.

In a soil where a 4 yearly rotation of crops was adopted(beets,-barley, potatoes and wheat), experiments were made with chemical fertilizers only and as well with barn manure mixed with manure and vegetable refuse. Beyond a certain limit, chemical fertilizers did not contribute to an increased yield (this limit was 500 Kg. of nitrate, 100 Kg. phosphoric acid and 1000 kg. of Kainite.) But by adding to 1000 Kg. kainite 30 to 40,000 Kg. of barn manure, 10,000 to 11,000 Kg. more beets were obtained, an equivalent of 1800 Kg. of sugar more per hectare from stable manure, 7500 Kg. more leaves per hectare were obtained. Therefore, organic matter and stable manure have certain elements (beneficial to the beet) that are lacking in chemical fertilizers, the latter influencing favorably the physical qualities of the soil for whilst undergoing a process of decomposition under the action of ferments they create heat in the tillable land, promote vegetation and advance often the date of sowing; loosen the compact earth and help to regulate the water supply by imparting to the subsoil a certain consistency. They likewise facilitate the aeration of the upper layers of the earth and tend to improve the conditions that are necessary to the existence of ferments in the soil.

We must also bear in mind that the use of lime, which abounds in Germany, Austria and Belgium, hastens the decomposition of manure and vegetable matter and maintains a slightly alcaline reaction in the soil itself. With that object in view every 6 to 9 years, 3000 to 5000 Kg. of quicklime are used and the more compact the soil the more liming may be done.

(Translation from the French)

CIRCULAIRE HEBDOMADAIRE DU SYNDICAT des FABRICANT DE SUCRE, de FRANCE.

MEETING OF THE SYNDICATE CHAMBER.

The Syndicate Chamber held its meeting on October 11, 1912 at 2 P. M. Monsieur Vieville, presided.

After the reading and adoption of the Minutes of the last session, Mr. Saillard gives an account of his tour made in the United States after having attended the Eighth International Congress of Applied Chemistry and the International Commission on harmonizing methods on the Analysis of Sugar Products, meetings having taken place in New York in September last, at which Mr. Saillard represented the Syndicate.

He visited the sugar factories and beet fields of Colorado, Iowa the region of Lake Michigan, and especially the factories and fields of the Great Western Sugar Co. (headquarters in Denver, Colorado). The latter have eleven factories and in 1911-12, obtained beets from 33,000 hectares (from 5,000 to 6,000 growers) and produced 119,000 tons of sugar.

Mons. Saillard was extended a hearty welcome everywhere and information was cheerfully given, particularly by Mr. Ware, Director of the "Sugar Beet" Philadelphia, Pa.; Truman G. Palmer, Secretary of the United States Beet Sugar Industry of the United States, Washington, D. C.; Mr. Frank Roderus, Editor of the American Sugar Industry and Beet Sugar Gazette, Chicago.
Mr. Truman G. Palmer aided Mons. Saillard in every way so that his journey in the United States would prove to be both profitable and instructive, and the Syndicate feels that thanks are due him in rendering Mr. Saillard all the assistance possible.

In 1890, the United States produced 2000 tons of beet sugar; now they produce 500,000 tons in 73 factories and this is due to a relatively high sugar tariff.

The State of Colorado, not far from the Rocky Mountains, the Michigan Lake district and California, produce most of the beet sugar in the United States. The rainfall between the Atlantic Ocean and the Rocky Mountains diminishes from year to year, but increases beyond, towards the Pacific Ocean. In the East the rainfall is from 800 to 1000 m/m per annum; in the State of Colorado there is only 200 to 400 m/m. In Colorado rain and snow are stored in reservoirs to be utilized for irrigation purposes during the spring and summer months.

Towards the Atlantic (East) and the Mississippi basin (center), it is usually very hot in summer 38° to 40 , and very cold in winter (- 22° - 25° - 28°). Thanks to the influence of the Gulf stream these extremes do not occur in Western Europe.

Beets at present are grown in the vicinity of the degrees of latitude where in June, July and August, the mean temperature is 21 to 22° centigrade or 70° Fahrenheit. In Colorado. beets are grown to an altitude of 1500 meters; in California beet seeds may be sown as early as January and February.

Beet soil in the United States is clayey and siliceous. On account of the profits at present derived from beet culture, the rotation system applied to farms is somewhat irregular. It is however, triennial, namely, beets, cereals, corn, or quadriennial; corn, wheat, beets, barley or oats, clover or lucerne.

Farms consist of cultivated and graxing land. In Colorado, stable manure is sometimes spread on beet fields, but not always, and very little or no artificial fertilizer is used.

Apart from the farms which need irrigation, the methods are the same as those used in Europe.

The circular plough is used for deep ploughing. For cereals this is also used.

In Colorado, a mechanical extractor is used which simply lifts the beet out of the ground. Farm labor is scarce; foreign immigrant labor is largely employed (Russians, Poles, Hungarians, Japanese).

Hand work, such as thinning, hoeing, pulling, costs from 20 to 21 dollars per acre.

For beets containing 14% sugar, $5.00 f. o. b. factory per English ton was paid. Those containing 165 sugar, about $6.00 . The juice from the beet is invariably less ~~xxx~~ pure than that of Europe.

12 to 13 tons of beets per acre are harvested, varying from 14% to 16% in sugar content. Since beet culture has been introduced the value of land and yield of cereals has vastly increased.

The unloading of beet carts is often done mechanically. They are lifted to a wooden bridge several meters high and by an automatic arrangement the beets are dumped into a wagon placed below, during this operation the beets are freed from a goodly portion of the earth adhering to them, or the beet carts are hauled alongside of silos into which they are emptied from an inclined plane by means of a tackle pulley which runs on an aerial rail .

In Colorado the beet wagons have openings at the bottoms. The roads are not always good.

Beets are preserved in covered silos adjoining the farm buildings; sometimes the slanting walls of open silos are in wooden lattice work; water being on a level with the soil. The washing tanks are5 to 6 meters long.

The Diffusion Batteries with 14 to 16 diffusors are usually heated by means of injectors. In Michigan, pulp drying is extensively done, 9 to 10 francs the 100 kilogram.

In one factory, the drying oven is provided with a mechanical fuel feeding device. Sometimes the tap roots and rootlets are mixed with the pulp.

The liming is done under heat with lime milk or sucrate of lime milk. The juice is purified by double carbonatation followed by sulfitation (sulfur oven). In one factory in Colorado the Kelly filter is used instead of filter presses.

The evaporating apparatus is of triple and mostly of quadruple effect.

Syrups are sulfited.

Sugar for direct consumption is made in fine grain; the second product is boiled in grain and the sugar is remelted in the juice. Boiling of first product (fine grain) lasts 2½ hours to 3 hours; turbinating then takes place - a granulator is used.

The boiling of II product lasts 12 to 18 hours and the mixing (malaxator) 3 to 4 days.

1 and II. product turbinating is done in Watson Turbines usually provided with Stearnes Rogers apparatus so as to diminish hand labor in cleansing. Blueing is prohibited. Where a Steffens process was used the sugar was extracted from the molasses. The latter is used as fodder. (5 francs 100 kilos).

One of the factories I visited has, so to speak, no chimney. The draft is effected with a ventilator which acts in connection with the pressure of Stearns. Another factory visited is trying to make paper out of sugar cane after having extracted the sugar therefrom. The cane is shipped to this factory in a chopped up state and dried.

Coal used is not of a good quality - 180 to 190 kilos is used per ton of beets and costs f. o. b. factory 6 - 10 francs per ton.

Factory wage earners get 0. frcs. 90 to 1 fr. 10 per hour, and ordinary yard workers 0 fr. 85 per hour but the cost of living is higher than in Europe. White sugar is often delivered in casks. In some sugar factories an immense iron tank is erected reaching higher than the roof and this obtains a cheaper insurance rate .

The President, Mr. Vieville, thanks Mons. Saillard for his interesting report and a discussion is now started anent the preserving of beets in a washed or unwashed condition and mechanical devices for unloading the beets.

The Syndicate laboratory has this year in August and September, week by week, followed up the variations of azote and sugar content of the beet.

The beets of 1912 are not so rich in azote, amide and ammoniaferous and deleterous azote as those of 1911.

Losses of alcalinity during evaporation and boiling are less appreciable and less molasses will be obtained than in 1911.

The proportion of pernicious azote for a total of 100 gradually diminishes between 1 August and 1st. October. Development of Azote in a root is slower than that of Sugar in the same root.

A complete report on the journey of Mr. Saillard will appear shortly.

(Translation from German)

EXCERPT FROM BLÄTTER FÜR ZUCKERRÜBENBAU, OCTOBER 15, 1912. PAGE 337.

MONOGRAPH BY RITTER UND KAMMERHERR EDLER HERR ZU PULITZ GR. PANKOW as it appears in the Year Book of the "Imperial National Agricultural Society".

The limits within which beet culture may be circumscribed cannot be very well defined; climate and soil are no doubt important factors but the conditions and methods on individual estates and farms are mainly to be taken into consideration when debating the question of what are the limits of beet culture in Germany.

WE ARE NOW BOUND BY THE BRUSSELS CONVENTION (UNTIL SEPT. 1918) WE CANNOT PAY A BOUNTY ON EXPORTS; WE HAVE LITERALLY CEDED TO RUSSIA (as it were) our right to sugar exports - for without the right to get a premium on exports we cannot compete with Russia, which naturally tends to keep our beet culture from increasing; for what are we to do with our sugar that we produce annually and do not need for our consumption?

The only safety valve we have got to fall back upon is to increase our home consumption, and that will only be made possible by removing the tax on consumption which will make our sugar cheaper by 7 cents per pound and sugar may be used for industrial purposes for which it is now too dear.

However, we must do something, as the Russian government gives moral and financial assistance for promoting beet culture and powerfully aids by special enactments, the production of sugar. This, and the fact that the Brussels Convention has recently granted Russia the privilege of increasing her export quota will naturally throttle Germany in her capacity as a sugar exporting country

Beet growers must have a sufficient force of workmen available at time when most of the work has to be done in the field; if labor is not available then beet culture becomes if not impossible, unprofitable.

There are districts in which abundant labor is available at the proper time especially at thinning time, but in other districts foreign immigrant are scarce so that special holidays have to be granted school children (as in Saxony) for the purpose of enabling them to help in the fields thinning, etc. The number of farm hands that are necessary for all phases of beet culture depends entirely on climatic and soil condition. For instance, after a heavy rainfall the fields are not muddy, fewer people are needed for hoeing than where they are muddy.

If you have to engage reapers for your cereals as early as April, then you must see to it that to cheapen the beet production, you provide enough work for them to keep busy, for if reapers are not kept so from April to May then you will have to debit the beet account with a considerable amount and beet culture will become unprofitable. On many estates it will be possible to employ the men profitably especially where wheat is grown. There are large farms that have started beet culture for the reason that they wish to have reapers at hand at the proper time and wished to employ them profitably in weeding, hoeing, etc., between April and May.

In such cases, beet culture becomes a side line; conditions on the farm improve and methods of cultivation are changed for the better.

The next question is the team question. Beet culture requires an increase in team work. Deep furrows must be drawn in the beet fields before winter sets in. All through, a number of team animals (oxen or horses) are absolutely indispensable for a successful beet growing.

The steam plow is used profitably on large estates. In regard to our calculations as to the cost of keeping animals, we are largely wrong, as we should only debit our beet fields with the cost on such days as they are active in the fields or hauling beets from the fields to station or factory. Railroad freights as applied to beet transportation play an important part. The railroad administration has thought out a fine scheme for transporting beets.

Rate	III =	28 Km.	in distance
"	II.	29 to 32 Km.	"
"	III.	50 Km.	"

Beet freight rates start with $4\frac{1}{2}$ Pfgs. per centner (~~10.88~~ 1.08 cents per 100 pounds) for a distance not exceeding 13 Km. (8.07 miles). 10 Pfgs. for a distance not exceeding 61 Km.(37-3/11 miles) (2-1.5 cents per 100 pounds) 15 Pfgs. for a distance not exceeding 100 Km. (62.13 miles) ($3\frac{1}{4}$ cents per 100 pounds). This rate is about the limit of rates which beets could possibly stand. Of course, some factories which have a good deal of capital written off and are in a good flourishing condition can afford to refund the freight to the farmer, but the small factories cannot do so.

Of course, later, we may get a system of narrow gauge railroads from beet fields just as they exist now on many large estates, then the difficulties of hauling beets from field to factory will be overcome and savings effected in transportation., especially when the highways are bad by reason of heavy rain.

(Translation from the French)

EXCERPT FROM THE JOURNAL des FABRICANTS de SUCRE, OCTOBER 30th, 1912.

SUGAR FACTORY AT HULIN, BOHEMIA.

This factory uses an average of 785,000 Kg. (865 short tons) of beets, which are freed from dirt and weighted with "Chronos" scales. They are then sliced by 2 root slices and conveyed to the diffusors where they are exhausted. There are 16 cells, each provided with a discharge door on the lower sides for emptying exhausted cossettes. Each diffuser has a capacity of 65 hectoliters or 1600 gallons; the juice is heated by means of a calorizator The diffusion juice passes through a pulp separator, "Koran", before arriving at the measuring tanks. The quantity of juice drawn off after diffusion, shows 110 to 114%, and with an exhaustion of 0.20% to 0.30% of sugar in the pulp.

In the measuing tanks the juice is treated with 1/8th of lime of the weight of beets, is conveyed through juice heaters and at a temperature of 80 degrees Celcius, passes into 3 clarifying boilers, where it is treated with the rest of the predetermined quantity of lime, namely, with 2-1/2% of the weight of beets. The lime is added in the shape of Milk of Lime, which is carefully measured by means of an apparatus known as the Device Cerny Stole.

The clarified juice is carbonated in a 4-discontinuous boiler to 0.07 alcalinity (per cent of lime left in the juice), filtered by means of 6 filtering presses, known as "Monster" Kroog and afterwards refiltered by means of 2-mechanical filters, type "Maresch".

The second carbonatation is carried on equally in 4 boilers, similar to those used in the 1st. process of carbonatation. Here the juice is again treated with lime 1/4% of the weight of the beets. After filtration, with the 4 - filter "Maresch" system, the juice is conveyed into 3 boilers for the purpose of undergoing the third carbonatation, where it is saturated to show 0.01 alcalinity.

The juice of the third carbonatation is filtered twice, through the "Maresch" filters, then conveyed to the evaporating department where evaporation is brought about by a quadruple effect constituted as follows:-

1st. Tank with a heating surface of 265 sq. meters (317 sq. yards), and at a temperature of 106 to 108°

2nd. Tank with a heating surface of 290 sq. meters (347 sq. yards), and at a temperature of 106 to 108° Celsius.

3rd. Tank with 320 sq. meters (382 sq. yards), heating surface and at a temperature of 87° Celsius.

4th. Tank with a heating surface of 355 sq. meters (425 sq. yards), and at a temperature of 77° Celsius.

5th. Tank with a heating surface of 390 sq. meters (466 sq. yards), and at a temperature of 68° Celsius.

There are two sets of boiling apparatus for the boiling of the 1st. product, each having a heating surface of 120 sq. meters (1291 sq. feet), for each batch to be boiled; there is a malaxator which yields, after 6 hours, 30,000 Kgs. or 66,138 pounds (33 short tons) boiled mass.

For treating the second product, this factory has a boiling apparatus which is almost similar in construction to the "Freitag" type, and which yields after operating 10 hours, a boiled mass of 27,800 Kilogram (61,287 pounds) (31-6/10 short tons). There are six (6) Malaxators connected with this boiling apparatus.

The turbines (Weston system), have a diameter of 850 mm. (33-1/2")

There are 3 turbines used in handling the first product and 2 turbines for the 2nd product.

The beets which were delivered to this factory during the last campaign, showed a saccharine content of 13.5% to 16.5%.

The massecuite of the first product showed a purity of 90 to 93; the 2nd product showed a purity of 76; and molasses a purity of 63 to 64.

(TRANSLATION FROM THE FRENCH)

EXCERPT FROM THE JOURNAL des FABRICANTS de SUCRE, OCTOBER 30, 1912.

FACTORY NIEMCZYCE (MORAVIA).

This factory having been built in 1910, is one of the most improved plants erected. A daily quantity of 780,000 Kg. (860 short tons) to 900,000 (992 short tons) of beets is worked over.

The clean, washed beets are weighed on "Chronos" scales, where, by means of 2 cutters they are sliced and dropped into a Diffusion Battery - the cells having doors for the emptying our of the exhausted cossettes.

The juice is heated by means of direct steam injectors to 85° C. In the last diffusing cell the juice has still a temperature of 68°. The diffusion cells are provided with doors that open and close by hydraulic pressure. The juice passes through a pulp separator before being forced into 2 measuring tanks of 59 Hectolitres (1558 gallons) each, where 2% of lime is added for 100 beet weight. The juice extracted shows about 106°. It then passes from the measuring tanks through Calorizators - bringing it to 82 - 85° C. before arriving at the clarifiers (three boilers of 75 hedtolitres (1981 gallons) in which it is mixed with 1.7% of lime in the shape of milk of lime by means of an apparatus Czerni Stole.

The clarified juice is carbonated at a temperature of 80° in 5 tanks until the percentage of lime left in the juice shows only 0.7 alkalinity; it is then filtered in 7 filter presses ("Giant Kroog") containing a double layer of cotton cloth. The filtered juice passes into heaters where the temperature is raised to 90° C. befo re being forced, without additional lime, into the tanks for a second carbonatation.

The juice run off from here shows an alcalinity of 0.02, then is filtered in 4 filters("Maresch") and brought to a state of ebulition. It is then filtered a second time in 3 "Maresch" filters before being subjected to evaporation in quadruple effect apparatus (4 in number), the first horizontal effect has a heating surface of 600 sq. meters (717 sq. yards), and has a temperature of 110 - 112° C. The second effect has a heating surface of 550 sq. meter (656 square yards) and a temperature of 106°. The third vertical effect has a heating surface of 170 sq. meters and a temperature of 86°;and a fourth effect of 190 sq. meters (227 sq. yards) heating surface with a temperature of 60°.

For manipulating the first product this factory has two sets of apparatus, with a capacity of 278 hectolitres (about 30,000 Kg.) (33-6/10 short tons) massecuite for each apparatus, each provided with an agitator, the boiling lasts 6 to 8 hours.

For the obtaining of the second product this factory has an apparatus type "Freitag" of 278 hectoliter (7343 gal.),each boiling period lasts from 24 to 26 hours. The massecuite is run off into six crystallizers where it remains 5 to 6 days, the supersaturation being regulated by adding water according to Claasson's system.

This factory uses 3 turbines of the "Weston" type in connection with the first product, and in connection with the second product the factory uses two "Weston" turbines - diameter of each turbine 1 meter 1.09/100 yards.

The sugar of the first product is mixed with the sugar of the second product.

The beets of 1911-12 had a sugar content of 16.25%

RENDEMENT:

Raw sugar 1st. product 13.85%

" " 2nd. " 1.40%

Molasses 1.40%

With a purity of 60 - 62.

(French Translation)

EXCERPT FROM THE JOURNAL des FABRICANTS de SUCRE, OCTOBER 30,1912.

SUGAR FACTORY CZESKY BROD.

This well known sugar factory is located in Bohemia and the quantity of beets worked over per day is 1,000,000 - 1,200,000 Kg. = 2,204,600 to 2,645,524 pounds avoirdupois.

Operations in the factory begin by weighing the clean beets on "Chronos" scales; then they are sliced. There are 4 beet slicers; the slices then pass into a battery of diffusion consisting of 16 cells, each cell being provided with doors for emptying the exhausted cossettes, and having a capacity of 90 hectoliters (2,377-1/2 gallons).

The diffusion juice passes through 2 pulp separators "Rassmus" then into two measuring tanks; the juice from here is forced into heaters, then into 4 Carbonators, where it gets a treatment of lime - 2-1/2% of lime of the weight of beets.

After the first continuous carbonatation, the juice is filtered in 4 filter presses (Giant system), and afterwards in 2 filters (Maresch).

The second carbonatation is a continuous process carried on by 2 "Maresch" filters - then is conveyed to the evaporating apparatus which is made up of a "Kestner" with a heating surface of 150 sq. meters (161.4 sq. yards) at a temperature of 124° Celsius.

A second effect "Kestner" with a heating surface of 600 sq. meters (717-1/2 sq. yards) is employed, at a temperature of 105° Celsius; 3 ordinary steam chests having a total heating surface of 630 square meters (753 sq. yards).

Another steam chest with a heating surface of 310 sq. meters

(370 sq. yards) is employed, and finally a steam chest with a heating surface of 330 sq. meters (393 sq. yards).

The syrup coming from the evaporating apparatus is filtered by 3 filters (Maresch) then forced into the boiling apparatus.

To get the first product two sets of apparatus system (Hexa Herold) are used; the boiling lasts 9 - 12 hours. When the juice has boiled down each apparatus yields about 75% of raw sugar, after having undergone an agitating process to keep it from solidifying.

Three turbines are used (Hampi system); under each boiling apparatus a mixer.

The residue of the 1st. product is boiled in an apparatus known as the Kasalowsky.

The massecuite is forced into 9 crystallizers and there are 4 turbines in operation.

The factory has a total of 8 turbines which are provided with a discharge door at the lower part of each turbine.

The beets of 1911- 12 campaign contained an average of 15.7% of sugar. Exhausted slices contained 1.18% sugar.

The Massecuite of the first product had a purity of 93 and the boiled mass of the second product a purity of 76. Molasses showed a purity of 60 to 62.

(Translation from the French).

EXCERPT FROM THE JOURNAL des FABRICANTS de SUCRE, OCTOBER 30, 1912.

BEET SUGAR REFINERY PECEK.

This refinery is located in Bohemia and is the largest of all the Austrian refineries; 240,000 Kgs. (264.5 Short Tons) of raw sugar are worked over. The sugar is refined in Mixers and then turbinated; the residue, mixed with the residue from the (third class) refined sugar, is boiled and forms ordinary crystals; the residue of this massecuite (73 to 76 pure) is considered as Molasses.

The raw sugar in process of refining is remelted and filtered by the sand filtering system, known as the "Perfect" system and refiltered by means of Bone Black (15 Kgs. of Bone black for every 100 Kgs. of melted sugar). The filtered syrup yields a massecuite for first class refined sugar-(loaves of large and small crystals, plaquettes, produced by the Scheibler process , the Pzillas process, produces large crystals.

The waste from first class refined sugar is made into powdered sugar.

Sugar for discoloration and granulated constitute refined of the second class. The ordinary crystals and crushed bits constitute refined sugar of the third class.

The residue from the third class is boiled into grain: the residue from turbinating this massecuite is considered as Molasses, the proportion is 7% and the purity thereof is brought to 73 - 76. This molasses is added to the ordinary molasses produced by a sugar factory located in the vicinity of this refinery and the combined quantity of this molasses is desugared in an annex of the refining plant. The desurgaring is effected by the Strontian process. The juice coming from this process (which has a density of 14 to 18 Brix and a purity of 96 - 98) is conveyed to the Refinery where it is worked over.

TRANSLATION FROM THE FRENCH.

EXCERPT FROM THE JOURNAL des FABRICANTS DE SUCRE, OCTOBER 30, 1912.

REVUE OF

TECHNOLOGICAL AND CHEMICAL WORK CARRIED ON IN THE FOLLOWING FACTORIES:

1) Kruschwitz,
2) Czeski Brod,
3) Pecek.
4) Hulin,
5) Niemczyce.

(TOTAL - 5 FACTORIES INSPECTED)

Mr. Max Pawlowski has lately published in the Gazette Cukrownicza 1912, (Nos. 28, 30, 32, 34, 35, 39), several articles describing in detail the plants of sugar factories and the work carried on there in factories that he visited during last campaign.

FACTORY KRUSCHWITZ.

This factory is located in the province of Posen, Prussian Poland and has a capacity for handling 1,800,000 Kg. (= 1984 short tons) of beets daily, which at the starting point are weighed by two scales, type Chronos then sliced by means of 4 root-cutters. Afterwards they are submitted to a treatment of exhaustion in two diffusion batteries, each battery consisting of 12 cells with a capacity of 26 Hectolitres each (= 1850 gallons); each is fed with 58 Kg. or 128 pounds of slices for every 26 gallons of its capacity.

Diffusion is carried on by being aided with residuary water coming from the presses.

Beets delivered during the last campaign had an average sugar content of 18.2% (alcoholic digestion).

Exhausted strips contained 0.8 to 0.9% of sugar.

The diffusion juice is reheated at 80% Celsius and passes into 2 boilers that are provided with mixers, where the juice is clarified by means of lime (ratio 1.75% of the weight of beets), this lime is added in the shape of milk of lime.

The first carbonatation is carried on continuously in four boilers; which are divided into two sets. The work of carbonatation proper is carried on in two boilers. The juice leaves the first carbonatation process having an alcalinity of 0.06, and is filtered in a room where 14 filter-presses of the "Giant Kroog" type are installed, the juice here is heated at 84° C, then is subjected to a second carbonatation when another 1/8 of lime per 100 beets is added.

The second carbonatation is carried on also by a continuous process, in two boilers; the juice, after having undergone this second carbonatation has an alcalinity of 0.03 to 0.04, then passes into 6 filter presses, type "Giant Kroog"; it is then heated again and filtered by means of 5 small filters.

To facilitate evaporation, the factory uses 3 Pre-Evaporators (Juice Boilers "Saft-Kocher") that have a total heating surface of 625 sq. meters (747 sq. yards), where the ebulition is carried on at a temperature of 120 to 125° C., and with a quadruple effect as follows:

1) Set of two tanks each having a heating surface of 500 sq. meters (598 sq. yards) brings the juice to a temperature of 105° Celsius.

2) A tank with a heating surface of 500 sq. meters (598 sq. yards), brings the juice to a temperature of 90° C.

3) A tank with 500 sq. meters (598 sq. yards) heating surface brings the juice to a temperature of ebulition.

4) This tank also with a heating surface of 500 sq. meters (598 sq.yards); the juice here being subjected to a temperature of about 64°.

The syrup coming from the Evaporating process is treated with a little sulphatic lime, it being done by a continuous process within two boilers, until the juice shows 0.02 alcalinity. Then the sulphatic syrup is filtered and passed on to the syrup boiling room.

The factory has six vacuum boiling pans, each pan having a capacity of 32500 Kg. (358.2 Short Tons) (716.50 pounds) of boiled mass. The boiling process lasts from 6 to 8 hours. and the boiled mass is then run off at a temperature of 83° Celsius, reaches the crystalizers where it remains 18 hours to undergo a cooling process of 50° Celsius.

There are 12 crystalizers each with a rotatory turn of 1-1/2 turns to the minute. The purity of the mass is about 93. There are 15 turbines, each of which are provided at the lower portion with a discharge vent. The dregs are not separated here. A part is returned to the Boiling Department of the 1st. product (3500 litres) 925 gallons for each boiled mass, the balance is boiled to produce the 2nd product, for which the Claassen system is used; here the boiling lasts 36 hours and is run off at a temperature of 90° C. into crystallizers where the mass remains five or six days, then cools at 50° Celsius. There are 10 crystallizers used here and eight turbines, similar to those used for the first product.

Diameter of each turbine 1 meter (3.28083 feet) = 1.093.611 U. S. yards. The Kruschwitz factory consumes large quantities of coal, 6 to 6-1/2% of the weight of beets. Coals giving 7300 to 7500 CALORICS.

(Translation from the French) Page 434

EXCERPT FROM THE SUCRERIE INDEGENE COLONIALE, NOVEMBER 6, 1912.

OBITUARY.

We regret to learn that Mr. Hermann Briem, Director of the Seed Growers firm of Wohanka, Prague, died on October 29th, 1912, at Innsbruck, Austria. Mr. Briem was a savant of the highest order and his work in connection with Beet Culture will live after him. He thoroughly understood the physiology and selection of the sugar beet, and it is mainly due to his laborious efforts that the firm of Wohanka became so celebrated in the matter of seed production.

His numerous writings, which are real text books for beet growers, have made his name a household word; he was always quoted as an authority, and his departure from the sphere of activity is a great loss to science, beet culture and the Sugar Industry.

COST OF PRODUCTION OF REFINED SUGAR (Native)

AUSTRIA.

EXCERPT ERОМ DIE DEUTSCHE ZUCKERINDUSTRIE, NOVEMBER 15, 1912.

BASIS: 100,000 Dz. Refined, for Home Consumption, and
100,000 Dz. " " Export.

100,000 Dz. = 10,000 Metric Tons = (11,023 short tons)

134 days are necessary to produce 200,000 Dz. or .... 22,046 short tons
Buildings and Grounds 1,400,000 K. = ...$284,200
Machinery and Equip't. 1,600,000 K. = ...$121,800

FIXED CHARGES:

5% written off of value of building	70,000 K. =	....$ 14,210
10% " " " " Machinery,	160,000 K. =	....$ 32,480
	230,000 K. =	....$ 46,690
Salaries	90,000 K. =	....$ 18,270
Monthly salaries, Accident Ins. Supplementary Fund, Allowance Fund	75,000 K. =	....$ 15,225
Taxes	30,000 K. =	 6,090
Repairs	50,000 K. =	 10,150
All other costs (Teleg.Office Exp., Trust Exp.	80,000 K. =	 16,240
Fixed Costs	555,000 K. =	$112,665

If we assume that production for export participates to the extent of 30 Hel. per Dz. (6.09 cents) which means sugar for export yields an extra 30 Hellers, such export production will be debited with 100 x 30 = ... 30,000 Kr. = ...$6,090,00

Therefore, the refining of 100,000 Dz. of Inland Sugar will have to carry the sum of 555,000 Kr. less 30,000 Kr. = 525,000 Kr. = $106,575

Spodium at 0.25 per Dz. = ...	25,000 Kr. =	$ 5,075
Coal at 50% of the quantity of production at Kr.1.75 ($35\frac{1}{2}$¢)	87,500 Kr. =	$ 17,837.50
	112,500 Kr.	
Weekly Wages		$ 22,837.50

800 Wage earners at 2.60 Kr. (52.78¢) per
day = 2,080 x 134 .... = 278,720 Kr. = ...$ 56,580

Remaining 226 days during which time the
factories were not in operation about
K. 100 per day (226 x 100 K. per day) .... = 21,280 Kr. = .$4,319.84

Weekly wages for 100,000 Dz. Inland and
100,000 Dz. for Export,
equal to .... 300,000 Kr. of which half is for Inland
consumption, = ... 150,000 Kr. = 30,450.

Half of 525,000 Kronen as above, leave ... 262,000 Kr.

Sale of Molasses (10% of 100,000 Dz.) .... 100,000 Kr.

Leaving a balance of .... 687,500 Kr.

Cost of Refining 100 Kg. = 6.87 Kr. = 0.63 cents per pound.

On 10,000 Metric Tons there remains cash in hand for new
campaign after all expanses above indicated, a sum of .... 52,000 Marks.

Equalling $10,556.00

NOTE:

The 0.63 cents per hundred pounds include excise tax and
amount written off for depreciation.

0.63 cents - 0.1167 leaves 0.5133 per lb.net cost of production.

(Translation from the German)

EXCERPT FROM BLÄTTER FÜR ZUCKERRÜBENBAU, NOVEMBER 15, 1912, PAGE 337.

"WHY DOES BEET CULTURE IN GERMANY NOT INCREASE MORE RAPIDLY"

By

Councillor of State Vibrans Wendhausen.

Germany, by reason of her climate and soil, is one of the most suitable countries for beet culture and sugar production. The beet grower has no permanent guarantee for a steady price for his beets, and one of the reasons why beets are not planted more extensively is indirectly due to the fact that a heavy tax is put upon consumption, which increases the cost of sugar 7 pfenings per lb. (1.666 cents per lb.). Assurances were given that this tax would be reduced, but a year after it had been officially given, we are informed that the Government is not going to do anything in the matter. Thus, the farmer has no guarantee that his outlay in increased planting will be returned to him in the shape of remunerative beet prices. The enterprising spirit of the sugar industry has likewise been dampened by the continued efforts on the part of the Government to get as much as possible out of the Industry

Since sugar factory owners do not know where they are at, it is not to be wondered at that the increase in beet culture is slight. That it has not yet diminished is mainly due to the fact that beet culture is recognized as an excellent help to obtain higher yields of other crops. This factor, if no other, should be carefully considered in connection with beet culture, as it promotes to a marvelous degree the yield of cereals, insuring an ample supply of food for the people. Therefore, instead of putting continual brakes on the wheels of Industry, the development of beet culture and the beet industry should be encouraged in every way. Indeed, it would be a severe calamity if the culture of beets which has rendered such an important service to agriculture should cease to be profitable. But why should we ask this question? The question we should ask, is whether agriculture, taken as a whole, on large estates or on small ones, is benefited by beet culture or not.

THE INFLUENCE OF PHOSPHORIC ACID UPON THE GROWTH AND QUALITY OF SUGAR BEETS.

- By -

DR. WIMMER.

EXCERPT FROM BLÄTTER FÜR ZUCKERRÜBENBAU, NOV. 15th, 1912.

In many instances, agriculturists pay little attention to the needs of nutrition to our plants, as the effect of certain fertilizing materials cannot always be ascertained. However, we must try and find the real cause for the many mysterious processes occurring in the soil.

The fertilizing may remain without effect if either the soil is already rich enough in nutritive substances required by certain plants or if there is a certain condition in the soil which hinders the absorption by certain plants of nutritive elements contained in manure, or artificial fertilizers.

In the first case a high yield of crops will be attained without the respective fertilization; certain fertilizers may even diminish the yield of crops or weaken the quality. In the second case, low yields may be obtained in spite of good fertilization, and crops may, under certain conditions, be of a poor quality. This may occur in a case where the nutritive elements are absorbed by the soil or when vegetation is hindered by the poor constitution of the soil, too much moisture or drought, parasites, certain microbiological processes, deleterious influences due to industrial establishments, etc.

It is of the greatest importance to ascertain what is the true reason in a case where fertilizer fails to produce results and to obtain a knowledge of what nutrition a certain plant needs; especially is this essential with sandy soil where the connection between fertilizing, growth of plants and yield has to be thoroughly understood.

The symptoms noticed in plants caused by want of nutrition or excess of nutrition are the same with plants grown in experimental pots and those growing in the field. But before these symptoms were well known, they were mistaken for plant diseases of various kinds and those not familiar with these symptoms will fall into the same error, for instance, beet phthisis, brought about by the activity of nematodes, was one of these diseases, which could be counteracted by potash fertilizers, but the real nature of this disease could not be ascertained.

If, after reaching a certain growth, and in addition to the nematodic activity there is a lack of potash, the plants after reaching a certain stage of development will vegetate instead of growing vigorously, and will prematurely die.

By one-sided potash fertilizing, we may not succeed in obtaining large harvests, but we may prevent plant phthisis.

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M O N O G R A P H

Sugar Factory Berry - Au - Bac.

- By -

Paul Marcus.

EXCERPT FROM THE JOURNAL des FABRICANTS de SUCRE, DEC. 4, 1912.

This factory was built in 1867 at the junction of two navigable waterways; the Aisne Canal joining the River Marne and the lateral canal leading to the River Aisne; therefore this factory is in the best location as far as getting beet supplies is concerned.

It is very interesting to know the extent of its beet plantation, the harmony of its proportions, the excellent way in which the factory is managed and the fine quality of its product; it represents the average type of an important sugar factory.

From an administration point of view it has three (3) distinct divisions.

1) The sugar factory proper;
2) The commercial division;
3) The agricultural division.

A director is at the head of each division, and a delegate administrator supervises the three divisions and keeps them in touch with each other.

Three farms aggregating 1200 hectares (2471 acres) belong to the factory and contribute more than one fourth towards its needs. The working capacity of the factory is 325 tons of sugar beets per day (24 hours; the beet supply reaches the factory by boat, by farm carts and by rail (narrow guage connecting Reims.

The roots reach the factory by means of a hydraulic transmitter; are dumped into two ordinary washers, then into a Loze washer that is provided with a device for removing gravel and stones. Thence they pass into a shaker; from this to an elevator chain of buckets which lifts them to the top part of the factory whence they fall into a scuttle attached to a special type of scales which finally pours them into the hopper of a beet slicing apparatus provided with trays, each lot, leaving the scales for the hopper, weighing 500 Kg. (1102 lbs.)

The cossettes turned out by the root slicer are narrow, clean cut and of very regular shapes, are exhausted in a battery of 14 diffusors of 28 hectoliters and heated by tubular calorisators with a heating surface of 8.25 meters (9.86 sq. yds.) by means of steam coming from the first tank of quadruple effect.

The juice is measured in the gauging tanks that are provided with Horsin-Deon indicators. The liming is done in the same tanks by adding a quantity of milk of lime at 25° Beaume equivalent to 2 Kg. of Ca.O. (4.8 pounds per hectolitre of juice (105 quarts). In consequence of the exceptional richness of the beets the yield of juice was high, having amounted to 128 litres (33.8 gallons) per 100 Kilograms (220 pounds) of beets worked over.

The exhausted cossettes fall from the diffusors into a pit constructed of cemented stones thence are taken up by a chain of buckets adjusted to the elevator chain at regular intervals, which brings the cosettes to a winding distributing device adjusted above 4 pulp presses; 1 press Bergreen, and 3 Klusemann. The pressed pulp is then taken care of by a set of winding devices which convey them to wagons or carts or to small trolleys that are drawn, by animals, to boats anchored in the canal.

The diffusion juice treated with lime as above mentioned, is submitted to a temperature of 75° in its transit through 2 heaters of a heating surface of 45 sq. meters and heated by the steam of the second set of evaporating apparatus then carbonated until it shows 1 gramme alkalinity per liter in a specially constructed boiler in which 98 hectolitres (2588 gallons) are handled at each operation.

The juice from the first carbonatation is taken up by a pump Shabaver, is forced back again - passing through 2 heaters of a heating surface of 50 sq. meters ($59\frac{3}{4}$ sq. yards), making 8 circulations, heated by steam from the first set of heaters - (under a temperature of 90°) then the juice is forced back again into the room where the filter presses are. There are five filter presses:

a) 1 Massicot with 30 frames ($1^m \times 1^m$) 39" x 39".

b) 4 Bedus with 20 frames of ($1^m \times 1^m$).

In this region, on account of the calcareous nature of the soil, the farmers do not make use of the scum coming from the beet factories. This cumbersome residue is dilated at the factory and run into the ditches where the waste from beet washings are stored for eventual utilization.

The thin juice of the first carbonatation, to which is added a new quantity of milk of lime and mixed with rich diluted residue obtained from re-melted syrup, is saturated with carbonic acid until the alcalinity is reduced to 0.25 gr. per litre - this is carried on in a boiler of the same type and the same cubic contents as the one used for the first carbonatation.

The turbid juice obtained by this operation is brought to 95° (in two heating tanks of 40 sq. meters) ($47\frac{3}{4}$ sq. yds.) benefiting by the steam of the 1st. set of the quadruple effect; is filtered on Dansk filter presses (4 elements with 30 trays 600 x 700 centimetres fitted with fine cotton cloth which in its turn is stretched over a cloth, woven partly of flax and partly cotton); then is filtered on wood fibre filters and brought to an ebullition temperature in a boiler of 50 sq. meter ($59\frac{3}{4}$ yards) by means of exhaust steam; finally clarified in 3 filters, system Philippe, each filter having 30 frames.

The evaporating division is constituted as follows:-

1st.	tank	280 sq. meter	(334 sq. yards)
2nd.	"	140 sq. meter	(166 sq. yards)
3rd.	"	110 sq. meter	(132 sq. yards)
4th.	"	180 sq. meter	(214 sq. yards)
a total of	....	710 sq. meters	(846 sq. yards) of heating surface.

The first tank gets exhaust steam and live steam; it gives off steam at 109°; this steam is used in heating the second set, the two boiling masses, the 4 heaters and the diffusion boilers; the steam of the second tank has a temperature of 91° and is utilized to heat the 3rd. tank and two heaters containing virgin juice; the 3rd. and 4th. tanks produce steam at 70° and 49° respectively.

The syrup leaving the quadruple effect is sulphated almost to a point of neutrality, (phenol phataleine) brought to 90° in a heater of 30 sq. meter ($35\frac{3}{4}$ sq. yards) heated by means of steam obtained from the first effect, filtered on 2 Philippe filters of 30 frames and then conveyed to the boiling room which contains:

1) Apparatus of 345 hectolitres (9113 gallons) fitted with two serpentines (worms) heated by live steam;

2) 4 Lyre-boxes that are heated with steam from the first set of evaporators;

3) 1 apparatus of 280 hectolitres (7,396 gallons) fitted with two serpentines (worms) and 3 Lyre-boxes;

4) A boiling apparatus of 90 hectolitres fitted with two worms for producing secondary products.

The mass for the first product is entirely fed with filtered syrup, containing as stated above, a certain proportion of rich residue and of re-melted syrup that was purified in its course towards the second carbonatation and only at the final operation a variable quantity of a residue of poor quality finds its way into the apparatus.

The massecuite for the first product is run into horizontal malaxors having a capacity of 350 hectolitres (9245 gallons), then some of the poor residue is added; after 12 hours it is turbinated in 7 centrifugals of normal type. The residues are then separated; the rich residue goes to a second carbonatation, the poor residue is sulphited, reheated and filtered in a sand-filter, system Raimbert, description of which is here given:

This filter is of a conical shape; the sand is between perforated plates and maintained at a distance of a few millimeters from the cloth and a series of superimposed rings, a vertical section of which has the appearance of the slats of a Venetian blind. In consequence of this graduated disposition, the filtration surface is not only made up by the upper layer of sand but also by the free space existing between each ring, which imparts to the filter at one and the same time, a horizontal as well as a vertical surface of filtration.

The particular originality of this filter consist in the manner of washing the sand. In other systems the soiled sand is washed in the filter itself and often this kind of cleansing process is imperfect. With the "Raimbert" system the washing is effected in a tub and the transfusing of the sand takes place by means of an ejector under pressure of $1\frac{1}{2}$ Kg. to 2 Kg. (2-1/5 to 4-1/2 lbs.) The sand is washed in a special tub by means of a current of warm water acting from below; the dirty water flows away from the surface without loss of sand; when the washing is finished the sand is forced back onto the filter by another ejector, the orifice of which is inserted into the bottom of the washing tub. One tub suffices for a number of filters.

At Berry-Au-Bac, one set of "Raimbert" filters insures the filtration of residue derived from the operation of 325 metric tons of beets per day, and if the time during which the filter remains idle is taken into account, we may say, that barring accidents, the "Raimbert" filter would be sufficient to filter the residuary liquid of a factory working over 450 tons of beets per day; the sand is washed out every 36 hours.

Filtration by means of this ingenious apparatus is so perfect, that Mr. Chabod, technical director of this sugar factory has affirmed that it is mainly due to this filter that a crystallization of second products was effected rapidly and with regularity.

The poor sulphited residues which did not return to the boiling apparatus and the crystallizers of the 1st. product, are boiled in a not and run into mixers. The mixing room is very well lighted, airy, and admirably fitted up in every respect.

There is a lime kiln attached to the factory; dimensions 100 cubic meters (130 cubic yards). It utilizes the lime rock of that region; two (20 mixers type "Lacoutre" ; prepare the milk of lime at 25° Beaume.

The factory is lighted by electricity furnished by a dynamo of 100 ampere, under 110 volt, operated with a Crossley gas meter of 20 H. P.

Thanks to the energy of our excellent friend M. Chabod, a competent and experienced chemist, the factory is operated economically; fine white sugar is produced, the diffusion system has been improved; a better diluting process for scums was adopted and an improved system of mixing secondary products was introduced.

Berry-au-Bac is one of the best sugar factories of France and we are delighted with its success.

Therefore, we present our congratulations to Mr. Dussaussory, the venerable chairman of the Council of Administration of the Berry-au-Bac factory.

The author of this monography will never forget some of the happiest years he spent in this factory, working as a subordinate under this excellent man, and which the undersigned will always remember with pleasure.

(Signed) Paul Marcus.

(Translation from the French)

ARTICLE WRITTEN BY MONSIEUR DUREAU, IN THE JOURNAL des FABRICANTS de SUCRE, PARIS, DECEMBER 4, 1912.

(The Journal des Fabricants de Sucre, founded in 1859 by B. Dureau, father of Georges Dureau, its present owner, not only is the oldest, but the most conservative and influential sugar journal in the world).

"SUGAR AT A GLANCE"

Charts and data prepared by Truman G. Palmer, 68 pages, and 42 maps and colored charts.

From an American point of view, to bring before the public the sugar question in an impressive style which the ordinary reader can easily understand even if he is not initiated in the sugar question has always been one of the difficult tasks to be accomplished.

But Mr. Truman G. Palmer, who for a number of years, has made the most meritorious efforts to popularize the economic advantages of the Beet Sugar Industry and who was one of the main factors to implant this industry into the United States, has, through his "Sugar at a Glance" brilliantly solved the difficulty of the problem and his book has been printed by order of the Secretary of the Senate after Mr. Palmer had dedicated it to this august Assembly.

(Document of the Senate No. 890 - 62d. Congress, 2d. Session, 1912.)

In his introduction, the author shows the origin of the prejudice that people had for a long time against the growing of sugar beets in the United States; the farmers blamed the sugar beet that it exhausted the productive capacity of the soil. In the beginning, the farmers were justified in this, as they planted sugar beets for several years in succession in the same fields instead of having alternated with other plants.

Mr. Palmer, then, preaching the example of the European agriculturists, establishes clearly the fact that the introduction of sugar beet culture, if planted in rotation with other crops, (1) improves the soil; (2) increases the yield of cereals; (3) develops the production of wheat, etc.

He is right when he maintains that the discovery of the foregoing facts, was the most tremendous advantage gained in modern times and by the introduction of beet culture the yield of cereals was almost doubled after rotating with sugar beets.

All European countries have taken advantage of this experience, and the great Governments of the Continent, Germany in particular, have made heavy sacrifices for the purpose of advancing sugar beet culture; but these sacrifices were not in vain for they were amply compensated by the vast strides made in agriculture and by prosperity attending agriculture in general, and rural conditions in particular.

Only England, by her free trade policy has remained an outsider, not sharing in the benefits enumerated, for her yield in cereals has diminished, and as far as sugar is concerned, she is entirely dependent on foreign countries for her needs.

That Great Britain has perceived the folly of her policy is proved by the fact that she has this year made a start in Sugar Beet Culture (by planting 1417 hectares, and by erecting a factory at Cantley, Norfolk, in which, during the campaign of 1911-12, 31,500 metric tons of beets were produced).

In view of the striking contrast existing between the result of these two fiscal policies, diametrically opposed to each other, practiced without interruption for the last sixty years, it should not be difficult to determine what policy the United States should pursue either to lower or abolish the duty on foreign sugar advocated by the Sugar Refiners of New York and thereby hinder the development, if not entirely ruin the only competitor of the American Sugar Refiner - to ruin as we say the native beet sugar factories; or to maintain the existing duty on sugar and thus hasten the day when - the farmer and American wage earner will get the benefit of the 100,000,000 dollars which the United States annually sends abroad for sugar purchases. Not only these benefits, but also the hundreds of millions of dollars that will accrue to rural communities, by the increase in other harvests, brought about by the extension of sugar beet culture.

The introduction to "Sugar at a Glance" is followed by a speech made on the 27th of July, 1912, in the Senate Chamber, by the Hon. H. O. Lodge, Senator from Massachusetts, with reference to the sugar question; it would take up too much space to analyze this lengthy document.

There are embodied in Mr. Palmer's Book, photographic views connected with the sugar industry in the United States, maps and colored charts.

(1) Cane and beet sugar;
(2) World Statistics - for the year 1911;
(3) The growth of cane and beet side by side, from 1840 to 1910;
(4) The source of European and United States Sugar Supply;
(5) Production of beet sugar from 1898 to 1911;
(6) Per capita consumption of sugar in the United States and Europe in 1910, 1911. Import duties and revenue taxes levied in divers countries.
(7) Price of granulated sugar in Europe and the United States;
(8) Consumption (by decades) per capita in the United States;
(9) Acreage devoted to beet culture in the United States;

(10) Agricultural daily wage earnings in the beet fields of Europe and the United States;
(11) Agricultural progress in the United States and Germany, due to the influence of beet culture;
(12) Effects of the Spanish-American War, and legislation on the development of the American Beet Sugar Industry, etc., etc.

The final chapter of the book is devoted to the study of the Sugar Beet and the influence thereof on agriculture, based on inspiration drawn from many Austrian and German authors distinguished by their learning experience.

Mr. Palmer, who is an ardent protectionist, cites John Stuart Mill in support of his edition on sugar, who advocates temporary protective duties for an infant industry, that is in course of adapting itself to the conditions of a country (like the United States into which the sugar industry was implanted from abroad).

Let us add that Mr. Palmer wields a facile pen; the book is written in plain language; abundantly illustrated with maps and charts the book suggests new ideas, and the general make up of the book enables any layman to grasp at a glance, the varied aspects of all the complex questions relating to sugar.

We therefore are bound to congratulate the author for his ingenuity and for the particularly happy originality of his ideas.

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APPLIED CHEMISTRY.

CRYSTALLIZATION OF SACCHAROSE IN A MORE OR LESS IMPURE MEDIUM.

- By -

A. AULARD.

CHEMICAL ADVISORY ENGINEER FOR SUGAR-MAKING.

Journal des Fabricants de Sucre, Dec. 4, 1912.

Forest-les-Bruxelles,Belgium.

All chemists know that Saccharose C^{12} H^{22} O^{11} or sugar in the process of crystallization crystallizes in clinorhombic prisms or in hemihedral compositions of two elements - hard to the touch and anhydrous.

Saccharose can only crystallize when chemically pure but several small crystals joined to each other or the surfaces of which adhere to such other at some point, may at any time interpose between the edges of their surfaces some particles of the watery mother-juice, which causes the sugar to have a greyish or yellowish tint; this tint will depend on the medium in which the crystals were formed.

It is therefore important, that the sugar factories who wish to produce sugar directly for consumption, see to it that the massecuite be in a state of fluidity and as colorless as possible. This fluidity and discoloration will reach their maximum by the judicious use of the sulphi-carbonatation process of J. Weisberg; but if the massecuite is of the quality described above, other conditions are imperative.

It is necessary, that at a given moment of the boiling process, no syrup of a poorer quality or of greater density be added, as such an unreasonable irrational course would counteract the normal formation of crystals.

Let us take for granted that the syrup is regularly fed into the pans; let us say 92° and in analyzing samples taken from the boiling apparatus, which being examined under a microscope, it will be noticed that such samples will show shortly after crystallization, that all the small crystals will be regularly formed with a perfect clinorhombic crystallization; however, in becoming larger, gradually, by reason of being additionally fed under the influence of the saline mother-fluid and by organic elements floating around them, they will become deformed as the mother-fluid may degenerate to a purity of 84° or even 80°.

In the apparatus there are formed different strata of a saline and organic composition; new syrup is always introduced from below, the rhombic base of the crystals which have a tendency to gravitate towards a vacuum, becoming enlarged, that part which is heaviest, being on the lower side in a newly arrived medium, from which it can draw its nutrition easier than from above, is only following a well defined crystallographic law governing physical bodies. On the other hand, in a medium that is unfavorably disposed towards the normal development of crystals and by reason of a resistance which such crystals meet in unfavorable surroundings in a medium that is poorer towards the upper part of the apparatus (there where salts of potash and soda and organic matter accumulate), the crystals are flattened out at some point where their angles or ridges or dihedral lines meet; there will then appear crystals of all possible shapes, even needle-like crystals as is often the case during the sugar extraction process from Molasses. And the evil becomes even greater, if at the final stage of boiling there is introduced into the boiling apparatus, syrup of a high density and of inferior purity; inferior to that of the mother liquid, in which the crystals are already floating, in that case the crystals are liable to become dented, worn away and even break into fractional parts, instead of growing normally larger on all their facets.

In order therefore, to get pretty crystals, it is expedient for the first product that the time of tubular boiling process (in prefernce to all others), should be limited to from 6 to 8 hours - at the utmost. The syrup to be favorable to crystallization should be of a density (56 to 58 Brix) at a temperature of 80° to 85° C., and should be as fluid, as pure and as colorless as possible, when entering the Boiling Apparatus; then in carrying on the operations rapidly without admixture and without admitting any turbinating residue, regular crystals will be formed that will approach the regular classical type.

If, on the contrary, the cooking is slow with more or less copious returns of poor residues, the crystals will be deformed and the sugar, after being turbinated will have a dull appearance, because many crystals will have lost their natural classical shape. This mass will be run with 8% water at 84° - 85° C. into crystallizers, Ragot type, which are found to be superior to others, because in these crystallizers the cooling points are in motion within a warm and fluid mass.

Turbination is completed six hours after the running in of the massecuite, the temperature of which is still 60° C.

Refrigeration must be carried on in such a manner that a drop of 4° per hour will take place.

During malaxation and the cooling of the masseecuite, the warm saturated turbinating residue is added (the temperature of which is 75 to 80° Celsius), in such a manner that during the turbination the mass will have 8-5/10 to 9% of water; it will be in a state of fluidity and warm at 60° C. as stated above. In this way, splendid crystals without any dull appearance whatsoever will be obtained, that will stand a relatively favorable comparison with the crystals obtained from 98° or 99° pure products, of the refineries where crystallization is more uniform and classical.

The Refineries Tirlemontoise in Tirlemont, Belgium, where sugar of 99.50 purity is manipulated, crystallization is admirably effected, because the boiling is carried on rapidly and moulds "Adant" are used, the crystals are small, but uniform and brilliant, and this is partly due to the fact that the boiling is carried on rapidly and that no impurities are allowed to enter into the mother-syrup.

In taking artificially colored water with which a lump of sugar is moistened, a uniform colored impregnation takes place, which proves that the mother liquid was very pure; if a lump of sugar is thus tested and no uniform colored impregnation takes place, then the mother liquid was somewhat impure; it is therefore advisable, in starting this work at the sugar factories and refineries, that the products be in a good state of fluidity and as pure as possible; that the boiling be carried on rapidly so that the crystals retain their clinorhombic shape as well as that brilliant limpidity which make them resemble small diamonds, being similar in composition (pure carbon).

That is why we have not yet arrived at perfection in the process of continuous boiling or with crystallization into sugar of a warm saturated mass by a cooling process. Douelle Say, Lambert, Mastaing, Kestner, Delfosse, LaGrange, have not yet given us their final improvements.

In the process Kestner, if properly understood and judiciously applied, there is a new idea involved which would do away with a lot of cumbersome machinery and apparatus in use at the present day - and help us to progress to heights hitherto unknown, because it is based onphysical and crystallographic laws which can be applied industrially with success.

Crystals howsoever small they be which are formed in a pure or an impure mass are always of the same shape if they are quickly eliminated from the mass in which they were formed. These crystals keep their shape so much better, the less they will have undergone the deprecating influence of impurities, with which they may have come into contact whilst in motion in the the mother-fluid and the less they will have rubbed against each other whilst in the process of formation. I have no doubt that Mr. M. P. Kestner, who has already given the sugar industry his juice concentration apparatus, an apparatus which supercedes and antiquated and cumbersomeconstruction for that purpose - will ultimately succeed in giving us a simple practical apparatus for continuous boiling operations, if the sugar people will consent to abandoning antiquated methods of making sugar.

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December 12, 1912.

(Translation from the German)

EXCERPT FROM BLÄTTER FÜR ZUCKERRÜBENBAU, PAGE 395.

BEET SEED PLANTING AND PROTECTION AGAINST PARASITES, BY

H. WIESE.

Take 5 pounds of beet seed per Morgen (A Prussian Morgen = 0.6309 acres), mix thoroughly with every 5 lbs. of seed, 10 lbs. dried boiled barley and fix the drill coupling at 15 lbs. per Morgen.

The germinating power of the barley is destroyed by reason of its having been boiled. It has been found that barley is a favorite article of food in the varied menu of beet parasites and full estimated crops have been obtained in every case where dried boiled barley was mixed with beet seeds. Three farmers each having planted 3 acres in this way were able to deliver from these 3 acres, 36, 45 and 54 tons of beets or a total average of 15 tons per acre, whereas, the total average without an admixture of barley was 10 tons per acre from 15 lbs. of seed. By mixing boiled barley with beet seed the thinning and pulling of the young beetlets is likewise simplified and more economical.

Not only the saving in seed but the saving in wages has here to be considered. Here is a practical demonstration of a farmer stealing a march on men of science looking toward economy in the matter of beet seed planting.

CENTRALBLÄTT FÜR DIE ZUCKERINDUSTRIE, DECEMBER 14, 1912.

Most of the large German Beet seed growers have formed a syndicate (30 growers) , and according to one of the Articles of Agreement, a M5(five) fine is imposed for every centner seed sold below the price fixed by the Association. The Association is in force until June 30, 1914.

1) Purity of seed is guaranteed;

2) Germination is guaranteed;

If the agricultural controlling station at Halle a/S. decides that the seed does not come up to the required standard the grower or seller of the seed is bound to refund the money paid for seeds.

3) If the seed does not yield 1800 Kg. per hectare the seller is liable for the value of the difference between the actual quantity harvested and said 1800 Kg.

The seller of beet seed shall not be liable for more than the invoice price of the seed; for instance, if a buyer purchases 200 Ctr. at 30 marks he shall in no case be liable for more than 6000 marks, but this only refers to cases where other beet seeds are mixed with sugar beet seeds.

But even this figure is fixed too low for I know of one case where seed was bought and when the beets were harvested it was found that 150,000 were nothing else but ordinary beets with a sugar content of only 6% and suffered a loss of 150,000 marks.

It would be desirable that a permanent agreement relating to the sale and commerce of beet seed should be arrived at both satisfactory to buyer and seller, so that the present uncertainty in the seed market should disappear.

BEET CULTURE.

SELECTION OF THE BEST VARIETIES OF THE SUGAR BEET.DÉC.25.1912.

(Extract from the Pamphlet "The Sugar Beet" written by and edited by J. B. Puviez, fils. General Representative of Wohanka & Co., Prague -- Reprinted in the Supplement of Journal des Fabricants de Sucre.)

Every beet grower is aware of the fact that a rational selection of varieties of plants that are to be cultivated contribute vastly towards reducing the cost of production and consequently towards increasing the net receipts.

A rational selection of varieties of plants is as important as the labor bestowed on the soil, the manure used and the rotation of crops adhered to - having gross or net profits in view.

Certain varieties of plants, whether selected or not have varied needs such as a good soil,proper manure, favorable climate, work bestowed on the plants during their growth, etc. They do not give us a yield to their full capacity except when their needs are fully satisfied. Therefore, it is of the greatest importance to decide what variety should be selected in order to make sure of a good and abundant harvest and that a judicious selection should permanently influence agricultural conditions, in a given locality, also that the variety selected should be adapted to the soil in which it is to be planted.

Let us take for instance the Sugar Beet, as a rule the grower uses the seed that had been recommended and was shipped to him: he seldom worries about its germinating power, its tendency to mature late or early; its tendency to root blight; he does not stop and ask does the seed delivered to him belong to a variety that will accommodate itself to his method of fertilizing his fields or has the selection been made with a view to being planted in a dry or humid climate and in a soil approaching to that in which the seed was raised?

The laws of nature that govern growth are the same in regard to all plants, the sugar beet included; therefore all seed growers and other modern establishments connected with beet culture should study these laws, conform to them and make their selection of seeds accordingly.

The work of seed growers has been greatly facilitated by their adoption of a method of selection by families.

At most of the important experiment stations two varieties of beets are produced, which for brevity's sake, we may designate as one variety for producing quantity, and the other for producing quality. The main object to be attained in both is to get on one and the same area the highest possible yield of sugar and not only have the varieties been taken into account as far as selection is concerned, but also with reference to conditions of vegetation, such as the vigor and humidity of the soil, manure, tillage, etc.

The honest seed grower will have two objects in view in carrying on his work. First the rendement, the harvest and polarization, have such a relation to each other that the higher gross yield of sugar could be obtained on a given surface. Some beets are, on an average, rich in sugar, but give quantitatively an abundant harvest. Second, in rich beets the care about weight is not neglected, but mainly efforts are directed towards getting a high polarization.

The small number of producers of selected beets who foreshadow in their advertisements a "universal beet"(uniting under any and every condition the two points referred to) have ample great hopes to succeed in producing such a beet. The laws of nature are unerring; upon them depend the work of selection and their success. Whether the ripening be more or less early, more or less late, there is an automatic result in the two varieties and the methods followed in the work of selection. The first direction followed corresponds with the needs of a variety that ripens early, the second direction followed corresponds with a variety of those that ripen late.

The creation of a variety of rich beet or of a variety that yields a large quantity is the result of the work of selection carried on for a number of years be it by experiments in the laboratory or in the field.

It is evident that a beet rich in sugar cannot be produced except by continuous selection of the richest specimens and their immediate descendants while the selection of a variety of a large yield requires experiments to be carried on in the fields on in the laboratory for a great number of years, special attention being given to the yield in weight, taking care at the same timethat the beets are satisfactorily rich in sugar.

If efforts are made to increase the sugar in a variety without neglecting to produce a rational weight, the grower will succeed gradually to produce a variety that may be rich in sugar,on the other hand, where the quantity in weight is to be increased - not neglecting the sugar content provided the phenomena of correlation permit it - a variety of an increase in weight can be produced.

Physiologically, the diversity of external and internal structure of the varieties of sugar beets can easily be explained by the two modes of selection.

a) We have the Wohanka extra rich in sugar;

b) Then we have the Wohanka beet giving a big yield in weight.

We will not discuss the details about the modification of the internal anatomical structure of these two well known varieties.

Each one has evidently some well defined needs as far as nutrition is concerned, needs of certain climatic conditions, etc., which the beet grower has to take into consideration, but which, however, he often fails to do.

An immutable law ofagriculture provides:

That the variety giving the greatest yield in wright will always be the one which can utilize completely all the given conditions of manure, soil and climate. Only through a practical test in culture can the best information be obtained as to the variety most suitable under certain conditions. Such a test will cost money, but in the long run the outlay will be amply recouped.

The appellation "rich in sugar" or "large yield" are only relative terms; but in the selection of seed the following rules should be adhered to: The Wohanka seed (extra) rich in sugar should be exclusively used if the climate is damp, and on land where the earth is vigorous and deep - the same rule holds good where fallow ground is brought under cultivation in low lands, after clover - or beans, when strong fertilizers are used.

Seed from the Wohanka beet, giving a large yield in weight, may be used in cases where these conditions do not exist, that is to say, on high ground, in less vigorous soil, in dry districts and where close sowing is done.

However, you must notconolude that the "rich in sugar" variety of one selection will give only such rich varieties everywhere, or that a selected variety of large yield will give quantitatively big harvests only; as the products of selection possess in a latent state a hereditary tendency, their development in the course of vegetation depends upon circumstances; above all, upon the distribution of rain, manure, fertility of the soil, the care which the farmer bestows upon the beet, etc., etc.

Therefore it is up to the farmer to observe and examine the two varieties at the different stages of growth during several years.

FRANCE.

KIND OF SUGAR USED IN FRANCE IN MAKING PRESERVES, CANDIES-ETC.

Statement of Mr. Georges Dureau, Director Journal des Fabricants de Sucre, Paris, France.

(See letter of Mr. Lucien Dureau of December 23, 1912 - Los Angeles, Calif.)

"No special quality of sugar is manufactured for preserves. The preserves, candies and chocolate manufacturers, canned fruit makers, etc., use white granulated sugar of fine quality, whose manufacturing cost is lower than that of refined sugar, not only because it has no refining costs, but also because it is free of the so-called "taxe de raffinage", whose amount is 2 francs per 100 kilograms of refined sugar".

EXCERPT FROM BLÄTTER FÜR ZUCKERRÜBENBAU, DECEMBER 31, 1912. PAGE 387.

CONDITION OF THE FOREIGN LABOR MARKET

By Freiherr von Busche Kessel,

Director of the German Labor Bureau, Berlin.

In considering the business year, regarding the development which has occurred in the German labor market, we find that in the Spring of the year we had an ample supply of it, especially from Russia, but even at Easter, labor became scarce, the supply not entirely meeting the demand (during Summer and Fall) made by industrial and agricultural centers. Notwithstanding the high commission offered to labor agencies the efforts made to bring foreign laborers in considerable numbers to Germany, were fruitless. This was due to bad weather at harvest time here and abroad, which lengthened the period of harvesting. Consequently, a great number of farm hands who would have come to Germany for work were unavoidably detained in their own country.

Although we succeeded in procuring a good supply of labor for Spring work, as stated above, during the Summer, and after Easter, the supply did not correspond with the demand. If we did get enough laborers to help us out until the latter time, we owe it to Russia, for she sent us far more men than in the previous year, and there was not only a relative, but an absolute decrease in this respect from Galicia.

If you follow my figures in this article carefully, you will find that Galicia can no longer be looked upon as a favorable recruiting ground as immigration from that quarter is gradually diminishing.

Now as to the ensuing year: We must expect an increased demand for foreign labor, particularly as related to our industries, as we are still on the upward curve in industrial activity. In looking over contracts and reports of important financial institutions and of large industrial establishments, we find everywhere that orders are abundant, the execution of which will last well into the summer and it will require a large force of workmen to execute these orders. Transportation reports from the railways and other signs of the times, point in the same direction.

The Balkan war (if limited to the powers warring at present), will scarcely affect our industrial development. But if a world war breaks out, the conditions would be different. The farmer would not worry about lack of workmen the factory needs, but immigration for the benefit of either industry or agriculture would cease. In such a case, we have no means of finding a remedy. However, it would be a greater calamity for Germany if, without her men going to fight, Austria and Russia were to mobolize and keep at home the men who otherwise would emigrate

Under normal conditions, we shall require a large number of immigrants to satisfy the needs of our flourishing industries. The following tables show how many workmen we procured from abroad and the proportion that were engaged in our industries:

1909.	Total of workmen				643,000
	In agriculture	375,000 =	58.3%		
	" Industries	268,000 =	41.7%		
1910/11	" Immigrants				696,000
	In Agriculture	388,000 =	55.7%		
	" Industries	308,000 =	44.3%		
1911/12	" Immigrants				729,000
	In Agriculture	397,000 =	55 %		
	" Industries	332,000 =	45½ %		

Although we had 33,000 more immigrants this year than last, yet 24,000 went to work in industrial establishments and only 9,000 on farms. Summing up the foreign labor supply, the proportion of industrial workers has recently increased much more rapidly than that of agricultural laborers.

On account of the rising curve in the extension of our intensive agricultural methods, we must look to foreign countries next Spring, for an increase in our demand for agricultural laborers, also because the preparatory work on the farms has been delayed in Russia owing to unfavorable weather conditions. This will delay the usual contingent coming from there to help us in our work.

A considerable number of our agriculturists in different parts of Germany are behind in their farm work and they will have to apply intensive methods in order to make up for lost time. This will absolutely compel them to employ (this Spring, 1913), an increased number of foreign laborers far in excess of the number employed last season. Our Bureau will be kept exceedingly busy in consequence of this, and we are apprehensive lest the demand shall be greater than the meager supply we will have to offer. Last year's bad harvests in Russia, forced a vast number of laborers to come to us for work, who otherwise would not have come. However, as Russia, this year, had a good harvest, the incentive on the part of many to emigrate does not exist. We will be curtailed in this direction and fears are entertained that the decrease in immigration from Galicia will further hamper us in the way of a sufficient supply of workers.

Now we come to the Poles and Ruthenians, who make up a large quota of our foreign laborers and we find that Galicia proper, has given us only 114,000 farm laborers in 1909/10; in 1910/11 only 109,000; and last year only 97,000, a minus of 17,000 as compared with two years ago; and a minus of 12,000 as compared with the previous year. These figures are sufficiently eloquent without my having further to comment on them.

Of course, Russia has helped us hitherto by sending us in

1909/10	242,000	agricultural laborers;
1910/11	238,000	" "
1911/12	262,000	" "

However, it is a serious matter for us Germans to have to depend more and more on "Russia" for our supply of agricultural laborers. I put emphasis on the word "Russia" as there the police not only pry into the political conduct of the workmen, but also have their say in rural economics. In the matter of migration, the will of the Police is supreme. In order to cross the frontier, every foot of which is closely guarded, a Russian subject must be provided with a specified permit and those permits are issued according to commercial treaties made between Russia and Germany from time to time, - and when you bear in mind that Russia is a country which largely exports agricultural products, you will then realize the gravity of the situation which confronts Germany with respect to the latter having to depend mainly on Russia for her supply of agricultural laborers.

Men who know Russian conditions in the interior, believe that she is on the eve of a new revolution and it only requires some sort of foreign complication to fan the glowing embers into a flame.- China, Persia, the Balkans, - the mention of any of these three names, will give us food for thought. Therefore, not to be entirely dependent on Russia for our labor supply, we must bestow our attention on Galicia. And why has the supply of laborers from Galicia decreased? Let us examine this question. First of all, we have competitors in the European labor market.--

Last year we offered for men per day,	1 M. 74 (41.4 cents)
" women " "	1 M. 51 (36 cents)

or allowances converted into the same amount of money.

Denmark, at that time made contracts paying

Men per day .... 1 M. 90 (45.2 cents)
Women " " .... 1 M. 49 (35.4 cents)

For men a plus of 16 Pfg. = (3. 8 cents)
" women a minus " 2 " = (0.47 cents) per day.

The National Central Bureau of Prague which hires the largest percentage of laborers for the Bohemian landowners offered men M.1.73 (41.1 cents) per day, and women 1.52 Marks (36.1 cents)

The great Agricultural Central Bureau in Vienna, which hires people for all Austria at Mk. 1.73 (41.1 cents) also offered the women M.1.55 (36.9 cents).

The Emigration Union of Crakow, agents for "Austrian Landowners" offered : Men, Mk. 1.77 (42.1 cents) and
Women, " 1.60 (38 ") per day, that is to say, 3 pfenings (0.714 cents) more for men and 9 prenings (2.14 cents) for women.

These figures show that our European competitors are trying to dislodge us from the field. Then we must bear in mind that work in a man's own country is accompanied by many advantages: and added to that fact the workman as a rule is subjected to a greater supervision and discipline in Prussian Germany than is the case in Moravia and Bohemia, where surroundings are more congenial, and you will not be surprised to see that the laborer is inclined to prefer working there than in Germany.

If you read the newspapers, you will find therein articles written by Poles, advising laborers not to go to "Prussian Germany". Thus the Poles try to make use of any means they can to harm German agriculture by boycotting German employers of labor. One of the means also consists in publishing letters alleged to have been written to their relatives by workmen employed in Germany, in which complaints are made of the terribls treatment and sufferings entailed. Although the very exaggerated accounts bear the impress of untruth, yet we have taken the trouble with the aid of the authorities, in the locality named, to investigate these allegations, and we invariably have found that on confession of the writers of such letters, the accounts were untrue. Also that some incidents in the laborer's daily routine work were grossly misrepresented and exaggerated.

The "Polish Emigration Union" is specially active in this work and boasts in pages of its weekly paper that it will not cease to agitate until all laborers will decide to go to other countries rather than to Germany.. One object of this agitation is to secure for other countries their share of the labor available and to which the Poles are more favorably inclined.

We are living in a period of a highly advanced economic development, and with the increased cost of living the world over, the price of goods materially increased, wages must of necessity rise accordingly. Therefore, Germany ought to make efforts towards bettering and strengthening her position in the field of competition, for to stand still, would mean stagnation in agriculture, which not only must compete with a foreign element, but must right here, in Germany, compete for her labor supply with industrial establishments. We must also bear in mind that Easter of 1913, will be earlier than usual; those who make up their minds to celebratd it at home will not leave their country to go abroad until after Easter, this fact is well known to all of us. Therefore, if we wish to supply our demand for 1913, we must make strenuous efforts to secure an early and abundant flow of immigration.

What must we do?

To Russian laborers who demand contracts with more cash payments and scarcely any allowance for firewood, etc., we ought to grant an increase in wages of say 3 Pfgs. per day (0.714 cents) for menand 2 Pfgs. (0.476 cents) for women. To Galician workmen who make contracts on the basis of less cash and more subsistence in lieu of cash, we ought to grant 4 Pfgs. per day for men, and 4 Pfgs. (0.952 cents) for women, the increase in wages granted by our competitors.

I believe we ought to grant this increase in wages, as we cannot get around it, and it would not be too heavy a burden for our agriculturists to bear. I have received a list of 44 employers of labor - of contracts made on the Russian frontier - where alone, contracts for large numbers can be made, either by employers or their Agents. This list comprises 44 farms located in different parts of Prussia and Germany.

Below, I give you a comparative statement:

"We offered for menper day M.1.96 (46.6 cents) inclusive allowance "converted into a cash equivalent M. 1.45 = (34.5 cents) for women. These "44 employers give men M. 2.17 = (51.6 cents), women M. 1.59 = (37.8 cents) "a plus of 21 Pfg. (4.99 cents) for men, and a plus of 14 Pfgs. (3.33 cents) "for women.

I recommend therefore, in view of market conditions described, that the resolution I herewith introduce be faithfully passed. which will enable us to offer foreign workmen a higher rate of wages than those we have heretofore agreed to pay, and I request you gentlemen, to vote favorably on this, my resolution.

"SUGAR AT A GLANCE"

EXCERPT FROM WILLETT & GRAY'S STATISTICAL JOURNAL.

Jan. 2, 1913.

Charts and tables by Truman G. Palmer, Secretary of the U. S. Beet Sugar Industry, 901-903 Union Trust Building, Washington, D. C.: This pamphlet brings the sugar problems to the ordinary reader in a way easily understood, and is the valuable result of Mr. Palmer's efforts at home and abroad for many years to solve the difficulties in the way of a perfect understanding of the advantages of the domestic beet sugar industry to the United States in all its several applications, including those of the farming interests, especially through the rotation of crops.

He shows that the introduction of beet culture has almost doubled the yield of cereals after rotating with sugar beets.

The book is written in plain language, and is largely illustrated with maps and charts, bringing the whole subject within the grasp of a layman at a glance. "Sugar at a Glance" received the high courtesy of having its charts and data printed as a document of the United States Senate, August 1, 1912.

(Translation from the French)

"Le Bulletin" of Stock Exchanges and Markets.

29 Rue Jean Jacques Rousseau, Paris, France. January 9, 1913.

We have received from Washington, D.C. U.S.A., an extremely interesting literary booklet entitled "Sugar at a Glance" written by an expert on the sugar question, Mr. Truman G. Palmer.

We believe that Mr. Palmer has been the champion in America, in popularizing the Beet Sugar Industry. He has been one of the principal factors in developing the industry in the United States.

It is a well known fact that for a long time the farmers were opposed to beet culture, which they thought would exhaust the soil, as they were in the habit of planting beets with year after year in the same fields instead of alternating beets with other crops. Mr. Palmer convinced them that beet culture with a system of rotation of crops, improved the soil and helped to almost double the yield of cereals normally harvested without beet culture. European countries prove this, except England, where sugar beet culture was not liked until lately, and England, attached as she is to a free trade policy will, for a long time to come, be dependent on foreign countries for her sugar supply.

Mr. Palmer's book contains numerous colored charts and diagrams, which are remarkably exact as regards the world's production, consumption, retail prices, etc., etc., and justifies fully the title given by him to his work; as with one glance, the reader is able to grasp the complex details relating to the sugar question in all its aspects.

HOW BEETS ARE BOUGHT, SOLD, DELIVERED AND PAID FOR.

EXCERPT FROM DIE DEUTSCHE ZUCKERINDUSTRIE, JAN. 10, 1913. (page 38)

FACTORY BEETS AND SHAREHOLDERS' BEETS:

Beets acquired by various factories in Germany 1911/12. The factories planted beets partly on their own land, partly on rented land; some beets were furnished by agricultural associations (who delivered the beets according to contract) so-called contract beets. Of all the beets used in German factories, the largest part were such as were delivered by individuals and associations in excess of what their contracts called for (Uberrüben (excess) = Purchase beets).

Beets which were bought from growers where no contracts had been entered into between the parties, growers that were neither shareholders nor those who belonged to any agricultural or industrial associations. These are called Purchase beets. Even this class (purchase beets) are based on a delivery agreement according to which certain conditions must be adhered to by the growers, the principal one being that of planting only a certain specified kind of beet; this agreement extends usually over several years.

The Klein-Wanzleben beet is the favorite one planted, as designated and stipulated by the factories. The seed thereof is either furnished free of charge or the factory is refunded the actual cost price.

In 1911/12, somewhat higher prices were paid for Purchasebeets than in the previous year (1910/11); but we must bear in mind that statistics regarding prices for purchase beets cannot be absolutely relied on, as the outlay for transportation to the factory, storage and other incidental costs are in some cases included in the purchase price - in some cases not. Furthermore, beets are not paid for everywhere according to weight. Some factories pay a fixed sum plus a percentage, in conformity with the proved sugar content. Prices are also modified according to the quantity of slices the grower gets free of charge from the factory. The price for shareholders' beets fluctuates considerably, owing to the fact that the net profit earned by the factory is distributed in the shape of payment for beets. In many cases, the fixing of prices occurs during the progress of the campaign at certain intervals - either increasing or lowering them - according to anticipated profits to be earned by the sugar factories, or according to the fluctuation of prices on sugar delivery sales of which the factory notified the rowers within a given period. (The factories have nothing to do with the fixing of prices on sugar delivery sales).

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(Translation from the French) Page 49

EXCERPT FROM LA SUCRERIE INDIGENE ET COLONIALE, PARIS, JANUARY 15, 1913.

REFERENCE TO "SUGAR AT A GLANCE"

The beet sugar industry of the United States has made strenuous efforts to extend the beet culture in regions where it already exists and to introduce it into regions where beets were almost unknown.

One of the most energetic champions of beet culture is Mr. Truman G. Palmer, who has sent us along with a very amiable letter - a booklet entitled "Coup doeil sur le Sucre" (Sugar at a Glance).

Thanks to the continued efforts of Mr. Palmer, who is Secretary of the United States Beet Sugar Industry, the production of beet sugar will reach this year 630,000 M tons. These results are so much the more remarkable, for the reason that the cultivation of the beet has had to struggle against an enemy, the lack of laborers to cultivate the fields, these had to be supplied by emigration.

Ever since the first waves of eastern civilization lapped the shores of the United States, the pioneers of agriculture who came to settle in the northern part of America had to fight off the redskin - Indians, who were enemies of civilization pure and simple, but never co-workers with these pioneers. In the southern part of the United States, in Louisiana, which at that time was French territory, negroes were imported. but the soil of the northern part has always been tilled by laborers belonging to the white race who came from all parts of Europe, especially from Germany and Italy.

To say that these immigrants were experts in beet culture would be asserting too much; and even now the success in this culture has not been brilliant as yet, on account of the class of emigrants who came face to face with agricultural conditions, which, to improve, required money and skill. Under such conditions, with ignorance on one hand and poverty on the other, not much could be expected from them although there were no more redskins to fight.

In order to overcome the difficulties that were in the path of beet culture, powerful sugar associations were organized, and these organizations made the initial outlay to promote the cultivation of beet culture in new territories.

Numerous failures attended the starting of new factories, but the American character admits of no defeat. This is why we are not surprised to see them apply a prompt remedy; they will dismantle an unsuccessful factory and erect one in a locality more favorably situated or where the beet cultural conditions are more thoroughly understood.

At present, it is no longer the redskins who are the enemies of a branch of American agriculture. the beet sugar as well as the cane sugar industry, but the enemy is the new tariff policy. The import duty amounts to about 20 francs per 100 Kgs. sugar. The lowering of this duty would diminish the chances of an extension of beet culture and consequently decrease the production of sugar. It sounds very alluring for representatives of the people to promise them free sugar in their campaign speeches and then endeavor to get from other sources, the revenue that was derived from sugar.

Mr. Palmer's books is part of Senate Document No. 890, and appreciating the importance thereof, the august Senate Assembly has ordered it to be embodied in their state documents.

In the beginning, beet culture in America as was the case in Europe. was not looked upon with favor. Mr. Palmer brings out in his book the advantages accuring to agriculture through the cultivation of the beet, advantages which we all know. He also shows that there is a certain antagonism existing between the producers of beet sugar and the refiners. The refiners would like to see the duty on sugar removed in order that they may get cheap supplies from Europe. However, this foreign sugar would soon dislodge native sugar, as it costs more to produce sugar in the United States than in foreign countries.

In Mr. Palmer's opinion, instead of lowering the duty it should be raised. so as to keep at home the hundreds of millions of dollars that are now sent abroad for foreign sugar. He also advocates the production at home, of all sugar consumed by the American people.

Embodied in Mr. Palmer's books, is a speech on the sugar question made by Senator Lodge, on the floor of the Senate. the 27th of July, 1912. The book likewise contains pretty photographs relating to beet culture and 42 colored charts showing acreages, rotation of crops and the increase in acreage due to the culture of beets. Let us enumerate a few of these charts: Production of cane sugar side by side with the beet sugar in 1910, 1911; The gradual increase of cane and beet sugar by decades. and countries from 1840 to 1910; The production of American beet sugar from 1898 to 1911, showing a gradual increase from 36,368 tons in 1898 to 509,846 tons in 1909 and 606,033 tons in 1911. We likewise find charts on per capita consumption in all countries on retail prices of sugar, etc; In Italy this is highest - in England the lowest. Maps show the gradually diminishing sphere of influence of the New York refiners which is due to the increasing quantities of beet sugar brought onto the market. We also find an interesting chart showing the amount of sugar consumed by an American workingman's family: such a family consumes sugar to the value of $15.76, fresh beef to the value of $50.05. milk $21.32; bread $12.44, butter $28.76. By other charts he proves that beet culture causes an increased yield of wheat by 27.6% and a corresponding increase of other cereals.

Mr. Palmer concludes by quoting Helot, Knauer, von Ruemker, Humbert, Lilienthal, Briem and others, whose articles corroborate what he has so clearly and lucidly put before us in his "Coup d'ceil sur le sucre" (Sugar at a Glance)

Austria-Hungary.

EXCERPT FROM THE PRAGER ZUCKERMARKT, JAN. 8, 1913.

COMMENTS ON "SUGAR AT A GLANCE". DATA ON HIGH COST OF LIVING.

On account of the great interest of this question to the Sugar Industry in general, we wish here to discuss the most important points:

Sugar is one of the few commodities which does not participate in the general rise of prices but on the contrary, became cheaper with every decade. This is so much the more surprising when we consider the constantly growing world's consumption of sugar, for as a general rule, increased demand causes a corresponding rise in prices. We may ascribe the reason for this to the unlimited possibilities in the sugar supply as the advantages of beet culture have induced the European farmers to raise beets in abundance and a corresponding decrease in the cost of production of sugar took place.

In 1870, the consumption of sugar in the United States was 32.7 pounds per capita - the New York wholesale price is 13.51 cents, and in 1910, the per capita consumption was 79.9, but the wholesale price fell to 4.97 cents per pound.

The per capita consumption of sugar increased (from 1870 to 1910), by 144.3%, whereas the price fell by 63.2% per capita.

Statistics on consumption of sugar by 2567 workingmen's families (which is confirmed by the statistics of the U. S. Bureau of Labor) show that in 1909 each family consumed 268.5 pounds annually, and the balance is used in the manufacture of candy, condensed milk and other sugar containing preparations. Other statistics show that the average retail price of sugar for each 100 lbs. was only 82½ cents higher than the New York wholesale price so that 82½ cents represented the average cost of distribution for 100 lbs. during 17 years.

Proceeding from these premises, we may state that in 1870, the head of a family of five, bought 122.6 lbs. of sugar; in the year 1910 299.6 lbs; in 1870, he paid $17.57 for 122.61bs; in 1910 he paid $17.36 for 299.61bs. That is to say, for an additional 144.3% of sugar he paid out 21 cents less than he did in 1870. In other words, notwithstanding the fact that the yearly average consumption in 1910 was 177 lbs. higher than in 1870, the price of sugar fell to such an extent that the increased quantity consumed did not increase the cost of living as far as sugar is concerned.

Notwithstanding the fact that the total amount disbursed for sugar by a workingman's family was only 5% of the total expenditure for other necessaries of life, and notwithstanding the fact that the price of sugar in the United States is lower than in any of the European countries England excepted - yet the refiners of imported raw sugar have combined to propose to the Congress of the United States to take off the duty on imported sugar. They give as their reason for so doing, the price of sugar in the United States, maintaining that it is a burden on the consumer and also allege that it was a contributing cause to the unreasonable high cost of living.

According to a report to the Senate Finance Committee, the total saving per capita on sugar would be 14 cents per annum in favor of the consumer. It is likely that the refiners would adhere to low prices with a view to ruin their only competitor, the Beet Sugar Industry, and as soon as this was accomplished, force the price up in order to ultimately put into their pockets the $51,000,000 which the National Government now gets in the shape of import duties.

A marked contrast to the movement of sugar prices show the prices of other commodities which 2,567 workingman's families were obliged to buy in 1901, as compared with that of 1910, and it is assumed that the rise in retail prices has advanced correspondingly with that of wholesale prices.

EXCERPT FROM BUREAU OF LABOR BULLETIN 105, PART I. PAGE 32.

AVERAGE COST PRICE OF SELECTED FOODSTUFFS CONSUMED PER FAMILY IN 1901-1910.

	Quantity Used Per Family.	Cost Price Of same to each family.	Cost Price Of same Quantity to each family.	Increase Of cost to each Family.
	1901.	1901.	1910.	1910.
	Pounds.	Dollars.	Dollars.	Dollars.
Fresh beef	349.7	50.05	65.06	15.01
Butter	117.1	28.76	40.57	11.81
Eggs, (dozen)	85.2	16.79	26.72	9.23
Milk (quarts)	354.5	21.32	29.87	8.55
Meal, flour	680.8	16.76	24.84	8.08
Salted Pork Products	110.5	13.89	21.11	7.22
Coffee	46.8	10.74	15.79	5.05
Lard	84.5	9.35	13.18	3.83

National Federal Legislation as a Barometer for the Development Of the Beet Sugar Industry.

When the Dingley Tariff bill became law in 1897 it looked as if the United States were going to produce all the sugar needed for consumption. The bill promoted the expansion of the sugar industry and one year after its enactment 7 new sugar factories were erected, 14 new ones projected; and in 1899 the Agricultural Department reported the prospect of 107 new projected factories.

Each Agricultural Association that was able to guarantee the planting of 1000 to 2000 acres of sugar beet was assured of the erection of a half million to one million dollar factory in their midst.

The erection of such giant structures exceeded the capacity of the farmers to supply the beets which these factories needed in order to operate them profitably. Again, the sugar beet was a new plant, the agriculturists were indifferent to it, but the investor was not discouraged. Then came the war with Spain and the annexation of sugar producing islands - and five years later, Cuban Reciprocity. Capitalists who prior to this, had invested in the beet sugar industry eagerly, paused, and diverted their energies and capital into other channels. Out of 86 projected factories that were to cost $49,000,000, only eight were erected, and the other 78 projects fell through on account of Cuban Reciprocity.

Before the Cuban Reciprocity era, although the technique of the Beet Sugar Industry was not very well understood, there were erected within 6 years, 43 giant factories, and after the enactment of Cuban Reciprocity only 27 new factories were erected within nine years.

Now the capitalist became discouraged and the farmers became enthused, so that at present about a half million acre are annually planted to beets, and their efforts to interest additional capital in beet culture are in vain.

Although beet growers have contracted for five years in advance to plant 5,000 to 7,000 acres, they have not been able to secure the erection of additional factories and the same state of affairs will continue as long as the Congress of the United States is undecided whether it is in harmony with sound national economics to let Americans produce at home all the sugar needed for home consumption or whether the existing Beet Sugar Factories shall be allowed (with the co-operation of the Sugar Refiners) to be transformed into picturesque historical tarrification ruins.

EXCERPT FROM LaSUCRERIE BELGE, JAN . 15, 1913. p. 222.

The "Gazette" of Brussels, publishes the following:

Bad news comes to us from our sugar refiners. It will affect our agriculturists who depend on this industry for a livelihood, the Belgian Government not even consenting to take off 5 Francs of the revenue tax. A group of Russian refiners will shortly open a sales agency here for their sugar.

Here we have a group of foreigners who are going to compete with our producers in the English market, and England, establishing a sugar industry of her own, at home, her market will be lost to us.

The Magdeburger Zeitung telegraphs as follows:

"The Russian Syndicate of Sugar Manufacturers establishes a branch (Sales Agency) at Brussels, with a view of selling Russian sugar to Belgium, Holland and France".

Mr. Brodsky of Kiew, is at the head of this combination.

CIRCULAR OF EMILE PLUCHET, AGRICULTURIST & SUGAR MANUFACTURER.

PRESIDENT OF THE AGRICULTURAL ASSN. OF FRANCE.

EXCERPT FROM THE JOURNAL des FABRICANTS de SUCRE, JANY.15,1913.

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(Address)

To my Colleagues, Farmers and Sugar Manufacturers:

During the past thirty years, I have farmed 700 hectares of land of which 200 hectares were planted in rotation, annually, to beets. During that period I managed and operated a factory using 25,000,000 Kg. annually (35.115.600 pounds = 27,558 short tons).

I have witnessed many difficulties and apparent conflicts between grower and factory (caused invariably by misunderstandings) whose interests are identical, but who frequently seem to be opposed to each other. Having retired from active work, I am today, less directly interested in the sugar question, and am in a better position to permit my colleagues to benefit by the results of my long experience which may guide them to smooth over their little difficulties, dissipate misunderstandings and conciliate the interests of farmers and factories, which, I repeat, are absolutely identical.

Technical knowledge, executive ability, method and economy, play an important part in the manufacture of sugar, but we may assert without fear of contradiction that the commercial element with the growing of beets and the operating of a factory largely contribute towards the success or the failure of a beet sugar enterprise.

Due to an ancient custom, established when the beet sugar industry was in its infancy, the manufacturer is compelled to buy his raw material, the sugar beet, in February or March - 2 months before the seed is entrusted to the soil.

And upon what basis and in what proportions are the purchases of beets generally made?

First of all as to quantities purchased the hectare is taken as a basis. The owners of a factory with a capacity of 30,000 tons, estimating that the average yield in their district will be 30,000 Kg. per hectare, will endeavor to contract for a harvest of 1000 hectares. But this is a very haphazard way of providing for the future. The grower will have sold the future yield from a given number of hectares which he sets apart for beet culture although it is uncertain what that yield will amount to; but the buyer does not know even approximately, what will be the amount supplied to his factory and which he has agreed to take.

In consequence of climatic conditions, very favorable or unfavorable, as the case may be, the yield varies often 25% above or below the estimated average per hectare (in 1911 there was in many cases a deficit of 40% to 50%); the sugar factory buyer of beets from 100 hectares is liable to get 22,500 kg. or 37,500 kg. of beets per hectare, that is to say, quantities that are the minimum or maximum, with a result of increasing general operating expenses per ton of beets and of extending the period of operation and consequently, cause a considerable loss, either by reason of the beets remaining too long in silos or heaps which would naturally diminish the rendement in sugar.

These few remarks I believe are sufficient to show that the mode of buying beets quantitatively as done at present, is defective. And the beet is the only agricultural product sold in this way. In the case of wheat, oats, potatoes, product of vineyards, etc., etc., the agriculturist sells all these products in fixed and well defined quantities, and not an unknown yield to be derived from a number of hectares the yield of which may vary in considerable proportions.

This method of buying and selling, it seems to me ought to be improved upon.

We understand very well that the agriculturist does not wish to run the risk of carrying on an expensive culture, demanding great care, outlay in fertilizer, laborers' wages, etc., without being first assured that his crop will find a buyer. But he could easily sell a fixed quantity if he were to contract at seed time, to deliver, say 3/4 of the yield that he was getting per hectare on an average during each year. If he sows, let us say, 10 hectares of beets, in anticipating 30,000 Kg. per ha., he could sell a fixed quantity of 250,000 Kg. and reserve to himself the right of selling the surplus if any - at harvest time, or sell at seed time, 300,000 Kg. with the option of increasing or diminishing this quantity by 10 or 15%.

In this manner, the item of chance is for the grower as well as for the factory, reduced to a minimum; the grower is sure of selling his yield, the factory is sure of getting a regular supply. I do not believe that any serious objections can be made to this mode of procedure.

BASIS OF PRICES.

Two factors have hitherto been considered in this:

1) The quality of the beets furnished,
2) The market price of sugar in Paris during the month of manufacturing such as quoted at the time of sale.

The quality of the raw material in the beets is determined by the density of the beet juice at the time of delivery. The price per ton of beets is fixed if the beet yields a density of 1070 grammes per litre which in practice is called a beet with a 7° density.

Each tenth below or above causes a rise or decrease of prices varying from 0 fr. 30 to o fr. 50 per tenth, according to the special agreement made between the parties. We could discuss this empirical method as the density of a beet does not always give an exact indication as to what is its sugar content. In other countries, for instance in Belgium, the basis of prices for the beet is fixed according to its real sugar content which is determined after a complete analysis. It would be a good thing if this were done in France also.

The second item which is considered by the factory to fix the price of the beet showing 7° is the difference (represented by cost of manufacture plus profits) between the price of a quintal (220 lbs.) of sugar No. 3 (white sugar) quoted on the Paris Bourse whatever that may be during the month of extraction at a time of sale - and that of 1000 Kg. of beet at 7 degrees of density delivered at the factory.

This difference may vary in proportion to improvements in machinery, the quantity of production and according to the particular economic conditions under which the factory is operated.

It is presumed that the difference would not be less than six francs ($1.158) which would bring it down to 5 francs ($0.965) if the sugar is delivered at the factory, as 100 Kg. (220 lbs.) will cost about one franc (19.3 cents) for transportation and brokerage charges.

Such are briefly, the essential conditions under which sales are usually made. The prudent and serious minded manufacturer should protect himself by sales of sugar in advance and make his purchases of beets gradually, in proportion to contracts entered into for sugar sales.

Under present conditions governing purchase beets, with the hectare as a basis for quantity - could this be done? No, except one relies on chance, because, as we have explained above, the harvest may vary considerably.

In 1911 (an exceptional year) the yield of beets showed a deficit of 50% in certain districts. All beet growers - in consequence of excessively dry weather in 1911 may bear this in mind. I may add that the long delayed rainfall in September and October, causing the fertilizer to act only then upon the soil, by dissolving the nitric and ammoniac elements, phosphates, potash, lime, etc., introduced into the beet juice impurities which created serious difficulties in the sugar extraction and gave a very inferior rendement.

In consequence of all this a very considerable rise in sugar took place and certain manufacturers had to buy sugar to cover their contracts as they could not get enough beets to manufacture the sugar themselves and had to pay 10 to 15 francs more for a bag of sugar than they got for it. But you will tell me that this is an exceptional case. True, but these exceptional cases may crop up now and then in varying proportions. Such facts however, ought to condemn the present system of buying beets. How shall we go about it to reconcile the interests of both grower and manufacturer? In a very simple way - in selling the beet based on the difference in price of sugar (the difference to be the manufacturing costs, and a reasonable profit for the factory) and the price of beets.

I would like to have the grower-seller fix the date when to sign a contract for the sale of his beets. If, for instance, at the time when he sells his approximate yield of beets in February or March, the price of sugar during the campaign month appears to him too low he may inform the factory so that he will delay fixing the price of his beets.

He will have the option at such time as convenient up to 30 September, to fix his price for the beets based on the Paris Exchange market prices for sugar No. 3 as quoted for the three months of October, November, and December, taking into consideration the difference between the price of a quintal (220 lbs.) of sugar and a metric ton of beets (10 quintals of beets.) All the grower will have to do is to inform the factory by letter, and the price of beets contracted for in the early Spring will be determined according to the market quotation of sugar, the price to be received by him for beets will hold good from the day following the receipt of his letter addressed to the factory. If this date chosen by the seller falls on the campaign period, the price for a ton of beets will be that of a quintal (3rd of October) of sugar less the difference of manufacturing cost and a reasonable profit for the factory.

If, however, the date fixed is later than the campaign period that difference will be increased by Fr. 0.25 for each month of delay so as to protect the factory for cost ofstorage, insurance, etc., etc. To make myself well understood, I will here give you an example:

In the month of March 1913 Mr. X__________ beet grower, sells to Mr. Y.__________ manufacturer of sugar, 400,000 Kg. of beets on the basis of 7 degrees of density at 6 francs difference - delivered at the factory. On that date sugar No. 3 is quoted for 3d. October, 29 francs the 100 Kg., which, with a difference of 6 francs would make the price of beets 23 francs. a price at which Mr. __________ does not want to sell.

Between March and 30 September, sugar deliveries of 3d. October are quoted at 31 francs the 100 Kg. The farmer wants to make sure of 25 frcs. for his beets, 1000 Kg.; he informs the factory, and the price for 400,000 Kg. beets is definitely fixed (according to 3d. October quotation on the Paris Bourse), the day following the receipt of the letter by the manufacturer.

On the other hand, if Mr. X__________ does not see the 3d. October sugar rise before the 30 September, the fixing of the price for beets remains in abeyance. At that time he starts making his deliveries of beets and at a given moment he sees 4th May sugar quoted at 34 francs. This price appearing satisfactory, he informs his manufacturer Mr. Y__________ that he fixes the price of his beets according to the 4th May quotation of 34 francs.

The price therefore, will be 34 francs less the 6 francs (the difference agreed upon) less 2 francs - at the rate of 0.25 per month for the 8 months during which Mr. X__________ was holding back; total 8 Frcs. = ($1.54.3) Frcs. 34 - 38 = 26 Frcs., the price he would receive for a ton of beets. This, you see is not a complicated calculation.

In this manner the manufacturer whose mind is not worried by commercial fluctuations can apply all his intelligence and all his energy to the good administration and management of his factory in such a manner as to obtain the highest possible rendement; in converting his raw material into sugar at as low a cost as possible.

As far as Mr. X__________ the farmer is concerned, he remains owner of his merchandise which he will sell at the market price like all his other products. It would only be just that should the price of sugar go beyond 35 francs per 100 Kg. that the surplus resulting should be equally divided between farmer and manufacturer.

In adopting this method of buying and selling beets the interests of manufacturer and farmer would be absolutely identical, and I am convinced that all the little misunderstandings that occur in connection with beet deliveries would disappear.

But I admit that it will be very difficult to uproot inveterate habits even if these are acknowledged to be bad, and I do hope that my system which for its very simplicity should impress everybody, will be extensively adopted, as it would be a fair deal for every one concerned.

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(Translation from the French) Page 51.

EXCERPT FROM La SUCRERIE INDIGENE et COLONIALE, JAN.15,1913.

AZOTE AN ESSENTIAL ELEMENT IN THE NUTRITION OF PLANTS.

Of all the interesting elements that enter into the nutrition of plants Azote is without doubt, the most important and the most precious; the vegetable protoplasm which constitute the living parts of the plant are mostly made up of an azote combination if it is to be judged by its average composition which is as follows:-

1)	Phosphorated albuminoid substances	Dry Weight 40%
2)	Albuminoid substances and such pertaining to fermentation	15%
3)	Diverse azotized bodies	2%
4)	Hydrates of carbon	12%
5)	Fats	12%
6)	Mineral substances	6.5%

It therefore follows that in agricultural plant production, the production of dry substances is intimately related to the quantity of azote that plants have assimilated; this fact has been verified by Hellriegel, who noticed that vegetation (growth development) was promoted proportionately to the quantity of azote that had been added. The plants giving the largest yield (to the hectare) in dry substances are the most exacting as far as azote is concerned.

			Azote
A beet harvest on 40 hectares requires		..............Kg.	102.5
An average rye harvest	"	(20 ha.) "	40
" " Barley "	"	(25 ") "	38.1
" " Bean "		(16 ") "	64.4
" " Peas "		(18 ") "	90.0

		Azote
An average of Mangolds (40,000 Kg.)		Kg. 132
" " " sugar beet roots	(30.000 roots)	" 84
Potatoes "	(18,000 tubercles)	" 78.6
Cabbage-plant	(40,000 Kg. leaves)	" 137.4
Forage corn 60,000 Kg. green		" 170

This being the case, it would be very interesting to ascertain the sources of azote that are at the disposal of plants and by studying them make sure that they meet the present and future requirements of our agricultural production.

Those sources are fortunately very numerous, but does that mean that the needs of our cultural plants are satisfied? Very far from it. The actual consumption of azotised fertilizers scarcely reaches (notably in France) 1/4 of what it ought to be.

The principal stock of azote that the plants can draw from comes from the soil where the store is replenished by periodical manuring of the fields. These manures are organic, ammoniacal and nitric. Formerly these manures were exclusively organic - that is to say, in the main barn manure - dead leaves- and vegetable matter in the course of decomposition; all these made restitution to the soil of such elements as had previously been taken out by whatever plants were harvested; among those elements is azote of which we know and the cyclic transformation in the soil. Organic azote or the complex azote of organic matter cannot always be utilized by plants, except by symbiotic mushrooms which adhere to the roots of certain plants growing in moors and forests and which absorb the organic azote by direct assimilation, the plants themselves thus getting a direct benefit from it.

Organic substances when in the soil, are liable to become a prey of specific bacteria which transform them into carbonic acid and ammonia which oxydised by nitrous and nitric ferments of Wyngradsky produces nitric acid and finally nitrates, which by reason of their great tendency to solubility are the principal azotised factors in plant foods.

Ammoniac as an intermediary product can also be assimilated directly, as was demonstrated by experiments made by Müntz, but it is influenced by nitrification factors so that we fully assert, that the plants, a few of them excepted, draw their azotic nourishment mostly, if not entirely, from nitrates of the soil.

Boussingault was the first who ascertained in 1856, what part nitrates played in plant life and that they are absorbed by the plants previous to their flowering; they are then under the influence of solar rays gradually transformed into albumenoid azotes which help to elaborate plant protoplasme.

Grandeau tells us that the nitrates of soil are rather nitrates of calcium as the lime necessary to nitric acid saturation that result from ammoniacal oxydation (Nitrosation and Nitration) undet the influence of nitrous and nitric ferments which are always existing in the soil in large quantities and more abundantly than the average supply of Potassium. The ground supplies the plants with only thinned solution of nitrates, so extensively dissolved that we may assume that the plants absorb rather the ions Az. O^3 than the nitrates themselves.

Intensive production is characteristic of the actual conditions of agriculture and the immediate removal from the fields of harvested products help considerably to impoverish the soil - thus carting to distant cities considerable quantities of nitrates which find ultimately their way into

into sewers, rivers, and finally into the sea, where they are lost forever to agriculture and manure restitutes to the farm only a meager fraction of thequantity taken away by the crops harvested so that the question of azotized fertilizers at present is a serious one and may be summed up as follows:

The most important element that a plant needs is azote and this must be supplied before anything else. The question has been asked in what form and with what combination is azote preferable and various classifications of the principal azotized fertilizers have been suggested according to the cultural value of their azote content.

Wagner's table gives a pretty good idea (nitrates being represented by 100).

Nitrate of soda	100.
Sulfate of Ammoniac	90.
Dried blood, ground horny substances green plants not liquified	70.
Bone meal, powdered meat, fish guano, ...	60.
Barn manure	45.
Refuse of wool or hair	30.
Ground leather waste	20.

Ammonia sulfate which is obtained by mixing with sulfuric acid the ammoniac yielded from the distillation of sluice water and from water used in purifying illuminating gas is utilized in enormous quantities, the world's production of which in 1910 was 1,117,000 metric tons, which exceeded the 1909 consumption by 152,000 tons one third of which was produced by Germany; the latter's production was 6000 tons more than that of the United Kingdom.

Chilean nitrates of soda furnish the largest portion used in agriculture; their layers are produced by the nitrification of guanos, seaweed and marine plants thrown on land by volcanic action and due to a great scarcity of rain they are kept in a good state of preservation for an indefinite period.

Sea salt, sulfate of sodium and iodine formations are mixed with these nitrates but they are freed from them by a special process, in factories specially equipped for that purpose.

Chilean Nitrate of soda is delivered to the farmer 95% pure and contains from 15% to 16% of Azote; Chilean Nitrate of Soda is equivalent quantitatively speaking, to 3 times the fertilizing value of barn manure. The production of Chilean Nitrate of Soda was 2,470,000 metric tons in 1910, 355,000 tons more than in 1909; 520,000 tons more were consumed in 1910 than in 1909. U. S. America consumed 110,000 tons more than in 1909; Germany 80,000 tons more than in 1909; France 53,000 tons more than in 1909; Belgium 40,000 tons more than in 1909; Holland 33,000 tons more than in 1909. France consumed 350,000 tons in 1910. The total of Germany's consumption was 700,000 tons.

Nitrate is used in increasing quantities year after year; we have established the fact that these sales constitute ordinary plant food whether such salts are the remnants of previous organic ammoniacal manure or that they are a covering in the shape of nitric fertilizer - and thus mixed with the soil.

Compared with other azotised fertilizers their use in agriculture will therefore be constant on account of being easily assimilated and considering their low prices compared with the price of Azote quoted at Dunkerque. Besides Nitrates are saturated salts suitable for all kinds of soil from which they require very little food and that do not depend on the activity of soil microbes for their assimilating capacity nor upon a chemical reaction of whose conditions of equilibrium we know so very little and there is no doubt that in those salts both are nicely adjusted.

We have intentionally omitted to refer to the absorption by leguminous plants of the Azote of the air. We have already shown that these cultures need generally a larger supply of azote which as is well known get this azotized food from the atmosphere and through the medium of nodosities of the roots.

Willfarth and Hellriegel have demonstrated in their experiments that this fixation of atmospheric azote was a living phenomena due to certain soil bacteria which adhering to the roots of leguminous plants live with it in symbrosis. Formerly, it was known that leguminous plants enriched the soil, but before Hellriegel, the cause was not known. As regards the nodosities on which the bacteria for azote fixation are developed, some call them "Storehouses, indicating abundance", some only consider them parasitic mushrooms.

It has been noticed that nodosities occur on the roots in an inverse ratio to the richness of the soil in Nitrate and it appears that their function is to help to bring azote to the plant if the soil has not a sufficient supply for the needs of the plant.

Under ordinary conditions, a leguminous plant ripening to maturity lives at the expense of nitric azote and at the cost of the "azotes of microorganisms" existing on nodosities; nitrates are in fact very useful to the plant up to the time tubers are formed on its roots.

What particular part Azote fixation bacteria play has not been elucidated; thus the total absence of nodosities from 2, 3, 4 and six years lucerne has not been explained. It is however well known that the use of azotised fertilizers, if it is not indispensable towards getting a tolerably good yield, has always resulted in an increased yield; we may incidentally mention a report made by Beyerinck, in 1890, in which he refers to the bacillis radicicola and other ground bacteria that retain free azote (Azotobacteria) that are able to assimilate nitrates and other soluble composites and to immobilize them into an unsoluble force in the vicinity of leguminous plants, which would, according to Kayser, constitute a favorable condition under which they would draw to themselves atmospheric azote during the first stage of vegetation and store up a reserve supply of azote, easily soluble that could be utilized by the plant as soon as its nodosities disappear.

It is an established fact that the leguminous plants draw upon the vast stock of Azote (floating in the atmosphere) for its azotised food and for a good many years efforts have been made to extend this interesting azote-absorptive privilege to all our cultures - a privilege which certain sea-weeds possess and might benefit other plants with which they lead a symbiostic existence.

To take out of the atmosphere the azote which mixed with oxigene forms 4/5 of its volume was one of the most interesting problems to solve and the solution of which seems to have been found by the process Berkeland - Eyde in the preparation of artificial nitrates called Norwegian Nitrates.

Unfortunately, the process of getting a supply of nitrogen direct from the air with existing appliances to utilize it in plant culture is very costly, and when we bear in mind how beautifully simple the microbian reflex action in the soil is that nature effects without artificial aid, we have only one thing to regret, and that is its principal defect, that of being specific in its character.

The industry of making artificial nitrates to which I have alluded is not less interesting and has a great future before it. Carried on in electric furnaces, it is in principle an oxydation of the Azote of the air by means of the oxygen itself that makes part of the atmospheric mixture.

Natural forces have to supply the power that is necessary to activate the production of nitrates.

The Norwegian Azote Society utilizes waterfalls, which will give an energy of 400,000 H. P. once the improved plant is completed and wherever there are waterfalls, conditions for producing artificial nitrates or obtaining azote are admirable.

In the most favored regions of the French Alps the cost of producing 1 Kg. of Azote according to Mr. Plasin of the University of Grenoble, would amount to 1.75 to 2.48 francs, whereas, 1 Kg. of Azotic nitrate of soda is sold in France at 1.50 fr.

We are therefore led to believe that this Industry has not yet reached the desired stage of development, and if we cannot as yet cheapen the cost of its production then we will have to admit that it has come to the front a hundred years too soon. It takes 1,000,000 tons of nitrate to produce 240,000 tons of azote and in proportion as you take Azote from the soil you ought to replace it, so as to keep up the productivity of the land. Another way of getting Azote from the air has been pointed out by Franck whose process consists in producing calcic cyanide, which is already manufactured in Dalmatia, Austria, Germany and France. Calcic cyanamide is obtained by fixation of Azote distilled from liquid air by means of carburetted calcium, or upon a mixture of lime and coal at a temperature equal to that of an electric oven;

the azote should above all be free from oxygen the elimination of which is effected by the distillation of liquid air by the process of Linde and Claude. by which, at Terni, Italy.and Alby, Sweden. azote at a purity of 99.8% is furnished.

These are the principal sources of supply of Azote, an inert gas which promotes neither respiration nor combustion but the part it plays in the ecomomy of agricultural production is so important that it justifies us in declaring in reference to Beets"L'azote c'est la vie" "Azote is life"!

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(Translation from the German) Jan 22, 1913

EXCERPT FROM THE WOCHENSCHRIFT DES CENTRALVEREINES FUR DIE ZUCKERINDUSTRIE - - -

"Sugar at a Glance".

(Comments on Mr. Palmer's work)

Truman G. Palmer, who has been an advocate of the introduction and extension of sugar beet culture in the United States and the beet sugar industry in general, has in the pamphlet before us, solved the problem of how to bring before the public in a comprehensive form and in a manner easily understood, the great advantages resulting from beet culture. In his writings, he clearly demonstrates not only the great benefits accuring to agriculture, but also to the whole economic life of the United States through the cultivation of sugar beets.

In a short introduction, the autnor refers to the history relating to the introduction of beet culture into the United States and also alludes to the disappointment experiences by the farmer during the first few years, owing to the fact that year after year, the same area was planted to beets which naturally led to the exhaustion of the soil. It was only after they started to follow the example of the great sugar producing countries of Europe by adhering to well regulated crop rotation, that beneficial results were notices, not only in the improvement of the soil and the higher yields obtained, but also in the increased yield of cereals.

The author goes on to mention the relation existing between the sugar industry and the political aspect with regard to this industry. He especially refers to Germany and states that by making enormous sacrifices a flourishing sugar industry was created. He contrasts Germany with Great Britain, which is entirely dependent on foreign countries for its supply of sugar.

The author maintains that in order to strengthen the beet sugar industry and thereby contribute to the furtherance of the general welfare of the agricultural population of the United States, there is but one thing to do, and that is to keep a high protective tariff on sugar.

An excerpt of the speech made by Senator Lodge on the floor of the United States Senate on the occasion of the contemplated change in the tariff on sugar, accompanies the introduction of the author's work. The pamphlet is illustrated with a number of photographs, charts, etc., which give an interesting insight into conditions of production, consumption, prices, wages, etc., of the most important beet sugar producing countries as compared with the United States.

The author has also embodied in his book a few excerpts from the work of well known European authors whose authority on beet culture and on the sugar industry is unquestioned. Let us hope that Mr. Palmer's work will be not only a factor for those whose mission it is to further the sugar beet industry in the United States, but that it will meet well merited appreciation from the public in general, on account of the wealth of information "Sugar at a Glance" contains.

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EXCERPT FROM LA SUCRERIE INDIGENE et COLONIALE, JANAURY 22, 1913.

SUGAR AS FOOD FOR MAN AND ANIMALS.

Lecture Given before the Industrial Association of Amiens, by M. J. Crochetelle, Director of the Agronomic Station of the Department of Somme.

Learned men of all countries have studied the question of sugar in relation to food of men and animals from the time the immortal Lavoisier pointed out what part oxygen played in the production of heat and energy generated in our organism. Research work was carried on relating to the composition of foodstuffs, their transformation in the body and the energy they produce.

The United States has well equipped experiment stations for the purpose of carrying on these interesting studies. In our country we are indebted to Professor Grandeau for a considerable number of articles written on the subject.

Professor Chauveau had added to our knowledge on the subject in specifying the part that hydro-carbonated substances play in the assimilation of nutritive substances. The composition of nutritive substances has been thoroughly studied by M. Baland, the well known chief pharmacist of the Army. Unfortunately, it seems that our country does not wish to be benefited by the work of its eminent masters, whereas, the Americans, a practical people, par excellence, apply in their colleges, barracks and workshops, the experience and deductions obtained from that scientific work and we seem to be indifferent about it.

The research work of our learned men has vastly helped us to improve the feeding of our animals; but we have completely ignored the help science offered us for improvements in the nutritition of human beings. This is singularly anomalous, and it is high time that we compel our race to produce the maximum of energy of which it is capable.

We believe that a study of scientific alimentation and its general application to laboring classes would be very beneficial to our country in preventing the degeneracy of our race that occurs in certain regions, in diminishing the ravages made by alcoholism; finally to compensate to a certain extent, by an increased production of energy in the individual, the relative race suicide going on in those regions.

To ensure the maintenance of life in animals, a regular supply of new alimentary substances must be furnished them; these substances play three principal parts, i.e.,

1. To form new tissues,
2. To replace the waste of tissue constantly going on in the system.
3. To produce energy that is indispensable to life - whether this energy manifests itself in the shape of vital force, heat or mechanical energy.

The first two functions may be going on jointly and we will include under the head of aliments all the tissue forming substances, those that can furnish energy, also those that play a two-fold part.

The study of alimentation has for its object to investigate the chemical nature of foodstuffs adapted to absorption and to the maintenance of life, the nutritive value of each, the quality necessary for a thorough alimentation, and lastly, we may add, the facility with which the living being can procure for itself the necessary elements of nutritive value.

In considering the nutrition of mankind, we all know that the varied alimentary substances are mixtures of numerous bodies which are separately classified according to their chemical composition:

1) Under the head of proteic or azotized substances we include substances that are analogous to the flesh of the body such as albumine of the white of

the egg, Casein of milk, legumine, etc.

2) Under the head of hydrocarbonated substances we include those that contain no longer azote; they principally consist of carbon, in combination with the elements of water. These are real combustibles such as starch, amylaceous substances of plants, farina, sugar, and we may likewise add, alcohol.

3) Fatty substances as their name indicates such as oils, fats, butter and fatty acids.

4) Mineral substances which include mineral salts and water making up 70% of our bodies; the principal ones of these are chloride of sodium, sea salt, carbonate and phosphate of lime, of which the bony frame of our body is made up.

For the present, we will only discuss the three first classes of alimentary substances.

Until recent years long and tedious discussions were carried on daily on the subject of different kinds of food; physiologists, chemists, and technical men who made animal chemistry their study took part in those polite discussions and although some of the fighting adversaries have not yet been disarmed, we believe that some light is going to be thrown on the subject by Professor Chauveau, who, for many years past has investigated the part sugar plays in nutrition, by assimilation, in human beings and animals.

<u>SUGARY</u> <u>SUBSTANCES</u>:

"The glucose of grape sugar is a direct aliment for muscular work. (Laulanie)".

The muscles, whilst working, consume sugar in the shape of glycogene (a substance that generates glucose). By experiments, it has been proven that the production of sugar in the liver is promoted during working hours and during a consecutive period; muscular contractions and the physiological work of the muscles are sources of heat that help to a large extent to make up animal heat.

The activity of the muscles is permanent in the immobility of repose. They act silently - transform energy, and constitute one of the most important sources of animal heat. It is estimated that they furnish three-fourths of the total of glycogene.

It is therefore from hydrocarbonated substances (sugar, starch, alcohol), that the bodily system draws the direct aliment for the needed temperature and for its muscular contractions. These substances that formerly used to be known under the name of"respiratory principles" are now known as sources of muscular energy.

<u>FATS</u>: Fats are reserve substances of energy that are drawn upon to intervene when the system is not furnished with sufficient hydrocarbonated elements; they likewise intervene whilst normal work of the body is carried on and during consecutive states of rest, in order to renew the waste of glucose.

<u>ALBUMINOIDES</u>: Sugar, is the aliment of Force (strength); Protein is the aliment of matter; that is to say if sugar produces force, azotized substances supply the necessary butritive elements for building up our bodies. Matter of which our body is made up is undergoing a continual waste even whilst we are resting; we must not only furnish the fuel necessary to drive the machine, we must keep this machine in good working order, and by taking good care of it, make sure that it will perform its work satisfactorily.

Azotized substances have still another part to play; through oxydation these can be transformed into hydrates of carbon and into fats, their azote being eliminated during their transformation. In consequence of this transformation Proteine becomes a source of energy, but the experiments made by Chauveau proved that azotized substances are not directly productive of energy - that proteic substances do not furnish any of their constituent substances towards muscular activity. Their energetic function is a result of their transformation into hydrates of carbon.

All the immediate operative causes are capable of aiding the transformatory operations of the liver with glycogene. In giving hydrates of carbon we save the human system the trouble of manufacturing these with other things; but let us also furnish Protein so as to keep the digestive apparatus in good working order and make sure of the digestibility of the greater part of any ration taken into the system.

In consequence of this knowledge acquired mostly during recent years, sugar has been recommended as being a valuable addition to alimentation and mankind realizing its beneficial effects upon the body, consumption of sugar in one form or another has gone up by leaps and bounds.

As regards the effect of sugary food upon human beings, we have only a limited number of experiments to relate, one of these being the fact that before a bayonet charge soldiers were supplied with sugar rations or rations very rich in sugar, and the fury of the massacre that followed in the ranks of the enemy was mainly due to the energy supplied by sugar; and I believe that learning a lesson from the soldier on the battlefield we ought to supply our working men with plenty of sugar to enable them to perform their work more effectually.

The substitution of sugar, preserves jellies, etc., to alcohol, would be of great benefit to humanity and we could be successful in this if we were to enlighten mankind on the subject of sugar and sugary foodstuffs, and how to use them rationally.

The Department of the Somme has a traveling school with headquarters at Amiens; this mebryonic means of instruction will be the starting point for a vast improvement in the rational of our working classes. We no longer believe the fairy tale in which we are told that sugar causes "toothache". Ever since sugar has been produced in France, animals' fodder was mixed with residuary molasses.

Prominent men, like the Marquis of Havrincourt, Tetaro de Gonesse, Decombecques, Sarrazin de Mesbrecourt, used molasses in their food mixed with rice flour, boiled cereals, etc.

The Germans showed us the way to use sugar in cattle fodder - and we were forced into following their footsteps in consequence of a crisis that occurred (about 1895) - (extraordinary fall in prices by reason of over-production). Prejudices existing until then against using sugar or molasses for animal fodder were removed by the convincing arguments of Strohmer, Gonnermann, Kellner, Schulze, Grandeau, Sanson and Malleve. All of these learned men proved that sugar played a very important part in alimentation. At first, plain molasses was given to animals. but very soon it was found that it was more advantageous to mix it thoroughly with an absorbent containing more or less nutritive elements.

Molasses always has the same constituent parts, namely:

Water	from 23% to 35%
Sugar (total)	45% to 50%
Organic matter	15% to 25%
Mineral substances	9% to 12%

Half of the mineral substances consist of potassium and soda, but a maximum quantity of 40 to 50 grammes which animals can conveniently digest if mixed in one normal ration does not harm them.

Azotized matter mainly consists of Asparagine, Betaine and other amide composite that are generated in the course of carbonatation. Molasses do not contain any albuminoid substances because the combined action of heat and lime causes their coagulation. It is therefore proved that molasses, apart from its supplying hydrates of carbon has no other nutritive value. We may add, however, that they are essentially soluble and consequently very digestible.

Animal fodder substances usually mixed with molasses may be divided into two classes. Those that, in addition to their absorbent power, contain nutritive elements and others that have no food value whatsoever.

One of the most interesting consistent substances which is found in the first class is undoubtedly kiln malt of breweries, the average composition of which is:

	According to Grandeau	According to analysis.
Humidity	11.8	9.60
Ashes	7.6	7.45
Azotized Matter	23.3	24.06
Amylaceous Matter	42.8	24.06
Fat	2.1	0.45
Cellulose	12.4	17.05

In addition to its good nutritive value it has a minimum absorbent power equal to three times its weight. At an experiment made at our station, we were enabled to incorporate 330 grammes (0.22046 lbs) Molasses to 100 grammes (0.22046) of kiln malt which M. Delaport, a brewer at Amiens had kindly placed at our disposal. We may also mention Farina, from diverse grains, beans, rice, oats, marc of grapes and apples.

Mons. Saillard mentions a molasses fodder with a base from the residue of creameries obtained from the precipitation of Casein of Milk, the clabber obtained is subjected to pressure and other nutritive substances are added such as Oil,Cake, rice, bran, etc., A highly concerntrated aliment is thus obtained which has a co-efficient of digestibility to a marked degree.

In the second class we find the shells of peanuts, of cacoa and coffee; although these substances have a pretty good chemical composition they have only a slight alimentary value (the coefficient of digestibility is zero).

Grandeau gives the following values:

Coffee husks, interior and exterior covering with no nutritive value, rich in cellulose. Peanut shells - alimentary value nil. Cacao-bean shells with a small portion of nutritive value which may be compared with the straw from winter cereals; in this class we may put turf which has a great absorbent power which according to Quillard and Pellet is as follows:

Raw cellulose	27.70
Saccharistine Cellulose	5.60
Azotized Matter	4.11
Ashes	1.50
Undefined substances	27.35
Humic (relating to Humus) substances	23.04

With this a molasses peat is obtained which contains:

Molasses	86 to 87%
Peat in a dry state	13 " 14%

Messrs. Quillard and Pellet who have studied this question exhaustively have found that peat possessed certain remarkable qualities especially that of absorbing Potassium and Soda. This fact has been established by Sidersky and the experiments made by Saillard have likewise confirmed it. In fact, M. Saillard has found that in mixing thoroughly molasses with peat there is a release of heat equal to 70 calorics per 106 kilos of molasses & peat which shows a real combination. Mons. Quillard and Pellet have found that humates of potash and soda are non-hydroscopic and for that reason they can be kept in storage for an indefinite time.

Schulze, among other German authors, also says that molasses can be preserved indefinitely, and as regards molasses fodder, the conclusion is as follows:-

1) When the water content is high, forrage is liable to deteriorate, this deterioriation is more rapid in summer.

2) Molasses peat scarcely undergoes any change.

3) In order to make them keep well, humidity must be kept if possible under 20% else the sugar will deteriorate. Last year, we ourselves, analyzed a sample of old molasses (taken out from several flasks) and to our greatest surprise we found scarcely any sugar in it.

One of the objects we have in view is to make a comparative study of molasses fodder and its varied combinations with nutritive and non-nutritive substances.

(translation from the French)

FROM THE MONTHLY REVUE, PARIS, FRANCE,

79 Boulevard St. Germain.

LECTURE POUR TOUS.

SILK AND SUGAR.

The crushing victory according to the "Revue Universelle" which the Democrats obtained is essentially a French victory. Our export trade has suffered largely in consequence of the Customs Tariff passed under the McKinley administration.

As the Wilson program embodies a solemn promise, we are sure that a radical reform with the American tariff policy will take place, a reform which will react beneficially on our own industries.

The seven year period of the fat cows of the Trust is at an end, they have been swept away with the party that fattened them. Our French Industry which hitherto had to fight against the powerful American trusts will be able to take the offensive on American soil, and we Frenchmen have come again into our own, become again as of old, the masters of the markets of the world which rightfully belong to us and be able to fight successfully, American competition, for we consider the civilized world as one large family, all the members of which ought to have their respective interests in common and the election of Mr. Wilson is an event, the economic importance and advantage of which, for France, cannot be overestimated.

EXCERPT FROM DIE DEUTSCHE ZUCKERINDUSTRIE, JAN. 31, 1913. p.97

WHAT IS THE COST OF PRODUCTION OF 1 POUND OF CANE SUGAR IN CUBA.

Much has been written about the low cost of production of sugar in Cuba. Reports and opinions about this vary greatly, and it is difficult to get a uniform average for the whole of Cuba. Many reports are as "incorrect" as the calculations by rule of thumb which distinguishes Americans in general, as for instance the assertion that a Cuban Cane Sugar Factory with cane lands belonging to it was worth ten times as much in dollars as there are bags of sugar produced.

If, during three consecutive campaigns, a factory produces 100.000 bags of sugar, then a million dollars would be a fair value of the factory. These figures are superficial and seldom correct. The American Consul in Havana, makes the same kind of mistakes when he informs his countrymen that Cuban sugar plantations and cane mills usually pay 15% on their capital. Of course, there are factories that pay 25 to 30% on the capital invested, but profits fluctuate with prices and the general condition of stocks, etc.; such profits depending on many factors operating independently of each other. Some of these factors are the agreement with reference to cane deliveries, management of the establishment, geographical situation, disturbances due to conflagrations and other causes entailing enforced idleness and not the least of these factors is the yield of sugar.

I will do my best to base my calculations for this report on actual factory records that are unfortunately never published so as to give you a true picture of what the cost of production really is.

It is a well known fact that factories situated on the coast, owning ample and good cane land, obtain low freight rates for sugar and material shipped to the factory, and are in a better position than factories situated in the interior of the island, where means of transportation facilities are scant and where high charges obtain for transportation of wood, sugar, etc.

Furthermore, we must take into consideration whether the factory is located in the eastern part of the Island or in the old cane producing district of Matanzas, where 60 years of continuous cane culture without allowing the land to lie fallow or rotate, has almost exhausted the soil, and where the soil is what may be called "Cane-fatigued". Most of the land in the East is still virgin soil, and a higher yield is obtained there without any thorough method of cultivation. In addition to higher yields, newly planted cane lands show better and purer juice quotients; here, eight years usually elapses before having to replant the cane, whereas, in the Santa Clara Province replanting has to be done every 5 to 6 years. Then it depends whether the land belongs to the factories or to small planters who get fixed prices for their sugar cane. If the former, then the cost of production naturally will be cheaper. The factory can only then work its own fields to advantage when cheap labor can be had in abundance and when the management is in capable hands. If such is the case, then it is better to let the small farmer or colonist do the planting and clearing the cane-fields, who will invariably - working independently of each other - make efforts to raise and deliver cane of better quality. Colonists are very seldom joint shareholders with the factory as is often the case with German beet growers.

An important item in the cost of production is that of transportation; if the factory has its own railroad, that item will be low; if, however, large quantities of cane have to be shipped by rail from distant points that item will be high. Operating expenses are about the same in all modern factories.

Old factories, with inferior equipment, with faulty evaporation and juice extraction apparatus will keep the extraction as low as 75% with a correspondingly low rendement.

I succeeded in figuring a grand total rendement of 11%, polarization 96 degrees, averaging 5 arrobas of sugar, that figure being made as payment by the factory for every 100 arrobas of sugar cane.

The factories (situated in different districts) show the cost of production delivered at the nearest port (net price in port not f. o. b.) of Cuba including cane, wages, bags, taxes and all operating expense <u>without any profit whatsover</u> 2.04 centavos Spanish gold per pound or 500 grammes 1/2 kilo = 7.96 pfenigs equal to $0.01.55.348 per pound avoirdupois.

These figures correspond with the usual cost-tables kept in Spanish and Cuban factories where, taking sugar at 5 reales = $8.125 per bag = with a rendement of 96 degrees net profits should be 2 Spanish gold dollars (per 325 lbs. Spanish). Thus from the $8.125 we take 6.125, leaving $2.00, and there will be a cost of production of 3.77 reales per arroba. If the price of sugar delivered in port falls to 3.77 reales per arroba, then the majority of Cuban factories will be unable to make any money.

American factories in Cuba calculate, with a 10% rendement (96 degree polarization) sugar as being produced at 1.5 cents per American pound = 6.95 pfenig a metric pound (500 grammes) - but this is 1 pfenig per pound less than my calculations run to, but we must bear in mind that American factories equipped with modern machinery and with a large capital at their disposal, buy their coal, bags, etc., wholesale; pay no interest on loans, and with other economic advantages over Spanish and Cuban factories, may, under favorable conditions, reduce their cost of production by one pfenig per pound (1/4 cent per pound).

The larger the factory and the more cane they can use within a given period, the lower will be their average expenditure for wages, lubricating oils, etc.

For the last 6 years wages have gone up steadily until they are now 50% higher than they were in 1906. Prices of sugar bags have gone up 23%. Of course, these items are equalized by increased efficiency and speed in operating the mills, by the adoption of improved methods and by a higher rendement. Fluctuations in gross and net profits realized by the factories correspond with the fluctuation of prices for sugar.

Enormous profits are made by factories as soon as the price of sugar per arroba exceeds 5 or 6 reales (2.4 cents and 2.8 cents per lb.). Whereas Berlin capitalists have already made some investments in municipal electric stations at Matanzas and Cardenas, etc., it would be desirable to see in the near future capital invested in Cuban sugar plantations - before the American will have cornered all the good things going. At this time of writing, I find that 36% of all cane mills are controlled by Americans and Canadians.

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"SUGAR AT A GLANCE"

(page 121)

EXCERPT FROM DIE DEUTSCHE ZUCKERINDUSTRIE, FEBRUARY 7, 1913.

Mr. Truman G. Palmer, the valiant champion of the North American Beet Sugar Industry, in his "Sugar at a Glance" makes a final effort and appeal to the Senate, to prevent that body from taking steps prejudicial to the culture of beets and to the Beet Sugar Industry in general, a prejudice which is naturally feared by the latter body, for it might abolish the tariff on sugar.

The author has shown very effectively, by charts and curves, the gradual development of the world's sugar industry and the complex questions relating thereto. His booklet is an excellent, impressive work, and its purpose is well planned. He has handled the subject with great cleverness, and the instrument is so carefully executed that the Senate has honored him in embodying it in their official records. We believe that, to a certain extent, the author will accomplish the object he has in view.

However, we are in duty bound to refer to the item of "wages" which he claims are paid on the American Sugar Beet farms. He states that the wage is $2.60 per day, while that on the German Sugar Beet farm is 47 cents per day. He seems to put the wages for America too high and those for Germany too low. He also states that field laborers earn $2.60 (Mks. 1092) per day and that factory workers earn $2.99 (12.56 Marks) per day. This refers to a stretch of country from Michigan to California, the central and western parts of the United States.

In considering this wage question, we believe we are right in assuming that no matter how high the wage might be, the rate could not be higher than it is in Pennsylvania, one of the richest industrial States in the Union. According to official reports of the German Consul for 1909, workmen in Pennsylvania Cement factories receive $1.65 per day, = (Mks. 6.85), and it seems rather strange that North American Beet Planters should be forced to pay one dollar more per day than the Cement manufacturers of Pennsylvania.

We also wish to call Mr. Palmer's attention to the fact, that Thaer was not an English Agriculturist, but a good, full-blooded German, he having the distinction of being the founder of our "Rational System of Agriculture", a man with whom we are loath to part.

We do not in any way wish to direct these criticisms against the whole or Mr. Palmer's book, for in countries who have an eye on American conditions with respect to the sugar industry, his work deserves well-earned consideration.

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(Translation from German)

AUSTRIA-HUNGARY.

EXCERPT FROM DIE DEUTSCHE ZUCKERINDUSTRIE, FEB. 7, 1913. (Page 117)

Mr. Stefan Richter Central Director of the Domaines (Estates of Rossitz-Eichhorn) reported to the Sugar Industry at Brünn, Moravia, his results of strict book-keeping carried on during several years, and as very little was hitherto known about the exact costs of production in Austria, we are therefore indebted to Mr. Richter for his information about production which he is ready to prove by granting the privilege of inspecting his books to any one who may care to do so.

COST OF PRODUCTION PER HECTARE AND DOUBLE ZENTNER OF BEETS.

Minimum of working one hectare (2.47104 acres) of beets 458 Kronen ($92.97) equal to $37.62 cents per acre. To produce one double zentner beets (220 lbs.) an average of expense of 1.89 Kronen ($3.48 at the farm per short ton) was incurred.

For 1 double Zentner (220 lbs.) Sugar 6.7 double zentner beets are necessary. When you then deduct 1.5% molasses, i.e., 6.7 x 1.5 = 10 Kg. at 8 heller per Kg. - it will give you 80 hellers per 100 Kg. of Sugar = $1.50 per short ton.

Freight, Seed, Manufacturing tax. Return freight of Pulp, and all other incidental expenses, 4 Kronen per 100 Kg. = ($7.30 per short ton of sugar).

GRAND TOTAL OF COST OF PRODUCTION.

Maximum of 100 Kg. of sugar	a) 26 kronen	= ($5.27 per 100 Kg.)	per short ton $47.90
Minimum " "	b) 22 "	= ($4.46 " " ")	" " " 40.14

In 1911- 12 large sales were made in advance and those who could not produce their sugar at 22 kronen or less, could not make any appreciable profit. Fortunately, in December, 1912, sugar prices took an upward trend to the extent of 1 Krone per 100 Kgs. or ($1.28 per short ton).

EXCERPT FROM THE JOURNAL des FABRICANTS de SUCRE, FEB. 12/13

PROVINCE OF SAXONY.

Excerpt from Leading Article.

In consequence of better offers having been made for beets by the factories it is not likely that a diminution of acreage to beets will occur in Germany (Province of Saxony), therefore 1 M. to Mk.1.10 for 50 Kg. of beets will be paid (equal to $4.31 per short ton); in addition the grower is to receive 50% of pulp.

(Translation from the French)

EXCERPT FROM THE SUCRERIE BELGE, FEBRUARY 15, 1913, PAGE 269.

DOSAGE DU SUCRE DANS la BETTERAVE.

WEIGHING THE INGREDIENTS OF SUGAR IN THE BEET.

UNIFORM METHODS OF SUGAR ANALYSIS.

By F. Strohmer.

Ever since the introduction of chemical supervision in sugar factories, a supervision which could be developed only through the application of the polarimetric method for the determination of the sugar content has been facilitated, and beet analysis for sugar has become one of the most important questions in connection with the sugar industry. This question has been discussed by numerous learned men and if I were to explain in detail, all the experiments made by them in this connection, it would take me several hours to do it; but such a report is not necessary at the present meeting, and the names of the members of this Commission constitute ample guarantees for the improvement in the method of analyses of sugar content in the beet; the advantages and disadvantages of each are well known to you and consequently I can bring forward direct, positive propositions.

As an introduction to my remarks, I may state, that the methods proposed for analyses of the sugar beet to determine its sugar content may chronologically be divided into three groups.

1) The method on pressed juice;
2) " " of extraction;
3) " " of digestion.

The method of juice obtained by pressure consists in converting the beets to be analyzed into raspings and to submit them to pressure. The sugar in the juice thus obtained is weighed and calculated on 100% of beet by means of a co-efficient.

This method was found to be inexact, Sachs, Stammer and myself, experimented according to this method and we found that the composition of the juice differed according to the manner in which it was obtained,as there is no uniform way of obtaining the juice, neither is there any way of applying invariably the same co-efficient.

The method employed with pressed juice had,however, its raison d'etre (justification) so long as the process of pressing the juice served as a basis of juice production in manufacturing operations and consequently these two methods harmonized with each other.

At present, this method(the same as the process by pressure) has been entirely abandoned

The method of extraction consists in extracting the sugar from the raspings by something that dissolves the sugar but does not dissolve the non-sugary substances, which are visibly active during the experiments, and to determine this extract by polarization.

The most important of these methods was the alcoholic extraction of Scheibler which is still considered, even today, as the surest, for the purpose of determining the sugar content of the beet and is the only method that should be employed in experiments of a purely scientific nature. It is, however, too difficult and too complicated for practical purposes in general - and for manufacturing purposes in particular.

The methods of digestion are based on this principle; that raspings of beet rasped as finely as possible are digested by means of alcohol or water - cold or warm. The length of time required for aqueous or alcolholic digestion depends upon the fineness of the raspings; then a certain volume of water or alcohol, is added to the beet raspings according to the volume of beet substance, and the sugar content is determined from the strained mixture that has been digested. These very methods of digestion were employed in numerous experiments during the last few years, demanding laborious scientific research work, and the results are well known by all members of this International Commission.

The methods of alcoholic digestion are no longer used and aqueous digestion as initiated by H. Pellet, is the only method now generally in use. Numerous experiments conducted according to Pellet's principle have proved this to be the exact method - which, moreover, corresponds with the modern method of juice extraction during actual operations in beet sugar factories and in the presence of so many serious minded men gatheredhere, I will leave out of the question the fanciful conceptions of so-called sugar revealed to us lately by R. Chappelle's theory.

At the present time, no difference of opinion exists on this subject except on one point:

1) Whether we should add a certain quantity of water to a given mass of beet rasping;

2) Or add a certain quantity of raspings to a given volume of water.

Personally, I believe that the method advocated by Kaiser and Lewenberg (Listy Cukrovarnicke) and emphasized by Sachs, is the right one, namely to add a given quantity of water to a given mass of beet gratings, and I hope that most of my colleagues here will share my views on the subject.

This method eliminates the principal source of errors in regard to volume, errors due to the existence of air in the juice.

On the other hand, if we wish to become independent of the composition of the raspings, as far as their degree of fineness to which they were reduced is concerned, the application of heat is advisable.

However, great care should be exercised in this matter of heat, otherwise it may happen that ingredients visibly active may in consequence of an excessive heat dissolve in such quantities that they could no longer be completely precipitated by the amount of clarifying matter used (sub acetate of lead).

All these conditions are fulfilled by the method employed by the Institute of the Germany Sugar Industry; the Commission appointed by the German Sugar Industry, the Association for Agricultural Laboratory research work of Austria, by the Commission of Russian sugar factory chemists have adopted this method and we may say it bears now the stamp of international approval.

We, ourselves, have used this method for the last two years in our weekly investigations which we made for the International Commission of Sugar Statistics during the period of progressive beet improvement and with a varied number of samples sent us from different countries for experimental purposes, and with beets that were in different stages of maturity.

Based on my experiments, I propose that the International Commission make this method compulsory to determine the sugar content of the beet.

In regard to the apparatus to be used (which, however, changes nothing in the principle of the method) it is entirely a matter of taste; we have found out that all classes of apparatus submitted for this purpose enabled us to arrive at exactly the same results when the apparatuses were well constructed.

I herewith submit for your guidance, the following points to keep in mind when using this method:

The normal quantity of raspings is weighed in a metallic tube which is introduced into a dry iron flask the opening of which could be closed when needed, 177 cc. water containing sub-acetate of lead is added (25 cc. of S/A of lead for each liter of water). Shake the metallic flask that now is closed and heat 30 minutes, puttingit into a water bath at a temperature of 75 - 80°; then let it cool to 20°, then shake; then filter by means of a dry filter and polarize the filtered mass.

The use of a tube of 400 millimeters is recommended. It is advisable to have a large quantity of metallic receptacles of equal weight so as not to have to ascertain the tare each time a tube is used.

We likewise,would advise to follow the instructions of LeDoct (Process Sachs - LeDoct), in regard to metallic flasks and for the proper construction of the percolating tube containing water and sub-acetate. This method does not necessitate an extraordinary fineness of raspings.

If, by this method, results obtained by different chemists vary, it is not due to flaws in the method but to the manner of sample taking which, as you know, is rather difficult in the case of beets.

The only way to overcome this difficulty is to adopt a rational and uniform method of taking beet samples. The International Commission should issue instructions on this subject.

The official chemists employed by the Austrian Sugar factories have for many years past had standing rules for taking samples of beets for the purpose of experiments. These rules helped towards obtaining good results and were also adopted by the Union of Public Agricultural Stations.

I advise the International Commission to adopt them. They are as follows: In order to get a good average sample of beet raspings for analysis, the whole beet should be rasped, in case there are only a few beets available; but if a sufficient quantity of beets are available, a portion of raspings is taken from each beet (a section or a segment cut lengthwise).

For obtaining one analysis,(the sugar content of the beet to be ascertained), a maximum not exceeding 20 beets should be used. If the shipment exceeds 20 beets, they should be divided into several samples each of equal weight and the arithmetical average of the results obtained should be considered as the analysis of the sample.

When similar samples of beets are sent to two different chemists the beets should be weighed after being topped and cleaned and then placed on a table in a row according to weight or judged by sight according to size - placing as No. 1 in the row the smallest and finishing the row with the largest beet.

The beets, 1, 3, 5, 7, 9 that is to say, the odd numbers will constitute the 1st. sample; beets 2, 4, 6, 8, 10, that is to say the even numbers will be the second sample.

In order to keep in view the eventually dessication of the beets which might bring about a change in their composition, the correct weight (before shipment), of the total of clean beets should be carefully recorded. In regard to fresh cossettes, it is also advisable, to make for their analysis certain rules similar to those established by the Commission for methods of analysis and supervision in German factories.

Those methods consist in taking every 10 minutes a handful of cossettes from the middle part of the Diffusor; these cossettes are then directly put into a condenser which can be conveniently closed; the contents of this condenser are well shaken and mixed and renewed every three hours - a sample of cossettes is then taken amounting to one kilogram in weight with which the analysis is made.

In bringing these methods into general use a working basis for a comparative supervision of the International Sugar Industry could be established for a controlling element is necessary to be able to determine the exact sugar content existing in the raw material. I therefore take the liberty of advising you to adopt these methods.

Determine the per cent of sugar by the hot water digestion method.

Ten grammes of the beet pulp may be digested made up to 38.7 cc. and polarized in a 200 m.m. tube.

The raspings may be placed in a tarred dish and the whole weighed; the pulp is then washed into a 100 cc. flask if the sample amounts to about to about 13 grams , or into a 200 cc. flask if it is nearly 26 gr. and a water digestion is made in the usual way.

The per cent of sugar obtained multiplied by the relation of the weight of sample used to 26 grams gives the percentage of sugar present. A correction should be made for the space occupied by the mark, 26 grammes of pulp occupying 0.6 c.c.

The basic lead acetate solution is practically the only one used for clarifying beet solutions for polarisation.

The clarifying power of this solution depends somewhat upon its basicity . Care must be taken in the preparation of the basic lead acetate solution. Boil 3 quarts (by weight) of neutral lead acetate and 1 quart of yellow litharge with 10 parts of water until the reaction is completed or the material is practically all dissolved. This takes generally not over half an hour.

Cool and dilute the solution with water to a specific gravity of 1.25 or 53.7 Brix. The solution is filtered and allowed to stand until clear. The bottle should be kept tightly corked as the composition of the solution changes.

The procedure in the Sachs Ledoct cold water extraction method is modified as follows, for hot digestion:

The weighing and the vessels used are the same, also the quantities of lead sub acetate and water are the same, 177 cc. A special rubber disk cover is provided for the digestion vessel. Put this in place and after shaking the vessel, immerse it in a water bath, kept at 80 c. c. for 30 minutes or for 25 minutes if the temperature is 85° C. The temperature during extracting should not however, exceed this figure.

Remove the cups and immerse in cold water bringing the temperature down to 20° C, shake, remove the covers, and polarize after adding a drop or so of acetic acid.

Herzfeld in harmony with the Sachs LeDocte , uses this method. He uses an extraction vessel of nickel-plated sheet iron instead of tin - ceated copper beakers. This extraction vessel is round. He also uses small weighing glasses holding 26 grammes of material which can be introduced with the beet cuttings into the extraction vessel, these glasses are filled to equal weight and numbered consecutively, as are also the extraction vessels, the procedure is as follows:

Weigh 26 grammes of the beet pulp on a watch glass and transfer to the extraction vessel, then run in 177 c. c. of dilute basic lead-acetate solution (5 parts of basic lead acetate solution Brix 53.5 to 100 parts of water) shake and place a stopper which has been covered with tinfoil lightly in the opening. Submerge the whole in a water bath at 75° to 80° C. for 30 minutes shaking intermittently. When all air has been expelled (generally after 5 minutes) tighten the stopper in the vessel. At the expiration of the time remove and cool.

Take out the stopper after shaking thoroughly, filter and polarize in in a 400 mm. tube after an addition of a drop of acetic acid to determine the per cent of sugar in the beet.

This method does not require very fine pulp and is open to but a few chances of error.

EXCERPT FROM DIE DEUTSCHE ZUCKERINDUSTRIE, FEBRUARY 21, 1913, PAGE 173.

ANNUAL MEETING OF EAST GERMAN UNION OF SUGAR FACTORIES.

BEET CULTURE IN GERMANY AND THE GERMAN SUGAR INDUSTRY THREATENED WITH STAGNATION IN VIEW OF THE SUPPLY OF LABOR NOT BEING EQUAL TO THE DEMAND IN FIELD AND FACTORY.

By Dr. Cl. Mayer, Berlin.

"THE IMPORTANCE OF FOREIGN LABORERS IN RELATION TO RURAL ECONOMICS IN GERMANY".

You are all aware of the fact that the German Sugar Industry and the beet growing agriculturists depend very largely on foreign labor to carry on their work. Dark clouds have appeared on the political horizon and our peaceful security may be threatened at any time. To use the words of the Imperial Chancellor, "A conflagration over the whole of Europe - a war involving many nations - is still within the range of possibility".

These war clouds have materially influenced the labor market and may well give us food for thought with regard to the future of the Beet Sugar Industry.

If, at a given moment, war should break out, involving Central and Eastern Europe, we must take it for granted that all wage earners now flocking to our fields from Austria and Russia, will be forcibly kept at home, thereby inflicting a tremendous injury to our Sugar Beet Industry. The question is what can we do about it?

Some time ago, this question was discussed in Berlin and many came to the conclusion that, in case of war, during the time it lasted, our Sugar Industry would stagnate or remain entirely idle.

If such a contingency should arise, if it is thought, that such a thing might happen, then it is our duty to calmly picture to ourselves the calamitous consequences of such an occurrence and to think out what sort of a remedy to apply.

The vast number of men and women that cross and recross annually our frontiers, is greater than the migration of people we read about in history, people who came, saw, conquered and settled down, but here we have hundreds of thousands who come here to work, don't settle down, carry off over 100,000,000 marks annually, and may be, never to return.

I have brought with me colored charts, from which you will gain an idea as to the number of foreign workmen engaged in agriculture and the industries as reported by district officials and Councilors of State (of course these statistics refer to 1905, 1906, 1907 and 1908), these figures are also applicable to the present time.

FOREIGN WORKMEN IN PRUSSIA (by occupations in Industries).

Industries.	Number.	Agriculture	Total Number
1905	229,000	207,000	454,000
1906	369,000	236,000	605,000
1907	475,000	258,300	733,000
1908	471,000	309,000	780,000

FOREIGN LABORERS IN PRUSSIA. BY COUNTRIES OF ORIGIN.

		Per Cent.	
1908	(341,600	43.8	From Austria-Hungary,
	(184,000	23.5	" Russia
	(105,300	13.5	" Italy
	(103,800	13.3	" Netherlands
	(7,600	1.0	" Belgium
	(37,700	4.9	" Other countries
Total No.	780,000 (Foreigners)		

But we may safely estimate however, that 800 to 850,000 people male and female, cross our frontiers to find work here and 2/3rds come from the East, that is to say, from Austrian provinces and Russia and 1/3 from other States. There are Poles, Italians, Ruthenians, Dutch and Belgians, Germans from Austria-Hungary, Danes, Swedes, Norwegians and others.

More workmen are claimed by industrial establishments than are in demand for agriculture.- There are certainly 310,000 if not 330,000 foreigners at work in agriculture and 450 to 480,000 in the Industries.

I wish to point out the prejudice caused by these foreigners to our national economic life: 100,000,000 marks are carried out of Germany by these foreigners in the shape of wages - which is certainly a considerable item to the debit of our financial balance.

We must admit that through the influx of these foreigners wages for our own working people are kept down - as the families of these foreigners live mostly in their own country, where the cost of living is not so high as it is in Germany, therefore, the foreign workmen, are not compelled to earn as much to provide for their families. The German workingman is bound to get enough so as to satisfy the needs of his family. Besides, we have become entirely dependent on foreign countries for the supply of labor on our farms and in industrial centers. Should Russia or Austria require the help of these peoplo at any time and prevent them from crossing the frontier or recall them from Germany - even without the chances of a war - breaking out - (some reason might be given at any time by their respective governments for recalling thom). This would be the greatest calamity that could befall our central and East German agricultural districts. It would mean the ruin of numerous agricultural establishments, a tremendous shrinkage in many industrial undertakings and the loss of many millions of marks, in that case, would follow as a matter of course.

It has been found that in many districts where foreign workmen were employed breaches of contract between wage earners and employers were of frequent occurrence. which exercised an unfavorable influence on our native workmen as far as discipline and order were concerned.

Foreigners ought to have their papers in good order and should have documentary proofs as to their identity, their antecedents, etc. A case came to my knowledge where a Pole had a document provided with beuatiful stamps and seals which passed everywhere as his passport, until, one day, an official who could read Polish, found that the passport was nothing more than a certificate given by the municipal authorities of his native village, giving the holder thereof notice that he was again permitted to milk his cow, which two years previous had been adjudged tubercular. This shows the necessity of our taking vigorous measures to see that incoming foreigners are bearers of proper passports.

For agricultural and industrial needs, we now have a perfect Official Central Hiring Administration in Berlin, which works both in the interests of employer and workman.

Most of the foreign agricultural Austrian and Russian laborers are engaged by large landowners east of the river Elbe and in West Germany; mostly there, where beets are grown, where intensive farming is carried on. One-half of the Polish and Ruthenish wage earners are women.

As beet growing developed, we were obliged to employ more labor in the fields; we soon found that our native population did not supply the necessary and increasing demand. The so-called "Sachsengängers" (wandering natives of Saxony) that annually crowded into the beet districts, for a time, supplied the necessary labor material; but beet culture increased rapidly and foreign countries had to supply the demand for labor. Of course, we must attribute this partly to the fact that between 1850 to 1900, about 5,000,000 emigrants left for America, never to return. Then, in 1890 and since, came the steady flight of people from the rural districts to the city, causing an annual loss of 200,000 people to our agricultural districts in favor of industrial centers, the growth of which assumes, year after year, extraordinary proportions.

Agriculturists and landowners have been blamed for calling in foreigners in order to keep the wages of our native workers down to as low a level as possible. However, we know that this is not the case, as we were simply compelled to get labor from abroad, our native supply not corresponding with the demand. Large estates engaged in beet culture have been entirely dependent on the influx of foreigners for their supply of labor.

The foreign element who has come to us for work, has been largely unskilled labor, the essential being muscle and endurance. Many managers of industrial plants look upon the foreigner as an undesirable element, yet they are forced, for want of native help, to employ them. During the busy season there is an abundance of foreign labor from which recruits can be obtained, and when the season slacks down, this particular class is gotten rid of before any of the native workmen are discharged.

Of the foreigners employed, the Poles are subject to Government regulation; they are compelled to leave Germany on the 20th of December each year, and are also obliged to stay in their own country until February 1st.

As a rule, foreign workmen constitute a sort of contingency buffer, a safety valve for our native working population; for Germans are getting employment when work is slack, whilst foreigners are discharged ere the Germans get notice to quit.

It certainly is to be deplored that foreign workmen should play such an important part in our national economics and that we have to be dependent on the good will of foreign countries for our labor supply. It is with deep regret that conditions are such, especially so with regard to our agriculture, for other industries may incur some temporary losses by reason of an insufficient number of workers, but in the case of agriculture, such losses would be permanent, if, for instance, no workmen were available for harvesting our crops at the proper time.

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(Translation from the German)

EXCERPT FROM BLÄTTER FÜR ZUCKERRÜBENBAU, JANUARY 15, 1913. Page 11

Patent Device

To use an ordinary hoe round each beetlet is tedious and costly; this is the reason why the hoeing Device of Klement Lykorn, of Rostock, Bohemia, expedites the work of hoeing and brings about better results.

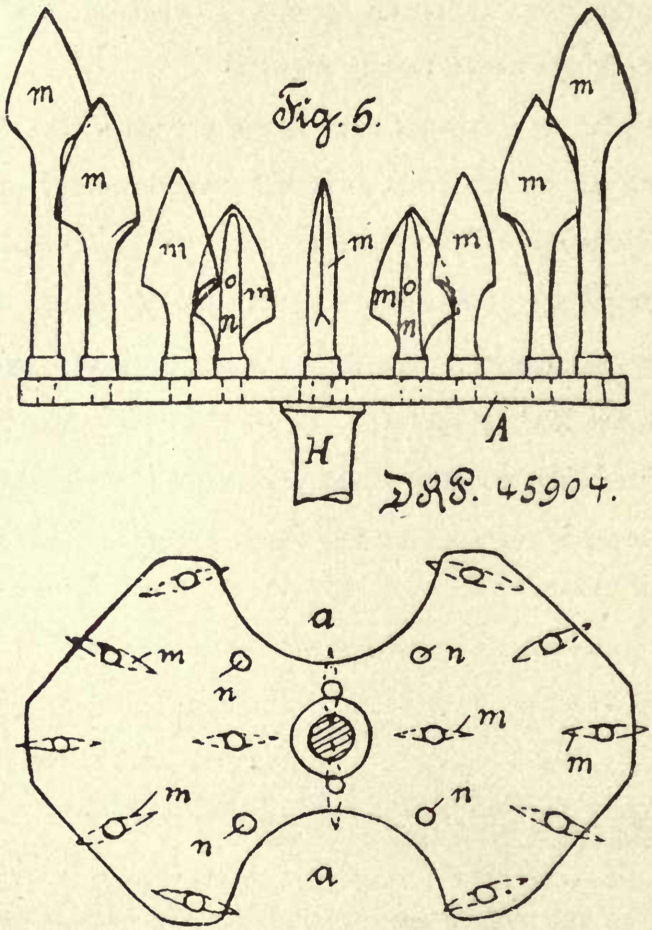
Figure 5, consists of an elongated iron plate A from a semicircular ("A" "b") part that has been out out on each side; to this plate several lance-like knives "m" and points "n" are screwed and welded on; set at right angles to the plate so as to avoid injuring the leaves and rootlets of the plant; the diameter of the parts "a" and "b" cut out from the plate is sufficiently large so that the beetlet will, whilst the hoe is operated, be surrounded by the knives and blades sufficiently distant from the beetlet which precludes the possibility of the latter coming into contact with any part of the above described hoeing device.

EXCERPT FROM PRAGER ZUCKERMARKT, FEB. 26,1913, p.168.
BEET SUGAR PURCHASES,CAMPAIGN
1913-14.

The Association of the Prague Raw Sugar factories has perfected in harmony with the Organization of Sugar Beet Growers their agreement for delivery of beets during campaign 1913-14 on the basis of 2.10 kronen per double zentner (220 pounds) delivered at factory ($3.88 per short ton); and on the basis 2.00 kronen per double zentner ($3.68 per short ton), delivered at the field receiving station. Conditions of delivery to remain the same as in preceding campaign 1911-12.

Patent Device Klement Lykorn;

see page 252.



(EXCERPT FROM BLATTER FÜR ZUCKERRÜBENBAU, FEB. 23, 1913.)

From Article by Dr. von Rumker.

Thus the influence of beet culture was very far reaching, prompting stock raising, increasing meat production; beet culture helped to increase freights in coal, beet slices, molasses, sugar lime fertilizers of different kinds, machinery, seeds, meat and cattle.

Organized farm management and new methods of agriculture has been favorably influenced by beet culture.

Capital and labor went hand in hand resulting in astonishing high yields which in favorable beet and sugar campaigns brought in respectable net profits. A beet farm assumed the character of a business or an industrial establishment.

A complicated method of book-keeping had to be adopted by agculturists in connection with the principal branches of farming. Farmers learned how to take advantage of favorable markets, errors of the past were recognized; they learned to avoid losses and grasp profits, in fact, farmers became alert - versatile, and got rid of old-fashioned methods to which they had been clinging so long with bucolic tenacity.

Germany made vast strides in beet culture, for whereas, in the beginning 18 to 20 centners of beets were required to produce one centner of sugar; only 5 to 6 centners are now necessary to produce the same amount of sugar; that is to say, the sugar content of beets were in the beginning 5 to 6%, whereas now, in consequence of scientific culture, they have been so developed that they contain 20 to 25% sugar and nearly every factory asks for beets of 16%.

Side by side with beet culture on a scientific basis, technical improvements made in the manufacture of sugar make it possible to vastly increase the amount of sugar extracted from the raw material.

If we take all this into consideration we find that sugar beet culture was doubtless one of the most important levers in bringing about a tremendous progress of German agriculture as a whole, and even now, sugar beet culture is, as it were, the high school of intensive agriculture, or rather beet culture is an agricultural industry and is the foundation and strongest support for cultivating heavy soils.

For lighter soils, potato culture is of the same importance. Whosoever therefore attempts to put the axe to our hoed crops endangers our whole agricultural production and the possibility to supply at home our need in bread and meat.

Shall we allow this to be done? No, and emphatically no. The Government cannot allow the successful cultivation of beets and hoed crops to be interfered with, for not only would a respectable amount of taxes be lost for the government - but a general depression in the receipts of the total production of agricultural raw material necessary for clothing and feeding people, would take place; a consequent diminishing of railroad freights, and small farmers and owners of large estates all over Germany would feel the effects of an attack on beet culture and hoed crops.

"SUGAR AT A GLANCE"

EXCERPT FROM THE INTERNATIONAL SUGAR JOURNAL, ALTRINCHAM, ENG. FEBRUARY,1913.

SUGAR BEET CULTIVATION AND INCREASED FERTILITY OF THE SOIL,BY G.M.

Mr. Truman G. Palmer, the capable and energetic Secretary of the United States Beetroot Sugar Association, has for many years made a study of this question of the effect of the cultivation of sugar beet on the fertility of the land. We know that figures were given a long time ago of the increased yield of wheat per acre in France when sugar beet became an extensive crop in that country. Mr. Palmer now gives us the figures for Germany for the last thirty years. He has recently prepared a most elaborate series of charts or diagrams illustrating various useful facts about sugar for the information of the United States Senate, and the Senate have ordered "That the charts and data prepared by Truman G. Palmer concerning the sugar industry, the increased yield of other crops when grown in rotation with sugar beets, and the rise in price of farm and food products, be printed as a document".

This interesting volume, entitled "Sugar at a Glance", Charts and Data prepared by Truman G. Palmer, Concerning National Economy and the High Cost of Living as Affected by the Increased Yield of other Crops when grown in Rotation with Sugar Beets" is Document No. 890 of the United States Senate, 62nd Congress, 2nd. Session. It is well worth studying.

In chart No. 25, page 36, Mr. Palmer shows that the production of wheat per acre in Germany, in 1879, was 17 bushels. In 1882 it was 20 bushels, in 1887 it was nearly 22 bushels, in 1894 it had risen to over 25 bushels, in 1899 to over 28 bushels, and in 1902 to more than 30 bushels. And it is still going up. On the other hand, in the United States, where sugar beet cultivation is still in its infancy, the increased yield of wheat per acre has gone up very slowly. In 1885 it was 10 bushels; from that it went gradually to 15 bushels in 1891, and since then it has fluctuated between 12 and 15 bushels till 1909, when it slightly exceeded 15 bushels. He gives charts for rye, barley, and oats, which tell a similar story. Chart No. 29 gives the collective average yield of wheat, rye, barley and oats per acre 1879 - 1909, in the United States and Germany, from which it appears that there has been an increased yield since 1879 of 80 per cent, in Germany, as compared with an increase of 6.6 per cent. in the United States.

This is a very strong argument against any such modification of the sugar duties in the United States as would strike a serious blow at the sugar beet industry of that country. Mr. Palmer is doing his best to save that industry from ruin, and he deserves to succeed.

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(Translation from the German)

EXCERPT FROM DIE BLÄTTER FÜR ZUCKERRÜBENBAU, FEBRUARY 15, 1913, Page 44.

HOEING BY HAND IN THE BEET FIELDS.

Description of Patented Device.

The "Count Lippe Administration" of Lindenhof in Martinwaldau has patented a Weeder-Hoeing device by means of which a circular space (reaching as near as possible to the plant) can be hoed, the ground cut and loosened without injuring the plant by throwing loose earth into the heart of the beetlet.

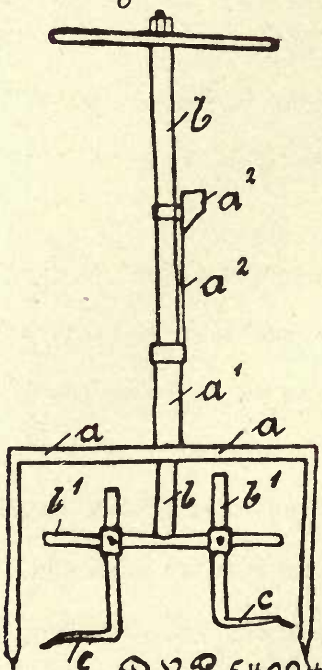
The device consists of two knives "cc" figure 7, which are adjusted on horizontal crossbeams b'b' attached to a vertical bar b; this bar passes through the neckpiece (a') of a fork a^2 which is provided with two handles at its upper extremity.

On the upright fork bar there is affixed a sliding pole a^2 projecting sideways by means of which it is possible to push the fork downward into the soil and to serve as a guide for Bar b. The knives "c" being movable and adjustable, they can be set in different positions according to the variety of plants, their shapes, sizes and distances from each other in such a manner that in turning the bar "b" the edges of the knives point outward so as to place the plant midway between the elbows of the two knives or the edges may point inward, in which case the plant will be midway between the edges of the knives. In both cases the edges of the knives will, by the rotatory motion thus imparted to them, describe a circle in the ground thereby cutting and destroying the weeds, aerating the soil within a limited radius from the plant. without injuring it or interfering with its growth.

Patented Device, Count Lippe Administration

see page 254

Fig. 7.



D.R.P. 54094.

(Translation from the French)

EXCERPT FROM LaSUCRERIE INDIGENE et COLONIALE, FEBRUARY 26, 1913. Page 199.

AGRICULTURAL CHEMISTRY.

The assimilation of carbon by chlorophyllous plants takes place under the influence of solar radiations; when the plant is growing in a confined space, it is noticed that it is more active under the influence of direct light than under diffused light. The general impression is that a clear sunshine is of the greatest importance to produce a good harvest and that a clouded sky, on the contrary, hinders the decomposition of carbonic acid and consequently prejudices the growth of vegetable matter in the plant.

If cultural facts are studied it will be found that such is not always the case; thus in regions, where the sky is frequently overcast, vegetation is very luxuriant and as a consequence the assimilation of atmospheric carbon is most abundant. It is true that such climates have an abundance of dampness and if light and water are compared as to stimulating their respective capacity to vegetation, it will be found that of water is incomparably greater, the vegetative activity suffers less than in the case where water is scarce. But if water is supplied in sufficient quantities for the needs of vegetation, can we say that luminous intensity is an important factor in the increase of harvests? Does it play that important part that is ordinarily attributed to it in plant production?

My own observations carried on during the three summers 1910 - 1911, 1912, enable me to reply to these questions; these three summers were very dissimilar, as far as rainfall and cloudiness are concerned, have been for 1910 and 1912, extremely humid with a sky almost constantly overcast; for 1911 extremely dry with a sky constantly clear .

At the chmical plant station of Meudon, France, a culture of luzerne left entirely to natural climatic conditions, produced on an average during June, July and August per day and square meter:

In 1910 dry plant substance	....	5 gr.24
" 1911	....	1 " 24
" 1912	....	3 " 12

It is evident that the want of water in 1911 was the cause of a diminution in assimilation of carbon. But during the same three years a portion of luzerne was regularly watered every 7 days with 40 liters of water per square meter; water consequently was not lacking at any time because a weekly sprinkling of 400 cubic meter of water was furnished per hectare.

From middle of June to end of August the following increase in growth was noticed per day and per hectare.

In 1910 Plant substance (dry)	....	10 gr.56
" 1911	....	7 " 00
" 1912	....	9 " 42

and during this period the sky was clouded most of the time (in 1910 and 1912). It was mostly clear in 1911. Thus, even when water was not lacking, luminosity does not favor the assimilation of carbon and the production of vegetable matter

Under natural conditions to what shall we attribute this indifference of the plant to the luminous intensity, an indifference so much the more surprising that when experiments are made in a hot house it is found that great variations occur under exposure to direct light or diffused light. Experiments (artificially) with plants raised under glass, the atmosphere has to be supplied with carbonic acid.

In the open air there is so little carbonic acid (2 vol.7 for every 10,000 vol. air) that there is enough solar radiation to determine the assimilation of carbonic acid and it matters little whether the sky is cloudy or the sun is shining brilliantly.

Assimilation is limited by the proportion to that of carbonic acid, but not to that of intensity of solar radiation. This explains why harvests are as abundant in years when the sky is overcast as in sunny years.

(Translation from the German) 262

EXCERPT FROM DIE WOCHENSCHRIFT OF THE RÜBENZUCKERINDUSTRIE, FEBRUARY 26, 1913. VIENNA.

O B I T U A R Y.

BARON ALEXANDER v. HATVANY DEUTSCH.

Friday, February 21st., the mortal remains of the President of the National Hungarian Sugar-factory Association and Vice President of the Central Association, Baron Alexander v. Hatvany Deutsch, member of the House of Lords of Hungary, were consigned to eternal rest.

The magnificent funeral furnished proof of the exalted public position which the deceased occupied in his fatherland. In addition to the relatives, bearers of a noble name, numerous members of the House of Magnates (Lords) members of the Lower House (M. C.'s), high dignitaries of State, men of science and the most prominent captains of industry and bankers, attended the funeral. A large contingent represented the Sugar Industry.

The Central Association for the Beet Sugar Industry of Austria, Hungary, sent a delegation headed by President Friess; a delegation of the Austro-Hungarian Sugar Refineries and the Association of the Trieste Sugar Traders attended .

A eulogy was made an hour before the funeral. Councillor of State Dr. Strohmer was present; Leopold Freiherr von Haupt-Stummer, also attended this meeting and briefly gave expression to his feelings of grief for himself and for his colleagues.

Resolutions of condolence were drawn up to be sent to the widow of the deceased, and it was also resolved to have his portrait placed on the walls of the Meeting Hall as a lasting token of esteem, attachment and appreciation of his services to the Sugar Industry. At the General Directors' meeting that took place the extraordinary services rendered by the deceased were extolled in a special Memorial speech. At this memorial meeting Vice President Count Andor Zichy, the director and all the members of the Association that were in Budapest on that day, were present.

After the impressive memorial meeting and speech of condolence the representatives of the Sugar Industry went in a body to the house of mourning. All the prominent representatives and members of the Austro-Hungarian Sugar Industry were present at the funeral.

At half past three o'clock, the General Manager of all the enterprises in which the deceased had an interest, made a touching eulogy and referred to the fatherly manner and kindly thoughtfulness that ran like a golden thread through all his life and emphasized the great loss his employees have sustained in the departure of Baron Hatvany Deutsch, for his heavenly home

Dr. Roland Hegedüs in appropriate and sorrowful words, expressed the great loss that the Sugar Industry has sustained by the decease of the Baron.

The closing funeral oration at the house of mourning was delivered by Vice President Count Andor Sichy. As a Sugar Manufacturer he was not surpassed by any of his contemporaries in diligence, resourcefulness and indefatiguable zeal. Splendid ideas marked his career and the benefits that accrued to the Sugar Industry cannot be over-estimated. The name of Baron Hatvany Deutsch will be mentioned for many years, with reverence, love and admiration.

After Count Sichy had spoken, the coffin was conveyed to the cemetery where the mortal remains were placed, accompanied with prayers, and placed in the family vault. A magnificent laurel wreath with the inscription "As a Token of Reverence" was placed on the coffin in the family vault by the House of Magnates. Seven carriages loaded with wreaths and floral offerings from Sugar Factories, Associations and private individuals were conveyed to the cemetery from the house of mourning and banked against the family vault.

Baron Alexander Hatvany Deutsch was born on November 12th, 1852, in Arad, where his family had founded (in 1822) the firm of Ig. Deutsch & Son. His travels abroad (1872 - 80) opened the mind of young Alexander v. Hatvany Deutsch, made him receptive, broadened his views, etc., etc., and being devoted to his Fatherland, he utilized his experience and acquired knowledge for the benefit of his fellow countrymen.

As soon as he became a partner in the firm of Ig. Deutsch, his field for useful activity was enlarged and he was able to put into practical effect his well conceived plans for starting new enterprises. When the Sugar Factory of Great Surany met with reverses, Alexander von Hatvany Deutsch persuaded his firm to purchase it and equip it as a modern plant. The acquisition of this plant may be called the epoch-making birth of the new Hungarian Sugar Industry, and he may, with justice, be called the godfather of the Hungarian National Beet Sugar Industry.

Convinced that closer relations between the Austrian and Hungarian Sugar industries would be of mutual advantage, Baron A. von Hatvany Deutsch always fostered the interests of the Central Union and his opinions were as much respected in Austria as they were in Germany.

Not only was the Baron a prominent figure in the Sugar Industry, but also in public life his personality was appreciated. In 1903 he elected a member of the House of Magnates, and last year, in recognition of his useful and meritorious activity in the interests of other National industries besides the Beet Sugar Industries, Emperor Francis Joseph decorated him with the Grand Cross of the Order of Francis Joseph.

The Association of the German Sugar Industry also sent a touching letter of condolence signed by its President Herr Koenig, in which all the members expressed their grief at the sudden demise of Baron v. Hatvany Deutsch, whose memory will always be revered by thousands of friends and admirers who personally had occasion to come in contact with him during his long and useful life.

(Translation from the German) 266

EXCERPT FROM THE WOCHENSCHRIFT DES VEREINS DER RÜBENZUCKERINDUSTRIE. PAGE 143. February 26. 1913.

BEET SUGAR PRODUCT IN ENGLAND.

According to the "Commercial Museum" Lord Claud Hamilton, President of the Great Eastern Railway communicated to the Directors and Stockholders at their annual meeting that the Beet Sugar Factory of Cantley from which great advantages are accruing to the G. E. Railway, is progressing favorably and that considerable freight increase is in prospect.

The noble Lord also mentioned that a factory to cost $110,000 is projected, beets to be planted on an area of 2500 acres within a radius of 20 miles from the factory. The question of getting government support for the development of this Industry is of graat importance. LordHamilton mentioned that it is not a question of a direct Government Subsidy but only that of getting the same Government support as the Tobacco culture in Ireland. He pointed out also that the Brussels Sugar Convention conditions against bounties may be a hindrance to obtaining Government support, but the British do not worry about that clause of the Convention as little as it worries about other clauses of that Convention.

It seems preposterous to expect from the British Government a strict observance of the clause referring to Bounties.

(Translation from the French)

EXCERPT FROM THE JOURNAL des FABRICANTS de SUCRE, FEBRUARY 26, 1913.

USE OF CELLULOSE AS A FILTERING MATERIAL IN THE SUGAR INDUSTRY AND OTHER INDUSTRIES.

For the purpose of filtering juices and syrups the Sugar Industry used various filtering material, Bone Black, for instance, which had a well defined physical effect; - it absorbed a certain quantity of salts, organic matter and thoroughly deprived the juice and syrup of their color.

It is true that in order to avoid a big loss in sugar from bone black washed out by a large quantity of water, the totality of salts, and organic matters it had absorbed could be recovered in a diluted state.

A concentration of the secondary juice had to be effected which caused complications, that thanks to mechanical filters, are now avoided.

Mechanical filters at first suggested by a Belgian, Mr. Oscar Tavrez 1878, were made of cotton manufactured in the shape of a sponge-like tissue. Many substitutes for cotton and hemp tissues were tried, such as sponges, felt, Amiante, Cake filters, gravel crushed brick, artificial Bone Black, wood shavings, vegetable strands, that would retain the precipitates and facilitate the filtration of a colloidal product Kieselzuker, mealy and fossile.

Various sand filters of which I suggested the use at the last International Congress of Applied Chemistry held at London have lost nothing of their real value, but a more convenient filtering material has been brought forward which is much easier to wash and clean than sand, raw cellulose (made of paper pulp). Long ago some sort of filtering paper was suggested to be used in sugar factories which has given ample satisfaction in laboratories being used in the shape of filter folders, the limpidity of which was perfect no matter what was the nature of the precipitate, but a good funnel to be used to suit the substance to be filtered had as yet to be found.

M. H. Perrin, the delegate from the Sugar Factory and Refinery Chalons sur Saône. France, has taken the matter in hand, and since his practical cellulose filter was used, a limpidity was imparted to the sugar product much superior to sugar in the production of which cloth had been used.

I will not here describe the filter Perrin, suffice it to say that I will call your attention to the following points which will militate in favor of the use of "Cellulose pulp" in our Industry (Sugar factories, Refineries, Distilleries, etc.)

Whatever the advantages may be in the use of mechanical filtration with cloths - this cloth consists of warp and weft - threads of the warp are subjected to a manner of handling and sizing which increases their tensile strength and makes them smooth, the weft of the threads are treated differently and dampened; no matter how well the tissue is spun the absorbent power of the threads of the warp are different from those of the weft and the tissue is not homogeneous.

Interstices exist howsoever small they may be and present a succession of weak parts in view of the fact that the threads of the warp are pressed more or less against each other and held in place by the weft threads, some above and some below them, and held less tight against each other than the warp threads; wherefore at the starting of a filtration with a cloth of whatever material, be it cotton or hemp - the liquid passing for a time has a muddy appearance which does not occur with a Cellulose filter.

Filtration of juice and syrup being carried on with as little pressure as possible on a plaque of Cellulose of 20 to 50 mm. thickness (about 3/4" to 2") has a perfect homogeneousness right through - by such a filtration an absolutely clear product will be obtained as clear as water that was blued with ultramarine that appears colorless after passing through a 10 mm.(3/16") cellulose filter. The same water if tinged with ultramarine blue retain its color for a long time if filtered through a tightly woven cotton cloth and would have to be subjected to an additional sand filter of 20 centimetres so as to become colorless.

The filtering power of Cellulose is extraordinary as Dr. Hazewinkel has demonstrated in his remarkable and long report on experiments made in Wonopringgo, Java. A surface of three square meters provided with cellulose took the place of 5 filters (Dehose) which usually filtered the concentrated unsilfited juice.

Perrin's Cellulose filter effected the filtering of 52 hectolitres (1372 gallons per hour) or 1248 hectolitres (32,969 gallons) with an average of 32 Baume - per 24 hours of continusous filtering operations. This is a remarkable showing which practice has confirmed, and this is the reason why I call your attention to the use of Cellulose for all industrial filtration where an absolutely clear product is demanded.

(Signed) A. Aulard,

Advisory Engineer in Chemistry,

Forest les Bruxelles,

Belgium.

(Translation from the French)

EXCERPT FROM LA SUCRERIE BELGE, February 1913, page 254.

(Comments) "Sugar at a Glance"

By M. F. Sachs

Mr. Truman G. Palmer, Secretary of the U.S.Beet Sugar Industry, has for many years past, devoted all his energies to the development of the beet sugar industry in the United States.

Some years ago, he made a fight against the entry of free sugar into the United States from the Philippines, and he is now making strenuous efforts to prevent a reduction in the tariff on sugar, which, as we all know, is an equivalent to a bounty on native American sugar. However, he loses sight of the fact that it is unreasonable to ask the public to go on paying a premium on sugar forever and ever; the sugar industry ought be allowed to reach normal conditions similar to those existing in Europe. It is want of logic to continue keeping up the price of sugar indefinitely by artificial means.

However, if we cannot agree with Mr. T.G.Palmer on tariff questions, we must, nevertheless, compliment him on his interesting book which ranks now as an official document, having been embodied in the records of the United States Senate.

This book contains interesting photogtaphs relating to the beet sugar industry and 42 colored charts, showing in a strikingly comprehensive manner varied statistical matter, relative to the sugar industry and the sugar trade. Comparative statistics on the production of beet sugar and cane sugar in different countries of the world, and the gradual increase from 1840 to 1910, shown by decades. Also the gradual increase of beet sugar production in the United States; the consumption of sugar in different countries, taxes on sugar, retail prices, etc. Many of the charts designed by the author relate to the most important part that beet culture plays in agriculture; other charts show average prices of articles of food as compared with the price of sugar, conclusively showing that the prices of other commodities have risen considerably since 1900, sugar excepted. The book contains 68 pages and is a perfect piece of statistical work.

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(Translation from German)

EXCERPT FROM CENTRALBLATT FÜR DIE ZUCKERINDUSTRIE, MARCH 1, 1913, PAGE 782.

BEETGROWERS - ASSOCIATIONS

Conditions in southwest Germany seem to approach a crisis, i.e. a Sugar Beet war is imminent. Sugar factories in Rheinhessen and the Pfalz offer only 1 M. 10 per Ctr. Beets ($4.49) per short ton and would rather suspend operations for the next campaign.

The growers on the other hand, declare that they would rather stop planting beets if they cannot get 1.20 for a centner = ($5.19 per short ton).

Beetgrowers in Wurtemberg held a meeting at Stuttgart and they came to the conclusion that the lowering of beet prices was unjustifiable - the following resolution was passed in harmony with those of Hessen Bavaria and Pfalz. In view of economic conditions relating to agriculture, advance in wages, taxes and expenses of all sorts, and considering the fact that the seed furnished by the factory gives a beet with a high sugar content, but inferior weight, it is out of the question to even consider a lowering of prices for beets. On the contrary, we unanimously declare that, - by adhering to the usual conditions in force, no beets be delivered under 2.40 per 100 Kg. ($5.19 per short ton).

A permanent Commission is appointed that will see to it, that the fixing of prices to be paid for beets in the future shall take place in the month of December at the latest.

Well, the soup once cooked, will not be swallowed hot and both parties will have to make mutual concessions.

Meanwhile, we learn that the sugar factory "Frankenthal" offers

Mark 2.35 per Dz. (= $5.08 per short ton). At the same time this factory is sending out ciruulars in which they point out that for the last eleven years prices have gradually risen from 1.60 to 2.40 Dz. ($3.46 to $5.19) and if they offer a minimum they say it is due to lower raw sugar prices, and to the buyers of beets from Holland. who can get beets in their own country for one Mark eighty (1.80 per Dz. = $3.88 per short ton).

(Translation from the German) Page 168

EXCERPT FROM THE WOCHENSCHRIFT DES CENTRALVEREINS DER ZUCKERINDUSTRIE, MARCH 5/13

TREATING WOUNDS WITH SUGAR.

Medical authorities have called our attention to the fact that in external injuries to the body, sugar may be used in the treatment of the wounds. Sugar is frequently used by medical men to counteract blood-poisoning. Internally, sugar also is employed as an antiseptic in enteritis by being added to other drugs. Dr. Magnus (Münchener Medizinische Wochenschrift) advocates the use of sugar in view of its favorable effect as an antiseptic; as an ingredient in other drugs used to further the formation of new skin it has also been found effective.

Sugar, therefore. is a harmless, cheap, and to all appearances. a healing remedy. free from dangerous bacteria. Its advantages consist in that it is within easy reach of everybody, which is not always the case with other drugs.

EXCERPT FROM DER DEUTSCHE ZUCKERINDUSTRIE, March 7, 1913.

Dr. Magnus, Assistant surgeon at the Marburg Clinic says: Sugar is used as a vehicle for other drugs and its chemical affinity with alcohol enables it to deprive the tissue of water and thus take away the element that is indispensable to bacteriological life.

Oculists use sugar in solution as a rinsing medium when cauterising the cornea and the conjunctiva.

At the Marburger Clinic of surgery experiments were made with sugar in the treatment of wounds and on account of the difficulty that exists in sterilizing sugar, a small quantity of beet sugar as sold in the open market was used experimentally and placed on various fostering substances. The result was as follows:

Number.	Fostering Soil.	Result.		Developed Germs.
18	Agar	15	3	1 x hay Bac.
11	Bouillon	9	2	2 x potato "
3	Bouillon hermetically closed vessel	3		2 x hay "
2	Gelatine	2		
2	Pepsin water	2		
2	Serum agar	2		
2	Potatoes	2		
1	Sacknous Whey	1		
1	Agar neutralized	1		
1	Grape Sugar Agar	1		
1	Milk	1		
44		39	5	

It was demonstrated that in no case was the presence of pathogenous bacteria found in purchased beet sugar.

Out of all experimental cultures 89 per cent remained sterile, on the balance of 11% harmless Sarophytis grew. Based on these experiments beet in a state as it came from the market was used. When taken internally digestion was promoted and generally a healthy condition in external wounds was brought about and internal disorders in the human organism counteracted.

EXCERPT FROM THE JOURNAL des FABRICANTS de SUCRE, MAR. 12/13.

AUSTRIA.

BOHEMIA-MORAVIA.

From leading article by G. Dureau.

In Austria negotiations regarding Beet Contracts and agreements about Kaufrueben (purchase beets) are being carried on.

The prospects for an understanding between the growers and factories now rest upon a solid basis and it is most likely that shortly an agreement acceptable to both sides will be made.

At a meeting in Brünn, Moravia, held on February 28th, 1913, by representatives of sugar factories and delegates of the Organization of Beet Growers, the sugar factories advocated the adoption of a minimum price as a basis of a certain level eventually attained by sugar quotations; the growers agreeing to this in principle, have asked that the price of purchase beets be fixed at 2.15 kronen per 100 Kg. (equalling $3.95 per short ton) with an increase of 10 hellers (18 cents per short ton of beets) - if sugar quotations rise above 22 kronen ($4.46 per 100 Kg. sugar, or $2.00 per 100 lbs.).

The factory delegates have offered 2.05 kronen per 100 Kg. beets ($3.78 per short ton) for the first group (district) and 2.15 kronen per 100 Kg. for every kronen ($0.203) rise in price of sugar beyond 22 kronen - ($4.46 per 100 Kg. sugar, or $2.00 per 100 lbs). In some parts of Moravia beets were purchased at fixed prices. The sugar Factories of Boemish Brod offer 2 kronen per 100 Kg. beets (equalling $3.68 per short ton) with an increase for every 100 Kg. of 10 hellers (18 cents per short ton) if sugar quotations reach above 20.50 kronen ($4.16 per 100 Kg. of sugar, or $1.89 per 100 lbs.) delivery October-December, 1913.

(Translation from the French) 276

EXCERPT FROM THE JOURNAL des FABRICANTS de SUCRE, MARCH 12, 1913.

HAWAIIAN ISLANDS.

At the time when America annexed the Hawaiian Islands the ordinary worker received 12-1/2 dollars per month.

In 1911, wages rose to 18 dollars for the Asiatic laborer and 24 dollars for the Caucassian wage earner; likewise, he receives at the end of the year 1% on every dollar as soon as the prices goes beyond 70 dollars a short ton, or $70.00 = (3-½ cents per lb.)

For instance, if sugar is worth $80.00 per short ton, the wage earner gets 10% as a bonus of the amount of his salary.

Last year, after this system had been adopted the wage earners received 13% of the amount of their salary.

EXCERPT FROM DIE DEUTSCHE ZUCKERINDUSTRIE, MARCH 14, 1913. (p. 239)

GERMANY.

PRICE OF BEETS IN GERMANY.

The beet prices are dependent usually on the current market price of sugar. At the end of 1911 the price of raw sugar was very high, and this is the reason why all German beet sugar factories were able to pay high prices for their beets; but recently the price of sugar has reached a low level, wherefore the sugar factories of Germany, especially those of South Germany, are determined to secure their beets at a lower price than they have been paying up to the present time. This was brought to the attention of Secretary of State Frhr. Zorn v. Bulach in the House of Representatives of Alsace-Lorraine, and he was asked what the Government intended doing about the proposed reduction in the price of beets. The honorable gentlemen conferred with Representative Wehrung, and after the conference stated that it was his opinion that the farmers should organize and protest against the lowering of the price of beets, and that the Government is not in a position to bring pressure to bear upon the farmers to accept a lower price for their beets, but that the farmers should have patience and when the price of sugar in the world shall warrant, the price of beets would undoubtedly return to the level of what it was in the last campaign.

NETHERLANDS (Ibid.)

Nord-Brabandt, 12th of March, 1913.

Contracts for beets are being signed up in different districts. Fixed prices for beets have been determined upon as follows for the campaign 1913-14.

Dist.	1 and 2,	12 Florens per Metric ton	(equals $4.38 per short ton).
"	3	11 " " " "	(" 4.01 " " ").
"	4	12.70 " " " "	(" 4.63 " " ").
			(Average 4.34).

These prices are paid for beets delivered at the factory gates and no increase or deferred payment will be made for deferred deliveries. The "Bund" of sugar manufacturers made an agreement with the German sugar factory association to the effect that these organizations will co-operate with each other in keeping the price the same in both countries.

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EXCERPT FROM JOURNAL des FABRICANTS de SUCRE, MAR. 26, 1913.

Leading Article by Georges Dureau, Editor.

In previous articles we referred to a petition of the cane growers of the Hawaiian Islands and Porto Rico, to the Congress of the United States.

The beet growers also tendered a petition, but one of the most important steps, was the action taken by Mr. Palmer, Secretary of the United States Beet Sugar Industry, the author of the remarkable book "Sugar at a Glance", a description of which was issued some weeks ago. We also attach great importance to Mr. Palmer's testimony which he gave before Congress, owing to the prestige of the author's name.

According to Mr. Palmer, there is no reason why the tax on this commodity should be reduced. Since 1870, the price of sugar has gone down 63% and at present, a dollar will buy as much sugar as could be bought at that time.

From 1900 to 1910, whilst the price of salt pork has increased 89%, that of fresh pork 61%, ham 60%, lard 77%, eggs 64%, and other commodities in proportion, the price of sugar diminished 7%.

During the last few years, native sugar has played an important role in cheapening sugar of all grades all over the United States. In 1911, when native beet sugar came onto the market it was offered at prices lower than that paid for cane sugar, and during 10 weeks the sale of this sugar in the American markets brought down the price of cane sugar 1.75 cents per pound.

In comparing retail prices, it will be found that sugar is cheaper in the United States than in most of the European countries.

According to data gathered by the State Department in July 1911, from 19 countries of Europe - only 5 countries showed for granulated sugar a price that was a small fraction of a cent a pound cheaper than in the United States. whereas, 14 other countries showed a price considerably higher; several countries showed a price more than double that of the price paid in the United States.

Only three European countries levy a higher tax than the United States; by tax, I mean import duty and internal revenue tax paid by European countries; and if the import duty on sugar were entirely abolished in the United States. and even if the consumer were really to benefit by the amount of duty abolished, the per capita saving only would be 14 cents per annum.

According to the Bureau of Labor of the United States. the outlay for sugar of a workingman's family is less than 5% of all other expenses incurred for food - and the absolute benefit derived from the elimination of duty on sugar would only be (per day) 4 cents for a family of 5 persons.

It therefore looks ridiculous to try and lower the cost of living by abolishing the duty on sugar.

On the other hand, no consumer will believe that the retail price of sugar will be lower if the native industry is abolished instead of being encouraged, considering the fact that the Beet Sugar Industry is the only competitor that the refineries have to reckon with.

To destroy competition and thereby establish a monopoly has never been looked upon as an efficacious means to secure low prices.

The true cause of a rise in prices in the necessaries of life is the misunderstanding of fundamental agronomic principles, in consequence of which only one bushel of grain is harvested in the United States where other countries harvest two bushels.

By reason of the low yield of crops - not considering the cotton crop - which is non-alimentary, the United States have become importers of agricultural products instead of exporters. From 1900 to 1910, the value of annual exports from the United States in foodstuffs has diminished 40%.

Apart from cotton, the annual excess of exports over imports of foodstuffs amounted to 267 million dollars.

Is it therefore surprising that under such conditions the cost of living has gone up so phenomenally?

This reversal of the balance of trade from an agricultural point of view is due to the method (system) of cultivation carried on in the United States.

The United States has ignored, largely, the system of crop rotation as adopted long ago, by the principal European nations. The United States, with its virgin soil, its excellent climate, its improved machinery, its energetic and intelligent farmers, its splendidly organized Department of Agriculture, should enable it to get a yield per acre higher than that obtained hitherto.

We agree with Mr. Palmer, when he told Congree that sugar beet culture in rotation (once in 4 years), with other crops, will give the American farmer the means of doubling the yield per acre of cereals and even more than doubling it, as we ourselves know has been accomplished for Europe where some nations had the alternative of emigrating or starving.

Before the introduction of sugar beet culture, European governments encouraged emigration, owing to the impossibility of feeding an ever-growing population. Today, they do all they can to discourage emigration, and Germany contracts every year with several 100,000 laborers from Russia and Galicia, to come and help them out with their tilling of the soil and gathering in of their harvests.

Europe has doubled the yield of its acreage, but the United States has not as yet known how to profit by Europe's example, and America is no longer considered as the favored country, - the granary of the world, or as some American periodicals put it - the feeders of the famished hordes of western Europe.

Of wheat. rye, barley, oats and potatoes, western Europe has harvested 43 bushels per acre - Germany 69.3 bushels per acre; and the United States only 21.1 bushels. Of these five crops, western Europe produced annually 26.7 bushels per capita; Germany 48.8 bushels per capita; and the United States 21.5 bushels per capita.

Is it surprising then, that the prices of foodstuffs have risen so abnormally in the United States?

The sugar beet harvest covers more than all the costs of tillage, as the increase in the subsequent yields of cereals is due to the improvement taking place in the quality of the land by reason of beet culture, which is a net profit to the farmer, and as harvests increase, the price of cereals diminishes for the consumer.

Mr. Palmer gave the Congress of the United States figures setting forth in a striking manner, the superiority of European agriculture over the American methods, and the consumers should certainly appreciate the material advantages which they are reaping from the Beet Sugar Industry, directly and indirectly.

Even if the reducing of the tariff were to make sugar cheaper, which we very much doubt, we think Mr. Palmer is right when he states that the consumers should not hinder the progress of this unique industry which has helped to double and triple the yield of cereals and to enormously increase the capacity of the farms in regard to raising cattle.

Mr. Palmer cites as an example, a farm which he visited in Bohemia where as a result of beet culture on a third of the land, the yield of the crops from the two other thirds was higher than the original tonnage obtained previously from the entire three-thirds, and the number of cattle this farm was enabled to feed increased to more than double.

The American laborer in consequence of the rise by 70% in the price of fresh meat, spends now for his family an average of 35 dollars more than he did in 1901, that is to say, double the amount he spends for all the sugar used per annum by his entire family.

Mr. Palmer maintains, and he is right, when he states that the refining of sugar is an industry of less importance in comparison with the real manufacture of sugar from beets. The refining of 700,000 tons of sugar represents a value of 5,000,000 dollars - whereas, the production of 700.000 tons of beet sugar represents an outlay in the United States of 52,000,000 dollars.

The refining of 1,800,000 tons of sugar imported involves an expense of only 2 million dollars: whereas, the production of the same quantity of beet sugar in the United States would involve the distribution of 135,000,000 dollars all of which would remain in the country.

After Mr. Palmer's testimony before the Congress of the United States, the secretary of the United States Beet Sugar Industry gave some testimony relating to wages in Germany, and pointed out that Germany assumed enormous financial burdens, in the shape of bounties with a view of developing and fortifying an industry, the enormous advantages of which. were duly appreciated in that country and that 95 to 97% of sugar beets grown in the United States are produced by 75,000 to 100,000 independent farmers who all have a direct interest in the question of the tariff relating to sugar.

Let us now quote Mr. Palmer literally in his declaration to the members of the Congressional Committee:

> "Based on a careful study of this important economic question I maintain that the higher the duty on sugar - within reasonable limits - the more you will diminish the cost of living.
>
> "In a dozen States, thousands of farmers are desirous now to grow sugar beets in order to thereby increase the yield of other crops on their fields, but considering the attitude of Congress as regards the importation of foreign sugar no capital can be secured for the erection of factories in those localities.
>
> "You gentlemen, fix the price of raw sugar at 2 cents a pound (22 francs per 100 Kg.), or keep the duty at its present level, and you give to the capitalist the assurance that you realize the importance of this great economic question - and in ten years you will not only have sugar cheaper than you ever had it before, but you will have reduced the cost of foodstuffs to a much larger extent than you as a Congress could do it by any other means or legislative measure".

Mr. Palmer's theory is absolutely right in stating that the Beet Sugar Industry, wherever it had been established - had improved economic conditions in agriculture as a whole, and for that reason, if for no other, it should get Government support (encouragement).

But let us hope that this industry now producing 700,000 tons of beet sugar per year will be able to fight valiantly, even if the tariff is reduced, and gradually increase its strength and efficiency by normal development. Let us hope that should a reduction in the tariff take place, the beet sugar industry will thereby not be permanently prejudiced.

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(Translation from the German)

EXCERPT FROM THE BLÄTTER FÜR ZUCKERRÜBENINDUSTRIE, JULY 15,1912 and MARCH 15,1913.

TECHNICO-CHEMICAL PREPARATION OF BEET SEED BEFORE PLANTING.

By Director Friedrich Strohmer, K. K. Councillor.

In order to properly prepare (a) the seed an apparatus in the shape of a cylindrical drum with a diameter of 1.35 m. and a length of 2.50 m. is used. (b) 2 mortar trays 1.50 x 1.50 x 0.40 m. (c) the following tools:

Two wooden troughs for filling the drum, two forked sticks for mixing the seed in the drum, two T shaped tools for mixing the prepared seed with lime water and a variety of shovels and rakes.

For the purpose of setting the drum in motion it is provided with a jack-rafter (spur-gear). The drum should make about 8 revolutions per minute and should have a motive power of 4 H. P. The drum has on its inner side 6 projecting ledges facilitating the scattering and lifting the seed and thus thoroughly mixing it.

On the front of the drum is a small movable manhole for facilitating the removal of the prepared seed. On a given point of the circumference there are openings for introducing the seed into the drum; these openings are arranged so as to be closed with adjustable lids in the shape of closely woven sieves; besides there are two ventilating holes on the drum each hole provided with closely woven sievelike meshes through which acid gases are allowed to escape and serve also to lower the temperature that had risen by reason of a contact between the seed and acid so that the germinating capacity of the seed should not be prejudicially affected.

The drum is fed with 400 Kg. beet seed and 4 jars of sulfurous acid 66° beaume, each jar containing 30 Kg. of acid. The filling of the drum takes place in such a manner that alternately beet seed and acid are introduced through the openings which immediately is stirred thoroughly by means of a T shaped crutch. Then the lids are fastened on the openings, the drum is put in rotatory motion which is kept up during two hours. The contents are then forced into the mortar-boxes through the manhole on the front of the drum by means of a powerful stream of water. In those mortar boxes the seed is then washed thoroughly during half an hour - fine sieve openings on the lower front of the drum serve to allow the water to run off without permitting the small seeds to escape. After the seed has received its final water bath the sieve-like openings are closed with boards and the boxes are fed with lime-milk - 50 litres of lime water for every 100 Kg. seed - which will neutralize any acid lingering on the seeds. After the seed has been thoroughly stirred during an hour by means of a T-shaped crutch the boards are taken away from the sieve openings and the seed is washed in pure water until Lakmus paper shows no longer any reaction.

Seed prepared in this way can be planted immediately; if this is not done then the seed should be spread out in thin layers, allowed to dry and turned over several times. After two days it will be so thoroughly aerated and dry that it can safely be put in bags and stored away for future use. The seed naturally diminishes in size and weight during this operation; it can safely be calculated that from 100 Kg. unprepared seed 70 Kg. of dry prepared seed will be obtained. For this reason the quantity of prepared seed to be sown should be 30% less than the quantity of unprepared seed, i.e., instead of 36 Kg. of ordinary seed only 24 Kg. of prepared seed need be taken. As the beet ball will now be small and black in color, it might cause mistakes in drill-ing; it is therefore advisable to treat the seed after leaving the final mortar tank bath and before completely drying, with lime dust.

Fertilizing has to be carefully considered in beet planting for sugar extraction as well as for seed growing.

Land in Russia without fertilizer yielded seed in Kursk Government 15.6 dz. per hectare.

	Dz.	per	hectare.
2 Superphosphate	17.1	"	"
0.5 Chilian Saltpeter	16.1	"	"
1.5 Salts of Lime	17.9	"	"
or			
Superphosphate & Chiliam nitrate	18.2	"	"
Chilian Saltpeter and Salts of Lime	20.9	"	"

BLATTER FUR ZUEKERRUEBENBAU

MARCH 31st, 1913. page 93

By Dr. Albert Bartens.

LABOR and WAGES

What influence will the labor question have on the Production of cane sugar and beet sugar?

One of the most gratifying items for the American beet sugar producers is the fact that the Cuban planters have a great difficulty in getting sufficient labor although efforts have been made for years past to encourage the emmigration of Portuguese and Spanish families,-- but as the Cuban law prescribes that 75% of laborers must be Cubans these efforts have not met with the desired result.

Most of the Spanish and Portuguese laborers stay during the season and return to their own country after their work is done. Increases in planting cane and extensive new buildings are planned by competitors of the beet sugar industry, without thinking whence they will draw their material for doing the work and when once the Panama Canal will be opened the beet sugar industry of American will see Cuban season laborers drift to the western American States where better wages in all kinds of pursuits are paid and where the climate is more congenial as in Cuba.

We believe that thousands of season laborers who now help to swell the production of sugar in Cuba will no longer work for such wages as they had received hitherto, which, apart from fluctuations in climatic conditions, will materially increase the wage-account for the Cuban Sugar producers.

To get the necessary number of laborers for sugar factories has always been a serious problem especially for those factories that have to rely on foreign labor.

In the beet fields as well as in the cane fields there is always a cause of anxiety if a lack of workmen should exist during any season and the fields could not be attended to at the proper time, especially in the Spring at planting time. There is likewise grave cause for anxiety when there is not sufficient labor material available during the period of factory operations in cane pressing and beet juice extraction.

In this respect the labor problem will become more serious and the getting of labor forces attended with more difficulties in tropical countries than in beet growing countries - as a deterioration of the beets doesnot take place as quickly as is the case with the cut cane tendency to decomposition, as it is well known that cut cane deteriorates very fast when once cut. Comparatively speaking the tropical sugar producers will have greater difficulties to get laborers than beet sugar producers. The labor question has hindered in many cases the extension of sugar cane planting in general.

Upon this question rests the life, the productive capacity and we may say the prosperity of the cane sugar industry. We must bear in mind that the labor problem is likewise serious for the beet sugar industry but will be solved much easier than in the cane sugar industry. This will naturally be an advantage for the beet sugar industry as the tropical sugar mills will not be able to produce sugar cheaper than they have done hitherto on contrary we think that the cost of production of cane sugar will gradually get higher and higher.

Let us take Russia for instance,- In Russian factories peasants are employed who for the greater part of the year live independently of factory wages, which does not tend to establish labor organizations. It is true that in Poland a great many labor organizations exist but on account of the vastly scattered areas in which the sugar factories are located they cannot carry on any successful propaganda tending to strikes or enforce demands for higher wages.

But in Italy, Denmark and Sweden where labor organizations are geographically nearer each other, employers of labor have to come periodically to agreements with the organizations themselves, relating to wages.

In the Spring such labor and wage contracts are made often with reluctance on the part of the employers for in case of conflict the whole beet harvest is jeopardized during a given campaign. In Denmark there is a female labor union, and a Danish Machinists and Boiler attendants union, who only enter into direct negotiations about wage questions with the beet sugar factories.

In Italy also the sugar factories have often differences about the wage question, for instance in 1909, a union was organized for the purpose of getting a wage increase. By importing foreign labor losses and delays may be to a certain extent avoided, as for instance in Denmark where the sugar factory owners reluctantly import annually laborers from Galicia.

The surplus in working forces that exists in Austria and in Russia enables contiguous countries to regulate satisfactorily their labor supply. Likewise in G ermany in sugar factories and on farms a safety valve is found in being able to draw on Russia and Galicia for wage earners. Finally we may mention that France and Belgium have largely to depend on Galicia to make up their shortage on labor for field and factory.

This continuous demand for labor does not excite any envy on the part of the native population as those receive the same wages as the natives who therefore are not exposed to any damaging competition. In all countries efforts are made to introduce improved machinery so as to effect a saving in wages and reduce operating expenses to a minimum. Inducements are held out to laborers so that they may become permanently attached to those agricultural and industrial establishments where they get work from year to year. The inducements we speak of are as follows:

Building of barracks,- granting of railroad fares,- opportunities for traveling in general,- and other privileges.

Incidentally we may mention that the employment of vast numbers of foreign workmen in Germany tends to lower the standard of living and to influence the moral atmosphere on farms and in factories.

That only by paying good wages in the beet districts of Europe a sufficient number of laborers can be obtained at the proper time does not alter the fact that sometimes strikes do occur by reason of a demand for higher wages and that for other reasons entire cessation of work takes place. But this is purely a local matter, and is due to the parnicious activity of a few agitators. Some estates and some factories for a time are thereby subject to losses but by constant offers of work on the part of the unemployed laborers, it is possible to resume work speedily and without material loss to the productive capacity of a factory which would otherwise be the case.

In the case of a strike in the cane sugar factories and canefields, it is impossible to store it for any length of time, and when a strike does occur it is always advisable to make the best possible arrangement as otherwise the cut cane would spoil and as the factories get no special protection from the Government in Cuba, plantations often are exposed to incendiary fires on the part of the strikers,- the cane deteriorates or spoils entirely and for several years to come work on sugar plantations is retarded.

Efforts to introduce foreign workmen into the cane fields and cane sugar mills date back to the time of the liberation of the slaves by Great Britain, and we can truthfully assert that ever since the abolition of slavery labor has been scarce in Cuba, as the negro looks upon the cane sugar harvest as a festival and soon gets tired of the work. It has happened 50 and 60 years ago that florishing sugar cane plantations in Cuba had to be abandoned for lack of laborers and in other tropical countries many plantations became wildernesses because they could scarcely get enough people to work them. Even if conditions are somewhat better at present still the same conditions may occur again.

Here are some reasons why it is far more difficult to get an abundant supply of labor in tropical countries:

1st, Not many workmen can permanently work in tropical climates without injury to their general health.

2nd, Renewed and oft repeated planting and the increasing number of consolidations of mills at central points demand a corresponding increase in the concentration of labor forces.

3rd, The race question and special laws enacted in various sugar growing countries put difficulties in the way of emigration and colonization of cane growing districts.

These points do not entirely cover all conditions, for we could mention many other things. Even if enough labor is available for mill work, there is nearly always a scarcity for field work and for harvesting.

The intense heat makes it almost impossible for many to work and emigrants from various countries even if natives of tropical climates have not an equal power of endurance and capacity for giving a fair return for wages demanded and paid.

Many countries have contributed their quota supply for tropical sugar cane plantations especially China, Japan, Spain, Portugal,Russia, Germany, Hungary, Sweden and Norway; Norwegians did not stay for any length of time. In order to get a clearer idea of these difficulties let us analyse conditions on the Hawaiian Islands.

HAWAIIAN ISLANDS

Special enactment about emigration and the race question play an important part in relation to labor conditions in these islands.

The number of aborigines is getting smaller every year and it is scarcely possible to get a good days work out of a native of the Hawaiian Islands. Chinese have been imported and they did very well up to 1900, the time of annexation by the United States. From that time Japanese came in vast numbers, but somehow matters so far as the cane sugar industry was concerned did not improve as in 1900 disputes arose among the 43,000 workmen (64% the majority were Japanese), 8.9% Portuguese, 6.3% Chinese, 5.2% Philippinos, 4.3% Porto Ricans, 4% Koreans, 3% Kanaks and 1.4% Americans. Spaniards and Russians,- and it was only by considerable concessions made to the exacting Japanese, the cane harvest could be saved.

Inducements are now offered to white working families to settle on the Island to keep the Japanese in check and of course better American citizens can be made out of members of the white race. Russian and Portuguese families are offered higher wages than those paid the Japanese and each family father gets a grant of land on which to build himself a house, lay out vegetable gardens and he also gets assistance in the shape of seeds, agricultural implements, etc.

Those that only come for a season get good dwellings to live in their spiritual and physical welfare is looked after and all is done to induce them to stay permanently on the Islands,- but little success has attended these efforts.

The Directors of the Sugar Cane Planters Association are paying 100 marks ($23.80) a month of 26 days,- besides the workers who remain get a bonus or share in the profits of all the sugar they helped to produce,- this bonus to be in proportion to prices realized in the American markets.

Notwithstanding all this it is difficult to get the necessary number of people as according to the American Immigration law no contract is allowed to be made with immigrant laborers. As soon as a laborer arrives in Hawaii he can take work in the Islands wherever he choses.

Philippinos are now experimented with and the result is watched with great interest. Finally we may mention that socialists, free traders, labor agencies, and certain capitalists from the western United States cities, who are eager to colonize their own states, induce many to leave the Hawaiian Islands for the United States by guaranteeing higher wages and better living conditions. This class of emmigration is still going on and the Hawaiian Islands have to replace the losses caused by it.

Finally in Australia the the watchword is: "Australia for the white people", which made them give better wages to white people, and the government gives a bounty on sugar produced by white people. Should a member of the black or yellow race drive a wagon load of cane from the field to the factory, then such a cartload is not considered as being produced by white labor, consequently the sugar produced from such cane does not get the bounty. As there is not enough white labor available. no expansion of the cane sugar industry is possible in Queensland and not only that but also is it predicted that the quantity of sugar produced will diminish every year.

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(Translation from the German)

EXCERPT FROM THE CENTRALBLATT FÜR DIE ZUCKERINDUSTRIE, APRIL 5, 1913.

The Finance Ministry of Russia officially declared since 1908, that the cost of production per pud of sugar was 1.93 Rubel, but the factories maintain that their production costs (average) amount to 2.25 rubels per pud - the 288 factories therefore, do not make as high a profit as the Finance Ministry calculated.

NOTE: 1.93 rubel per pud = 2.7523 cents per pound = $55,046000 = $55.04 per short ton.

2.25 rubel per pud = 3.208 per pound = $64.16 per short ton.

(Translation from the German)

EXCERPT FROM DIE DEUTSCHE ZUCKERINDUSTRIE, APRIL 5th, 1913, PAGE 980.

"BEET GROWERS versus FACTORIES IN SOUTHERN GERMANY".

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The "Strassburger Post" publishes the following article:

All those who have the interest of agriculture at heart, will be unpleasantly surprised at the agitation started by beet growers against the sugar factories: the agitators do not wish to look facts in the face. Any agronomist as well as those who have experience in beet growing will frankly admit that beet culture is a blessing for agriculture in general, and 1 Mark per 50 Kg. (equal to \$4.32½ per short ton) paid for beets, leaves a fair margin for the grower.

Unfortunately, the factory is not in a position to adjust the sale price of sugar to the purchase price of beets, but has to part with the sugar at whatever the world's market price happens to be. Considering the fact that sugar is a product dealt in by the whole world's producers and costs (raw) now 9.75 mark per 50 Kg. (equal to \$2.11 per 100 lbs.) factory price, we do not see how it is possible to pay more than one mark per centner of beets (\$4.32½ per short ton).

All agitation in the world will not remedy this state of affairs, even experts will tell you that very little profit can be made by manufacturers paying 1 Mark per centner (\$4.32½ per short ton) if sugar is not going to be higher in the world's markets.

Beet growers should realize and know what are their real interests and should not allow themselves to be incited by their so-called friends to carry on a senseless agitation, a campaign against the beet sugar factory owners with whom they should have a community of interests.

(German Translation)

EXCERPT FROM DIE DEUTSCHE ZUCKERINDUSTRIE, APRIL 18, 1913, (PAGE 348.)

According to report of factory inspectors and Inland Tax Office four (4) new factories will begin operations:

Government Poltawa - Kotschubeja Factory, Village Sgurowka, District Toluki, Capacity 500,000 puds sugar (9,028 short tons)

Government Charkow - Count Kleinmichel Factory, Village Alexandrowka, District Bogoduchow.

Government Lublin - Stock Company, 170,000 Puds - capacity, (3070 short tons)

Government Wlstowka - Capacity 180,000 puds = (3,250 short tons).

Therefore, next campaign will see 291 factories in operation in Russia.

(Translation from the German)

Page 1059.

EXCERPT FROM CENTRALBLATT FÜR DIE ZUCKERINDUSTRIE, APRIL 19, 1913.

(Leading Article)

COMPETITION.

(LOWERING OF DUTIES ON SUGAR.)

Mr. Wilson, the new President of the United States has, in his message to Congress, pointed out that tariff revision is one of the most urgent and important matters to be attended to.

What interests us (Germany), is the lowering of the duty on sugar by 25% and in three years raw sugar will enter free into the United States.

Generally speaking, we hail with pleasure, this measure, but do not let us be too sanguine about it. We must bear in mind, that Cuba, by reason of her lower cost of production and of her geographical position, is better placed than the European beet sugar countries, although all European countries will be benefited by the gradual elimination of sugar duties.

There are only two contingencies which will contribute toward bringing in large quantities of German and Austrian sugar into the United States, in competition with Cuba and the beet sugar states of the Union:

I. A crop failure in Cuba;

II. A heavy overproduction in the European beet growing countries.

Contingency number 1, may occur through unfavorable weather conditions as well as a political upheaval. This latter event, of course, would not be of long duration, especially since America keeps the Island in her firm grasp. However, if either of these two contingencies should arise, we (Austria and Germany), may find a remunerative market in the United States. However, Cuban factories and planters and the allied refiners, who have invested large sums of money in Cuba, will do their utmost to get Cuban sugar into the United States, as we (Germans and Austrians), have to contend with higher freights than the Cubans. Nevertheless, we are very well satisfied with the steps taken by the new government of the American Union, which is now tearing down that wall of high duties, the imposition of which, has hitherto kept our German sugar out of the field of competition.

(Translation from the French)

EXCERPT FROM THE JOURNAL des FABRICANTS de SUCRE, APRIL 23, 1913.

By Lucian Dureau, Engineer of the Arts and Manufactures (France)

1st. Article.

The immense progress made by the American Beet Sugar Industry has created a great deal of interest in all countries of the world. In the near future, we predict, that the United States will take first rank in the family of beet sugar producing countries if the new tariff is not going to deprive this young industry of the protection it enjoyed hitherto, and without which, it probably never would have been able to have reached such a healthy development.

Desirous of studying by personal inspection, the conditions as they actually exist in the United States and Cuba, a trip was made there last fall. Boarding a steamer in Liverpool on the 19th of October, we arrived in New York on the 27th. We visited Washington, Boston, the classical Niagara Falls, Detroit, Chicago, Denver, Salt Lake City and California. From San Francisco, we followed the shores of the Pacific Ocean until we reached Los Angeles; we then went to New Orleans and from there took the boat to Havana.

After a short stay in Cuba, we returned to France by way of Key West (Florida) and New York. Our journey occupied a little more than three months.

Before going into details, we wish to express our sincere thanks to all those who helped us by their letters of introduction and their advice, without which we could scarcely have made such a pleasant trip.

We were particularly impressed with the extreme courtesy and cordial reception on the part of Mr. Truman G. Palmer, Secretary of the Beet Sugar Industry of the United States, whose influence we found, opened the door wherever we went, and we wish to thank him heartily; our thanks are also due to Messrs. Willett & Gray, and to Mr. Warner, of the Sugar Refining Company located at Edgewater, New York; to Mr. Jacobson, Statistician, at the Interstate Commerce Commission; to Mr. Thomas R. Cutler, Vice President of the Utah - Idaho Sugar Company; Mr. Hannam of the Spreckels Sugar Company; Mr. Driffil, Manager of the Oxnard Sugar factory; Mr. Roderus, of the Journal of the American Sugar Industry; Mr. Zurich, Mechanical Constructor, representing the French firm Cail; Mr. John Dymond of Louisiana and Mr. Spencer of the Cuban - American Sugar Company.

We will now give our readers a resume of what we noticed during our trip.

We found that in Louisiana the production was as follows:

In 1827	15,401	tons	of	1015	Kg.	(Long	tons)
" 1853/4	224,188	"	"	"	"	"	"
" 1856/7	 36,813	"	"	"	"	"	"
" 1861/2	235,866	"	"	"	"	"	"
" 1864/5	 5,331	"	"	"	"	"	"
" 1904/5	335,530	"	"	"	"	"	"
" 1906/7	188,571	"	"	"	"	"	"
" 1907/8	302,855	"	"	"	"	"	"
" 1912.13	170,000	"	"	"	"	"	"

The enormous fluctuations shown in this table are due to the (1) extreme changeableness of the Louisiana climate;(2) to frequent overflows of the Mississippi flooding the cane fields - often destroying harvests that at first looked promising.

Situated between 29 and 31st. degree of latitude, North Louisiana is subject to frosts. In 1895 the thermometer fell below zero 10°0 C. and the mean temperature during the winter months was plus 9:0C.

On the other hand, in 1890, the temperature was plus 7°0C, and the mean temperature of the winter months plus 18°0C.

In 1905, the minimum temperature was 7°7C, the maximum temperature 34°6 and the mean temperature for the whole year plus 20° 16C.

As regards the different varieties of cane cultivated we found native canes and seedling canes imported lately from British Guiana.

In 1757 sugar cane was first introduced into the United States; indigenous to Malabar and Bengal it was called Creole cane - some was introduced from St. Domingo and called Ptaheite cane.

Then in 1872 Mr. LaPice imported from Java the cane which is now known in Louisiana under the name of Bourbon cane, then they have striped cane, the "Red Ribbon" and purple cane.

Among the seedling cane imported from Demarara in 1893, the cane D. 74 and 95 are the two varieties best adapted to the climate and soil of Louisiana. These two varieties cover one-half of the cane area and a few years hence they will have completely dislodged the indigenous cane; certain planters however, prefer the native cane on account of their greater resisting power to unfavorable climatic influences.

The newly introduced canes are preferred to the native cane because they ripen quicker and contain 20 to 25% more sugar than the native canes.

Expenses are as follows:

Plowing and Sowing	169.45	Francs	per	hectare	(14.13	dollars	per	acre)
Cultivating	134.39	"	"	"	(10.59	"	"	")
Harvesting	197.35	"	"	"	(15.54	"	"	")
Sundry Expanses	160.27	"	"	"	(12.62	"	"	")
	661.46	"	"	"	$52.88		"	"

In sundry expenses are included costs of drainage at 3.34 dollars per acre (or 42.41 francs per hectare).

We have collected data about wages paid for field work; a teamster gets $1.35 per day (Fr. 7.oo) a cane cutter $1.10 (Fr. 5.65) for men; women get 90 cents or (Fr.4.65). Some women get $1.00 per day = (5fr. 15), and I was told the average wage throughout Louisiana was $1.25 for men, or (Fr.6.45) for men.

From this it will be seen that in the total cost of cane culture the biggest item is wages - as a good many laborers are required in harvesting the cane. They have tried to substitute machinery for hand work, but hitherto no satisfactory cane harvester has been found.

Most of the workmen are negroes; a good cane cutter may cut 2½ to 3 tons, but the average is 1½ to 2 tons. We saw the harvester invented by Mr. Cockrel at New Orleans, which, with a few improvements,may fill a long felt want. Mr. Cockrel estimates the expense of harvesting the cane at 5 cents (25 centimes) per ton not including depreciation of machine. At present, the cost of harvesting is 60 to 70 cents (3 Fr. to 3.50). It will easily be seen what will be the advantages accruing from Mr. Cockrell's invention.

(To be continued)

(Translation from the French)

EXCERPT FROM THE JOURNAL des FABRICANTS de SUCRE, MAY 5, 1913.

MANUFACTURE OF A SWEET FLOUR FROM SUGAR BEETS"BEET MEAL"

By A. Aulard, Consulting Chemical Engr.Forest les Bruxelles.

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"BEET MEAL"ITS USE FOR HUMAN AND ANIMAL FOOD.

At the preceding International Congress of Applied Chemistry (London 1909), I gave a lecture on manufacturing a sugary plant meal by utilizing the Beet as a raw material. Since then a factory (Daussoulx) Vedrin, Belgium, is starting its third year of manufacturing and all that was manufactured up to date has been sold; during the next campaign a second factory will be in operation (in France, near Dunkerque) the Belgian company owning the patents Dautrebande contemplates to establish several big factories capable of handling 30 to 50,000 tons beets each campaign to produce 4 to 6,000 tons beet meal.

A new industry, gentlemen, making flour from beets has sprung up, we baptized this flour "Beet meal". This infant was born in this obscure corner of the earth called Belgium well known for its industries and fertility, as well as progress.

This new industry, to accomplish economically, the dessication of the beet needed a practical dessicator which allowed the utilization of spent gases coming from the generators where the integral utilization of calorics produced by coal burned in a special heating furnace.

After making experiments with various dessicators preference was given to the vertical Huillard dessicator (Huillard of Suresnes) which is the only one bringing about a rational dessication of the beet at a temperature varying between 120° maximum and 40° at the outlet.

I will not enlarge on the technical details of the operation of the dessication of the beet.-- It is not so easy as one would suppose it to be at first sight, to extract the water contained along with sugar in an infinitely large number of small cells.

The protoplasm of cells, if heated to excess at the starting of operations contracts and lets the sugary juice exude, which causes difficulties in the drying of slices; the cells ought to swell without bursting which is only possible in the apparatus Huillard which has a series of superimposed trays with air currents well regulated from below and above, the air possessing a certain degree of humidity near where the gases are allowed to escape.

The beet cossettes, sliced as finely as possible are spread out on a first tray where they are exposed (in preference to a high dry temperature) to steam mixed with incompletely saturated hot air, the dry temperature coagulating the albumenoid substance of the protoplasm as brought about in most of the existing Dessicators (drying rooms).

In the system Huillard cells of the beet swell and are rendered fit to let the water which they contain evaporate; on the succeeding trays they are exposed to an intensive and rushing current of air with a gradually diminishing charge of steam (generated from water) consequently undergoing a gradual drying and increased heating process (120° C. on the lower tray, the hygrometric state of the air being around zero).

The sugar in the cossettes, is imprisoned in the vegetable matter; (this latter is capable of assuming the form of humid cossettes) and not at the exterior of the cells which would be incapable of swelling - to reabsorb the water on account of too high a temperature.

Such a product is capable of furnishing for diffusion purposes as good material as fresh cossettes; its exhaustion would be gradual and complete and give a dense and pure juice.

In the United States where hand labor is very high, where the distances from field to factory are very great, drying plants could be installed which would enable the existing sugar factories to operate during the whole year with dried slices. If a Huillard apparatus were installed the gases accumulating near the vent of the crown of the furnace could be utilized by the adjoining drying room.

But let us come back to "Beet Meal". Its composition is as follows, as per averages obtained from numerous analyses - of course, using for drying purposes only a fairly good sugar beet.

Albuminoid and azotized substances	6.00
Saccharose	65.50
Hydrocarbonated substances	12.75
Fatty substances	0.75
Residues (inert saline matter	3.80
	94.00
Water	5.40
	99.40

Such a product is not a perfect food, it contains too much of Hydrate of carbon in proportion to proteic substances of which there are too small a quantity; however, such a product which could be kept indefinitely (I kept some without their getting mouldy) for three years - and could be used in combination with oil cakes peanut. cotton seed, flax seed, etc; cocoanut and other meals too poor as hydrates of carbon and too rich in proteine - these would be rendered more digestible by reason of their sugar content and by their facilitating their assimilation Beet meal would enhance their market value.

We must bear in mind that experimental physiology has established the fact that the muscles draw the necessary elements for their activity in the body from the rich store of the quantity of irrigating glycogens produced in the body.

If nutrition by assimilation is rich in hydrocarbonated substances, (sugar) these are directly utilized; in the contrary case, either the animal transforms fats and albuminoids of its ration into hydrocarbons or it uses up its reserves of those elements or the two phenomena take place simultaneously. These facts being well established are of far-reaching importance; they are conducive to restrict the proportion of azotized matter contained in the ration to such quantity as is indispensable for repairing the waste of tissue and muscle and to increase in a marked proportion the quantity of non-azotized substances in man and animal when engaged in strenuous work. These non-azotized substances are: Starch, sugar, fats.

For the farmer raising cattle this fact is of the greatest interest. In fact the cost of the unit of azotized substance contained in forage is much higher than the cost of a unit of a hydrocarbon substance (sugar). Beetmeal, which is the flour of the sugar beet will therefore contribute its quota towards giving us a rich and healthy element for feeding our cattle and horses.

According to a report from the factory Daussoulx, 100 Kg. of Beetmeal can be sold at 20 francs ($3.86) which would put the sugar unit, in starting from a product of 65%, and 25% other nutritious substances, albuminoid and azotized, which I estimate at 15 Frs. (100 Kg. ($2.89) i.e., 25 x 15 = 3.75 Frcs. ($0.72) to deduct from the 20 Frcs. ($3.86) leaving 16 Frcs. 25 ($3.13) for 65 Kgs. of sugar = 25 Frcs. 100 Kgs. ($4.82) which, in Belgium in view of the price of sugar without duty is 6 to 7 francs less than crystallized ($1.16 - $1.35).

In starting with a beet at 30 Frcs. ($5.79) M. ton or $5.27 a short ton delivered at factory and in estimating that that quantity of beets will give a minimum of 250 Kg. of Beetmeal (551 lbs.) calculated on a dry extract 750 Kgs.(1653 lbs) of water will have to be taken out from a metric ton of beets which in the factory by utilizing the crown vent gas - will require a maximum of 90 Kg. (198 lbs) of coal plus the fuel to operate the machinery say about 30 Kg. (66 lbs.) or a total of 120 Kg. (264-1/2 lbs) of fuel at 18 Frcs. a ton = say a total for these 264½ lbs. of 2 frs. 16 = (41¾cts.).

The cost of labor will not exceed 3.50 Fros. = (67½ cents) other charge 1 franc (19.3 cents).

Fuel	2.16	
Labor	3.50	
Other charges	1.00	
Francs	6.66	= $1.28
Add the maximum overhead charges 3.34 frcs.=		0.64
		$1.92

or about $2.00 total cost of operating expenses for a ton (metric) of beets, or 4 francs (77 cents) for 220 lbs. of "Beetmeal" in adding the price of the product 30 francs - $5.79, it will give 40 francs ($7.72) expenses, against receipts of 50 Frcs ($9.65) for 250 Kg. (551 lbs.) which means 20 Francs ($3.86) per 220 lbs. or $1.75 per 100 lbs.

You will see gentlemen, that there is a margin of 10 francs for every 250 Kgs. or 40 francs per metric ton - i.e. $7.72 or about $7.00 per short ton.

This new industry should be seriously considered now that Belgium has blazed a trail for us, and it deserves so much the more due consideration as it will not only serve as food for animals but man also can use this extremely pure flour for culinary purposes, (baking, confectionary, etc.,). Flour from sugar beets may come into general use especially in England, for it can be used not only as an animal food but also in breweries and distilleries. Confectioners may use it in place of other flour

(3 to 5% beetmeal.) As the President of the Association of Sugar factories and Distillery chemists Mr. Dupont has pointed out, sweetened bread for the "Army and Navy" mixed with other flour could be made with beet meal flour in cakes and puddings (5 per cent of beet meal) thus effecting a saving of sugar to be used.

Various Belgian brewers have used this flour and have obtained excellent results. You all know the physiological part that sugar plays in nutrition by assimilation of human beings, I will therefore conclude by saying: Do all you can to increase the quantity of sugar in human food and in the feed of the farmers' hoed stock.

Therefore, produce it as cheaply as possible - 20 Fr. 100 Kg. $3.86 = 100 Kg. ($1.75 - 100 pounds) just as cheap as 100 pounds of beet meal can be produced.

EXCERPT FROM PRAGER ZUCKERMARKT, MAY 28,1913.

"HAMBURGER NACHRICHTEN" Newspaper edited in Hamburg, Germany.

Mr. Claus A. Spreckels, President of the Federal Sugar Refining has made the following statement:

I have always been in favor of abolishing the duty on sugar for the American people have to pay 2 cents more per pound for an important article of food than they ought to pay. If taken ad valorem $1.34 per lb. raw sugar means an equivalent of 80% - as against champagne at 70%, Automobiles 45%, furs 50%, Old Masters (paintings) 15% and on Diamonds 10% only.

Whereas the total capital of all refineries of the United States of America is only 110 millions and work all the year round, the capitalization of the Beet Sugar factories amounts to 143 million dollars. This enormous capitalization and the payment of dividends is only made possible because the price of refined Beet Sugar is independent of the cost of production but is arbitrarily fixed in such a way that they always manage to underbid slightly the sugar refined from imported raw material.

Neither do the wage earners reap any advantage from a high tariff, for in the Western Sugar factories there are only low priced Asiatic Mexican and Russian laborers employed.

The beet sugar people assert that the taking off of the sugar duty would ruin them; but nobody should believe them.

Actually their cost of production is lower than the cost of production in Europe, for in Europe the beet growers receive from six (6) to seven (7) dollars and fifty cents per ton, whereas in the West, an average of $5.00 is paid.

It has been proved that our Beet Sugar Factories can produce the refined article at 2.40 cents a pound, whereas they say it costs them 3½ cents a pound. We, Eastern Refiners, need not fear free sugar for we furnish a better article than the European manufacturers. That much European sugar will come into the American market, I do not believe; I am convinced to the contrary that we will be able to export sugar to Europe, for we not only produce better sugar than any other country, but also our cost of production is lower.

However, the well known sugar statistician Herrn Wallace P. Willett, of the firm of Willett & Gray, contradicts Mr. Spreckels and says that there is no doubt that with free sugar many sugar factories of the United States will have to suffer.

(Signed) By the Reporter of the Hamburger Nachrichten
and the Reporter of the Journal of Commerce of N.Y.

(Translation from the German)

EXCERPT FROM THE WOCHENSCHRIFT DES ZENTRALVEREINES FÜR DIE ZUCKINDUSTRIE.
May 28, 1913.

ARTICLE BY DR. STROHMER, ROYAL IMPERIAL STATE COUNCILLOR.
VIENNA.

Chemical technical experiment Station of the Austro-Hungarian Central Association for Sugar Beet Culture and Beet Sugar Industry.

With a view of solving many problems in connection with beet culture, our Experiment Stations need the active co-operation of members of this Association who will promptly notify the experiment station as to the appearance of plant diseases and forward simultaneously parasites, specimens of plants attached or portions of plants, in fact, anything that may have contributed to bring about a plant disease or damage to a healthy plant, namely, insects, fungi, etc. Along with the shipment of these the following questions should be answered:

1) When did the first manifestations of disease appear and to what extent?
2) Does the disease spread and to what extent?
3) What was the appearance of the leaves or root that led you to believe that the plant was diseased?
4) Did similar symptoms show themselves in previous years?
5) To what class of soil does the afflicted field belong and what are its mechanical and topographical characteristics.
6) In what condition (with reference to Manure or Fertilizers) is the field?
7) What is its crop rotation?
8) Were there any conspicuous climatic conditions which might be considered contributing to the appearance and spreading of the disease affecting either

beet root or leaves?

9) Did you observe any other conspicuous symptoms which have not been touched upon by the foregoing question?

The plants to be submitted to us for inspection should be carefully lifted out of the ground and packed along with the earth adhering to it in a wooden box and the space of the box not occupied by the roots to be filled up with earth from the same part of the field where it grew so that the rootlets should remain intact during transit. Simultaneously, a consignment of the leaves from diseased beets should be forwarded separately packed between moss layers or pure wet sand; leaves should on no account be forwarded pressed between blotting paper.

If it is suspected that the beet is afflicted with Nematodes, then care should be taken to lift the beet from the soil so that the fine side rootlets should not be torn off; the best way is to trace a circumference round the plant, said circumference to enclose a radius of the dimension of the longest rootlet radiating from the beet or tap root. Dig deep enough so as to take out beet and earth in one block - and forward it packed in a wooden box. Plant parasites such as beetles, insects, spiders, thousand legs or whatever may be found preying upon the beet or leaves, should be sent us alive: the best way of sending them is to put them in a cardboard box loosely filled with leaves; the lid of the box should be pierced with tiny holes for respiratory purposes.

We do not advise people to send any insects or caterpillars preserved in alcohol - as thereby they change entirely their color and shrivel up. In sending live specimens caught in preying upon beet roots or leaves, we request the following questions to be answered.

1) When did you first notice their appearance and to what extent?

2) What parts of the plant were the first attacked?

3) Was the Insect of prey noticed at any previous period and to what extent?

4) Were any measures adopted to exterminate them and if so, with what success?

5) What were the climatic conditions at the time of the discovery of the insects of prey?

It is in the interests of agriculture in general and in that of allied industries, to search out the cause and nature of plant diseases, as we consider it one of the duties of this Experiment Station to co-operate heartily in this direction.

All experiments for that purpose are carried on free of charge to members of the Association and all inquiries are likewise answered.

(Signed) Dr. F. Strohmer,

Member Imperial and Royal Government Council, and

Director of Chemical Technical Experiment Station of the

Central Association of the Austro-Hungarian Sugar Industry.

ASSOCIATION FOR THE WELFARE OF THE WORKING CLASSES.

STUTTGART, CHARLOTTENBURG, DÜSSELDORF, STRASSBURG.

EXCERPT FROM REICHSARBEITSBLATT, JUNE 1913, PAGE 441.

STUTTGART.

Home for Single Men. 133 Rooms, some with one, some with 2 beds.

Cost of Rooms. Single, per week ....M. 2.25 to 3.

Double beds, " ....M. 2.50 to 3.50

This includes service and weekly renewal of bed linnen, towels, &c., light and heat, extra. Only breakfast is served, coffee and rolls.

There is such a demand for lodgings in this home that a second home will have to be built. A shower bath cost 5 Pfg., in this home and many use it.

CHARLOTTENBURG.

Home for Single Men. A Home was opened in Charlottenburg with 306 rooms - 5 stories - ground floor, 342 beds. Each bed has a good mattrass, a woolen blanket, bed linnen, a wardrobe, wash-basin, table and two chairs.

Good nourishing meals are furnished, not only for the workingmen but also for outside customers.

A good substantial dinner is served for 40 Pfg = ... 9½ cents.

There is a large library with writing and reading room, attached to the Home, called Ledigenheim - home for single men. Swimming, shower and tub baths are furnished at a cent a person. The chief cook and manager live in the House. The building is lighted by gas and electricity.

Monthly rent for single beds 10 to 15 Mark=........................$2.38 to $3.57

This includes daily breakfast, cup of coffee, tea, cocoa and two slices of bread and butter.

During the year 1912, there lived in this Home 114 unskilled laborers (day) and 336 skilled journeyman of all trades and factories= 71 waiters; 41 Highschool boys; 9 Apprentices; 185 Commercial travelers, etc.

Under 20 years of age there were 108

21 " " to 40 " 580

The Home is open from 5 A. M. to 12 P. M.

DÜSSELDORFER HOME.

Rent from 9 to 15 Mark, per month. = ...$2.14 to $3.57

Only beer and no schnaps is sold.

In other workingmen's Homes (established for single men) the Rent ranges from 8 to 12 Marks ....$1.90 to $2.85

I may be mentioned that the deposits for building purposes for the common good of the work amounted to:

In 1900 ....M. 78,429,225 = ...$18,666,155.55

" 1912 ....M.418,254,076 = ...$99,544,470.

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In addition to the above Ledigenheims - Home Barracks, for single men were established in Neuss, New Cologne and Posen, Weissensee, and Strassburg. One was opened in the garden city of Hellerau. All this is done in the spirit of the proclamation in furtherance of the well being of workmen by Emperor William I.

These Ledigenheime are erected everywhere, where an influx of industrial or field workers would tend to demoralize family life and bring about unsanitary conditions in overcrowded dwellings, farm houses and religious associations. There are now 1,039,472 single field workers in the German Empire - 364,638 engaged in the manufacture of food articles, bakers, butchers, candy, sugar, chocolates, Preserve factories, and 51,487 horitcultural workers, a total of 1,455,797 - and it is the purpose of the government to urge upon rural and city administrations the establishment of sanitary Ledigenheims (Home Barracks) so as to eliminate throughout the Empire the dangers of contagious diseases, and moral degeneracy resulting from over-crowded dwellings, the greed of boarding-house keepers near beet fields and sugar factories who too often house men and women promiscuously in unsanitary dwellings, and it is essential to fight this evil to the end.

THE DEVELOPMENT OF THE SUGAR INDUSTRY 1888-1913.

ESSAY DEDICATED TO THE KAISER

by

PROF. DR. EDMUND O. von LIPPMANN

HALLE a/S.

EXCERPT FROM SPECIAL EDITION OF MAGDEBURGISCHE ZEITUNG JUNE 15/13.

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Like all other industries closely allied with agriculture, the sugar industry which is of great importance to the province of Saxony has undergone many changes within the last quarter of a century, brought about by technical and agricultural progress and activated by principles of national economic and commercial policies.

As far as the latter are concerned we need only refer to them in so far as the general plan and connection with the commerce in sugar is concerned, as the trade in sugar is the object of a special essay; we will likewise omit details in regard to the technical side of the sugar industry and limit ourselves to giving a general outline.

We presume that readers of the Magdeburger Zeitung are acquainted with the fundamental principles of the Sugar Industry, so as to be interested in what we are going to say. In accordance with Achard's theory that sugar is produced in the field and that the factory extracts it only - special efforts were made to raise beets that were rich in sugar and to ascertain methods by which such beets could be worked over economically on a large scale.

The Bernburger Experiment Station has gradually succeeded, side by side with numerous prominent scientists and practical agriculturists of this and other countries, in solving pertinent questions and we consider it therefore expedient to mention as a remarkable historical incident the fact that this Experiment Station in the Duchy of Anhalt was established because the "Association of Beet Sugar Factories" of that period did not anticipate any advantages resulting from experiments carried on there, and the Agricultural Central Association of the Province of Saxony, not only protested against the establishment of the Bernburg Station but assumed a hostile attitude towards it all along, deprecating its usefulness and consequently the Prussian Government declined to grant the Anhalt Station any privilges.

A vast amount of research work was done to solve the question of suitable soils for beet culture and the possibility for its extension and rotation, the method of planting and what kind of agricultural implements to be used - the proper distance of rows, the best methods of thinning and hoeing and the most suitable fertilizing elements to be used; all these questions cannot be covered by one general answer and without wishing to under-estimate the immense work done by thousands of diligent hands and minds, we may refer to the valuable discovery that each separate problem can only be solved by taking the local meteorological and agricultural conditions into consideration, and to do this effectively, experiments extending over a period of years have to be carried on by experts.

In regard to fertilizing, it must be remembered, there was a controversy over deep and surface fertilizing, over local and periodical adaptability of certain classes of fertilizers over an endless number of experiments with Potassium salts, of all kinds, Phosphates (Hypophosphates, Thomas slag powder), Nitrogenous combinations, (Nitrates, salts of Ammonia, Nitrogenous lime, calcareous nitrogen) kitchen salt, lime and gypsum, stable-manure, liquid, ichor, and finally catalytic substances. each, either by itself or in alternate mixtures. applied according to all the rules of mathematically calculated combinations.

During recent years careful research work carried on in experiment stations by scientists concerning plant food, assimilation of alimentary substances and changes of elements in the beet itself during the first or second year of growth, as well as on simultaneous influences of combined conditions of growth and the importance of their combined effect, so-called practical farmers ridiculed for a long time those "flower-pot experiments", which, however, brought about valuable results.

It is important to know that in consequence of these experiments it was demonstrated that the efficaciousness of all fertilizing elements depends largely upon biological conditions (the microbe flora) of a particular soil, upon its chemical reaction , which should neither be abnormally acid nor too alkaline. The physical properties of this latter requires to be carefully considered, especially in regard to a sufficiency of aeration and water storage as an abundant water supply plays an important part on and determines the development of the Beet: and it is still fresh in our memory how the exceedingly dry summer of 1912 in Central Germany not only lowered the yield per acre, but also was the cause of a poor beet by reason of an abnormal accumulation of injurious nitrogenous substances.

Such far-reaching influences of meteorological conditions manifest themselves in various ways, much more than was formerly known to be the case - and are the determining factor in the component parts of ashes in roots and leaves. The fact that sugar is formed in the beet leaf under the influence of sunlight (or rather sun energy), was known long ago, and no sensible man will now advise depriving the beet of some of its leaves - the essential organ for assimilating sugar. However, opinions differ widely as to the importance of shape, unfolding and surface development as to sugar formation in the leaf and migration into the root and how it accumulates there; meteorological condition likewise determines the so-called "shooting upwards" of the beet.

Of the numerous physiological and zoological enemies of the beet, most of them fortunately, are active only during individual years, so that we may say that the damage (leaf lice) done is only temporary. Beet fatigue and Nematodes are unfortunately more frequent and prominent scientific agriculturists have devoted a great deal of difficult and persistent work in combating them. It is of the utmost importance to prevent the scattering of residue, such as earth, scum, etc., from the factories in which Nematodes are, and a sure remedy is the maintaining of a low degree of alkalinity - fields newly infested may be helped by early fall surface ploughing - by abundant fertilizing with potash and stable-manure - and if everything else fails, then comes the expensive remedy, the catch plants.

Root blight, heart rot and dry rot, used to be ascribed to various causes and many remedies therefore were tried. We may take it for granted that those microbes (i. e. the often cited mushroom Phoma Betae) are not the cause, but only an accompanying symptom and that the real cause is the enfeebled condition of the individual beet which owes its weakness partly to physical defects in the soil, partly to deficient chemical properties and to disadvantageously detrimental meteorological conditions.

Experiments in beet selection has impressed us with the necessity of entering new avenues in the selection of individual beets and has enabled us by making prodigious progress, to be appreciated all the world over - not only to determine the average sugar content reaching to 14% in 1888 and now already hovering around 18%, but likewise enabling us to get combined high yields in quantity and quality. These two items are no longer irreconcilable, but really harmonize considerably with each other, and to have proved this, means a vast measure of success, of thoroughly studying correlations, research work that commences to throw more light on highly important items, such as light, in relation to specific weight, dry substances, sugar and invert sugar contents, anatomical and hystological properties, also firmness and structure of the beet, etc.

We can only briefly refer to the improvement in planting and treatment of the seed beets and so-called slips, shoots, the vegetative increase, the grafting, and splitting the dividing of parts - (part asunder, i.e. separating the constituent parts of a whole in such a manner that they exist as independent wholes for themselves) finally the important discovery of the biennial beet. We cannot take much stock in the theories advanced by advocates of different methods of preparing the Beet Seed impregnation, disinfection, corrosion, soaking, drying, shelling; as we do not attribute as much usefulness to each of these as they allege, although results may have been achieved in individual cases - the question of large or small balls have not yet been clearly answered - - as to the reliability of their value from a commercial point of view. But, as under unfavorable conditions the sugar content and the purity of the beet, especially those that are injured by handling may retrograde considerably and as each continued duration of life is accompanied by exhalation of sugar, it is in any case necessary to pay particular attention to the storing of beets and not neglect to take into special account climatic and local conditions.

Beet transportation by means of water flumes has been greatly facilitated and could scarcely be effected without these for lifting the beets, the so-called mammoth pump has been found admirably suitable, facilitating at the same time, a thorough cleansing of the roots and diminutive beets and tap roots that were formerly lost are now saved - and worked over appropriately. Automatic scales are now everywhere in use.

Although many good results have been achieved, we must not forget that a cast-iron rule of real heredity as regards the most valuable properties of the beet has only been discovered to a slight degree - and that even without careful selection and breeding, those properties remain inherent to the beet; at present we do not know as yet how much will and can be achieved by the application of the law of Mendel.

In consequence of the justified endeavor to limit the period of working over the beet and if possible to finish the campaign before Christmas, the siloeing of the beet has lost its former importance, in view of the fact that by proper beet selection we are now raising a beet that preserves its qualities longer than formerly, and if proper care is taken, a mathematically exact quantity of beets can at any given moment be worked over.

Important improvements have been effected in diffusion which is practiced in most factories; also cutting and slicing machines and in different methods of the so-called aqueous diffusion emptying by compressed air and return of sluiceing water.

The more recently invented processes of extracting juice, for instance, the boiling press diffusion, etc., show marked advantages in more than one direction. It was erroneous to maintain that by the boiling process the so-called "plus sugar" is formed, the process of which was hitherto not suspected in the beet which was usually imperceptibly lost during diffusion, mainly by reason of bacterial decomposition of a peculiar kind. Neither the re-examination in the laboratory nor the examination on a large scale could be said to have confirmed this assertion, the discoverer himself, had to forget it.

It is natural that the boiling process and other methods recently discovered have had a tendency to improve older methods and give an impetus to closer attention and increased activity.

The high percentage of losses experienced formerly in quantity and feeding value of slices after having been freed from the juice are now obviated, for all large factories utilize them to their full extent and value by extracting efficaciously all the liquid elements by means of appropriate presses and then dry them by themselves or in combination with molasses, - be it by gas or exhaust gases - or by steam, both processes having been found equally good, but drying by steam is preferable.

For certain purposes, the so-called sugar slices are considered advantageous, but the theory that they are under all circumstances superior to all others has not been confirmed in practice.

However, the introduction of slice drying is one of the finest industrial achievements of the age and adds to national wealth large sums that formerly were lost. Not less in importance may soon become the drying of beet leaves and tops which now is successfully carried on in many places.

The properly heated juices free from pulp are for purposes of clarification, still treated with lime or carbonic acid or sulphurous acid, for no other substances proposed for this purpose were found suitable. Lime, burnt from pure lime rock, at not too high a temperature is utilized either in the shape of milk of lime or dry lime, both having certain advantages, but which manifest themselves only when the quantity of lime to be applied is correctly determined so as to exert its influence upon the juice during a sufficient period at a proper temperature.

The segregation of the lime is effected by one or two saturations with carbonic acid, sulphurous acid or a mixture of both and require special attention (if continuous), on account of alcalinity. Although the conditions leading to a successful separation and saturation are well known, still many a mistake is made at different stages of operation such as the clarifying process of the juice, the boneblack with which one thought formerly to make good errors that had occurred. This has long been banished from the factory to make way for other substitutes such as sulphuring of the thickened juice, which, however, is not always safe, as in course of further operations certain inconvenient conditions arise from too strong a sulphuring, one of them being the clogging of filter-presses.

In the regular course of operations, these presses ought to furnish firm, uniform, hard, scum-cake, which can be promptly and thoroughly soaked out in lye; the scums, considered as a valuable fertilizer, can be mixed with water and by means of proper pumps conveyed to long distances into scum-ponds, from which they can later be lifted out again by special devices.

Experience has shown that absolutely clear juices offer considerable advantages. On being worked over the thinned juice is allowed to run through sand-filters before conveying to the evaporators. For the last twenty-five years considerable progress has been made initiated partly through systematic experiments of expert engineers, partly by continued careful observation of experts employed in the factory.

After the introduction of the boiling pan and the utilization of steam for heating the juices - innovations that were still too risky - (1888) there followed the drizzling apparatus with its well measured and distributed heating surface; many improvements were made in air pumps and condensors but the latest efforts are directed to doing away with both, to effect evaporation with high pressure waste steam by a so-called climbing apparatus; the very short time in which the juice would remain in it, makes it possible to use high degrees of steam temperature, in consequence of which all the elements can be again entirely used. It is hoped that in this way steam can be economized which has already, under favorable conditions, been reduced to about 50 Kg. (corresponding to about 6.5%) coal of 8-fold capacity of generating steam; in place of an antiquated steam engine there shall be substituted steam turbines adapted for that class of work which have already proved their usefulness in many factories for electric lighting and transmission of power.

Hand in hand with all transformation in steam utilization, goes naturally steam generation, and we can scarcely enter at this time, into all the complex questions of improvement in boilers, firing, economies in installation for transporting and unloading coal, bunkers, ash emptying devices, etc. It was of the highest importance for the boiling of the juice and syrups that used to be done in an entirely empirical fashion to have found out what were the conditions of crystallizing saturation and ultra-saturation, also the influence of too great a concentration and viscosity, which has enabled us to control and direct the boiling process. These new methods were not yet appreciated at their full value, partly due to their importance and partly to the fact that some factories are slow in breaking away from old customs and prejudices to which belongs the belief in the utilization of waste waters of which 60% sometimes, were returned to the massecuite, whilst a further portion was returned to the raw juice and clear juice. By this operation the after product was to be "transformed" into first product and that independently of the deterioration of the purity.

It was of great importance to discover the application of "crystallization in Motion" in the manipulation of the massecuite which was scarcely understood for a long time - was even called "senseless", but later, with some changes in the original rules and regulations was adopted universially (not without many ugly controversies), and finally became the indispensable foundation for all methods. Under its influence there disappeared the small massecuite boxes for the first, second and third products, and it was shown that a good process of boiling and working out of the green syrup and getting out all the sugar in two products can be done effectually, facilitating the working over of the massecuite, in a cheaper, purer and quicker manner. For the cooled masses the centrifugals do the work - they are either ball-bearing or suspended; they are driven by water pressure or by electric current, and are provided with a discharge opening at their lower end. The problem of a continuous centrifugal action has not yet been solved.

Final products of centrifugal work are on the one hand raw sugar which is carefully cooled, cleaned and mixed, and molasses which is mostly used in combination with dry slices for cattle food as well as in combination with many other substances.

Beet sugar factories no longer extract sugar from molasses; there are now large special establishments that do this work lucratively on a large scale, using, the Strontian hydrate process and is often only done on a paying basis when in chemical branch establishments nitrogen is got from lye in the shape of Cyanide and other Ammonia combinations. The question of drain water which was considered weighty not many years ago, has lost its importance, because less drain water is used and because in most factories, they are neutralized.

It was generally a practice to produce white sugar, but most sugar factories have abandoned it, leaving this work to refineries, pure and simple - where, on a large scale, under favorable conditions, refining is carried on under capable commercial management.

Among the important items of progress in refining we may mention;

General introduction of affination, work without bone-black, employment of proper centrifugal apparatus for loaf and cube production and simplification of second products by reason of newer boiling and crystallization methods. Our expectations with regard to the leaching process, which at first has been enormously over-estimated and was alleged to increase the percentage of extraction, were not realized, and most factories have abandoned this practice.

The scientific side of sugar making received its most important impetus by the erection of the Institute for Sugar the Sugar Industry - the important services of which are fully recognized by everybody and have this Institute has taken a leading part in international congresses as well as in fixing rules for universal recognized analytical methods; we many mention a few subjects that are within the scope of the Institute's continuous activity:

Research work in the field of the sugar beet and its constituent parts; improvement in the method of investigation; aqueous and alcoholic digestion; inversion analyses and determining the alkalinity of diffusion; extraction; saturation, etc., which experiments were carried on under conditions similar to those existing in work on a large scale which helped to ascertain fixed rules on losses during extraction; finally, the examination of new processes in extraction on a large scale which disclosed many new phases and gave a remarkable insight into what was unknown hitherto . If the sugar Industry did not fully profit by the results obtained from scientific research work, it is entirely due to the appointment of so-called "Campaign Chemists", not only is economy in this respect out of place, but it is also a misfortune for the whole industry, as such an innovation lowers the standard and is the cause of dislodging the most capable and educated talent and there is already a lack of experienced chemists which will materially hurt the future of the Sugar Industry.

We do not intend, as mentioned above, to go into details regarding the economic conditions of the Beet Sugar Industry. We must however, remind our readers that in 1888 a tax was put on consumption. This industry, that had for its dogma that its well being was inseparably dependent on the maintenance of a duty on beets. opposed this innovation, although the tax having fallen from 50 to 60 million marks to under 15 million, made it imperative to bring about a thorough and quick reform. Not only were they unsuccessful, but their attitude and the trend of events weakened their position in relation to the Finance Ministry and the Imperial Government. They could not make their voice heard with success and lost the influence they had formerly enjoyed. We cannot deny however, that dissensions within weakened the Industry, which it unfortunately connected with real or supposed individual interests and with mistakes that were made by all parties in 1901 - 1903 during the formation of a Trust. The renewal of a trust is neither possible nor desirable, but it would be expedient to form a common organization, for in view of the fact that all raw material is in the hands of well organized bodies for distribution, the ever increasing social and fiscal burdens, the increasing foreign, colonial competition, the faint prospect that we have of a material lowering of the consumption tax that might tend to increase consumption at home, the economic position of the sugar industry is getting more and more difficult every day.

If you compare the two campaign years 1888 - 89 and 1910 - 11, the following figures will give a birds-eye view of the gradual development:

	1888	1911.
Number of factories	396	345
Hectares of Sugar beets (land)	280,000	480,000 Ha
Beets harvested per hectare	282 Dz.	330 Dz.

	1888/9	1910/11
	Mt. Tons.	Met. Tons
Total beets harvested	7,900,000	15,700,000
Average ton of beets per factory	20,000	45,000
Total production of raw sugar	950,000	2,500,000
Average Sugar Prod. per factory	2,500	7.000

100 Dz. beets yielded 12 - & 16 Dz. of raw sugar in 188/9.

Now, we get 1 Dz. raw sugar from 8.4 to 6.3 Dz. beets.

	1888/9	1910/11
Net duty and tax amounted in		
	Mks. 30,000,000	173,000,000
That is to say, per capita	" 0.62	Mks. 2.66
Population	49,000,000	65,000,000

In 1888 prices were as follows:-

For each Dz. raw sugar	48 marks	....	($103.84 per short ton)
Without tax on beets	- 35 "	per dz.	(75.68 " " ")
For a Dz.loaf sugar	- 60 "	" "	(129.71 " " ")
Without the tax on beets	- 45.20"	" "	(97.79 " " ")

Whereas, in the year 1910/11 the prices were as follows:-

For Raw Sugar of 88% .... Mks. 20 ($43.50 per short ton)

Loaf " .... "41.70 ($89.28 per short ton)

Without the consumption tax amounting to(" 14=($59.93 per short ton)
(27.70

The difference in price between raw sugar 88% and loaf both without tax according to Magdeburg official quotations fell from 10.20 to 7.70 Mks. ($5.42 per short ton) by about 2.50, but on a general average still more, as in other markets considerable allowances are made and white merchandise cannot be sold as easily as raw.

As a matter of comparison, we may mention that at the time of introducing the beet tax in 1839/40 - 152 factories worked over 220,000 tons (an average of 1450 tons beets) and produced a total of 12,700 metric tons of raw sugar, an average of 83 metric tons (91.5 short tons); 100 Dz. beets yielded only 5.75 Dz. raw sugar; and to produce 1 Dz. raw sugar 17.4 Dz. beets were necessary.

The cost of a Dz. raw sugar was then about 75 marks ($17.85) (8.9 cents per lb). A Dz. loaf sugar about 150 marks ($35.70) (about 16.3/10 cents per lb).

EXCERPT FROM JOURNAL des ECONOMISTES, JUNE 15, 1913, p. 416.

VALUE OF SLAG AS A FERTILIZER.

The relative value of slag for dephosphorizing to be used in agriculture is well known today. In consequence of numerous experiments, Dr. Wagner demonstrated that there existed an intimate relation between the fertilizing of slag and their richness in phosphoric acid that is soluble in 2% of nitric acid; other experiments in other countries made by others have confirmed Dr. Wagner's assertions which were at first disputed. The use of citric reaction is the best means, under actual conditions, to estimate the agricultural value of dephosphorated slag. Notwithstanding, the unanimous conclusions arrived at by experiments, the citric solubility is not favorably looked upon in France and Belgium, where the sale of slag is going on based on their contents of phosphoric acid soluble by means of strong acids without taking into account the difference in the value of phosphoric acid. This point is of great importance if it is borne in mind that dephosphorated slags are abundantly used among the other phosphates in agriculture; we have therefore to pay special attention to these by-products so as to make sure that in consequence of possible changes that take place in the methods of manufacturing steel - their agricultural value is not diminished or modified as far as effective fertilizing is concerned. In this respect electricity has, in recent years, taken the place of other practical methods and we will therefore call your attention to a new variety of dephosphated slag produced by different systems, of furnaces that turn out electrolytical steel. This system of producing steel is still costly and incapable, under ordinary conditions, to enter into competition with other systems,-- i.e., the Thomas system, etc. The electrolytical process is only used to obtain fine steel, for certain qualities of welded ribbed or edged steel which are poor in phosphor and as a natural consequence the slag will be poor in phosphoric acid, the production of slag per ton of steel will be very low; about 50 Kg. (110 lbs.), therefore this electrolytical slag will not be of great value to agriculture as divers experiments have shown the possibility to get electrolytical steel direct from the ore, in which case slag will be rich in phosphoric acid and as electrolytical slag may be used in falsifying Thomas slag, we therefore had to ascertain the real fertilizing value by experiments started with different kinds of slag in the State laboratory of the City of Liege.

For this purpose the following kinds of slag were submitted to tests:

Thomas Slag

Electrical Slag A

" " B

Composition:- Sulphuric acid (soluble)

	In Mineral Acids. %	In Citric Acid. % 2	Silicum. %	Free Lime. %
Thomas Slag	21.81	20.94	8.12	5.88
Electrical A	5.12	1.56	8.76	4.06
" B	6.76	1.38	8.58	4.58

Preparation of soil; experimental results obtained:

Sand: plant grown, OATS. The sand containing 0.007% per 1000 of phosphoric acid soluble in chlorhydric acid (cold) after 48 hours contact.

Earth: plant grown, OATS. The earth containing 0.710% per 1000 of phosphoric acid, soluble in chlorhydric acid (cold) after 48 hours contact.

Quantity of sand or earth per pot:

1 Kg. (2.20) Manure,
2 grammes of Nitrate of Ammonia,
2 " " Sulphate of Magnesia,
1 " " Sodium Sulphate,
1 " " Potassic Carbonate,
1 " " Calcic Carbonate.

Dose of phosphoric acid per pot: 0.20 gr.

SAND:	Averages	Relative Value.
Without Phosphoric Acid, Grammes:	5.6	100
Thomas Slag	15.9	284
Electric Slag A	9.5	170
" " B	7.7	138

EARTH:	Averages	Relative Value.
Without Phosphoric Acid, Grammes:	11.0	100
Thomas Slag	14.8	135
Electric Slag A	14.6	133
" " B	13.1	119
" " B (1)	15.4	140

As regards the electric slag B (1) the does of phosphoric acid was calculated in keeping account of the phosphoric acid soluble in citric acid at 2%.

In taking the total quantity of phosphoric acid as a basis, electrical slags are found to be inferior to ordinary slag such as Thomas Slag for fertilizing purposes.

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Journal des Economistes

June 15, 1913.

Molasses as Cattle-feed.

Ferrucio Faelli, Italian Agronomist has made experiments with 3 groups of cows of various pedigrees, their average milk giving capacity was 15, 15 and 10 litres of milk (equalling 3.9, 3.9 and 2.6 gallons.

1st week - 3 kilograms of bran of wheat,- one kilogram of cocoa-bean-hulls mixed with molasses.

2nd week - & 3rd week - } 2 kilograms (4.4lbs) of bran,- 2 kilograms of cocoa-bean-hulls

4th week - 3 kilograms (6.6 lbs) wheat bran, - 3 kilograms cocoa-bean-hulls.

Those animals eagerly fed on these rations and Signor Faelli noticed an appreciable average increase in milk per cow and per day by

1200 grams	(2.64 lbs)	- 8%	for first	group
560 "	(1.23 lbs)	- 3.7%	" second	"
630 "	(1.38 lbs)	- 6.3%	" third	"

He likewise noticed a slight increase in the fatty quanity which proved the presence of theo-bromine or some other fatty principle in the (theobroma cacao) cocoa beam hulls, which had a favorable influence on the fatty formation in the milk. Cocoa bean hulls should be carefully selected, as those that have not undergone some sort of fermentation before feeding, will influence unfavorably the milk giving capacity of the cow.

According to M. J. G. Lucas' experiments,- if the quantity of cocoa bean hulls exceeds the quantity of bran, the milk giving capacity of the cow diminishes. The quantity of molasses has to be determined proportionately, so as not to give a ration in too liquid a form, the reason given why too much of cocoa bean hulls is disadvantageous, is that quantities in excess of above tax the digestive organs too much. The price of cocoa bean hulls is only half of what bran can be bought for.

DEFINITION:

Factory Beets are:

1) Beets that are planted by factories themselves on land that they own or which they take on lease;

2) Shareholders' beets and Contract beets are:
Beets that shareholders or Agricultural Associations owning factories in part or as a whole, have to deliver to the Factory.

3) Purchase and Surplus Beets are:
Beets bought in the open market from independent Growers and beets that are delivered by anybody in excess of quantities contracted for.

EXCERPT FROM DIE DEUTSCHE ZUCKERINDUSTRIE, JUNE 27TH, 1913.

1913.

PRUSSIA.

	Factories.	Factory Beets.	Shareholders' and Contract Beets.	Purchase Beets Surplus Beets.	Hectares, Total.
	Ha.	Ha.	Ha.	Ha.	Ha.
	258	20,769	160,052	250,461	431,282
FOR THE WHOLE GERMAN EMPIRE.	342	27,017	207,913	296,548	531,478
	APPROX.	5.0%	40.0%	55%	100%

See also Centralblatt für die Zuckerindustrie, June 28, 1913. p. 1432.

UTILIZATION OF BY-PRODUCTS AND SO-CALLED WASTE IN SUGAR FACTORIES.

EXCERPT FROM DIE DEUTSCHE ZUCKERINDUSTRIE, JUNE 20,1913, PAGE 568.

As in every other industrial plant there is in every sugar factory a number of by-products and waste material that are thrown off in the sugar making. Some of these are useless and some can be utilized, but all more or less encumber the factory space and must be removed so as not to hinder the operating of the factory during the next campaign. Sugar factories are in a pleasant position (in contradistinction to some chemical industries) for having a ready market for their waste and by-products, - as these can be utilized and often at a good profit.

The waste resulting from the working over of the beets returns again to the farmer and indirectly to the soil, where the beets, the raw material grew. In this way, values carried off from the soil in the shape of leaves and roots are equalized.

Let us briefly compare with this the chemical industry and we find that often, years elapse before it is discovered that by-products looked upon as useless, can be utilized and that it pays to work them over. In this connection, we may mention tar, hydrochloric acid, Thomas slag, etc.

When the beet sugar industry was still in its infancy pressed slices were already used for fodder because the original beet was known in olden times as a hoed crop, recognized by agriculturists as a valuable element for cattle feed. We are therefore surprised at the statement that in foreign countries these by-products are neglected. Beet slices, molasses, tap roots, etc., all of which are so highly esteemed as fodder in our country are looked upon in America, Russia, Italy and some other countries, as so much rubbish which can only be got rid of by throwing them into rivers or into the sea.

In countries where fodder is scarce, some of these by-products are very valuable - first in relation to agriculture and as a factor in helping to pay interest on the capital invested in the sugar factory. This fact is confirmed by the experience that the closing down of a factory was delayed several years because the farmers would not get along without the fodder furnished them during several decades, free of charge. This advantage is, at present, not estimated at its proper worth by the farmers, because they have gotten accustomed to procuring a supply of cattle feed cheaply or for nothing - for, without the presence of sugar factories they would have to get it in some other way and pay for it.

In the Fall, immediately after beet pulling time, the farmers can rely upon getting this valuable by-product , and only when the supply stops, its loss is keenly felt. Incidentally, we may say that by-products used as fertilizing elements play an important role in agriculture.

Disregarding the conditions surrounding foreign factories, we may mention that the factories are sometimes willing to give a portion of the by-products away if people like to haul them off. Another portion has to be carted at some expense to some distance from the factory to a point, where, for months, it encumbers the ground.

These by-products and waste material are not only useful to Agriculture, but also by their marketable value help to pay the interest on share capital, and, on the other hand, they often increase the debit side of operating expenses. We may divide the by-products and refuse into the following groups:

1) Fodder substances;

2) Fertilizing "

3) Waste proper; ashes or sediment.

Some expense is attached to the removal of this waste, an expense which varies with different factories according to equipment and space available, which, for both items, depends on the working over of the raw material. An extended campaign increases the quantity of these substances, an inferior quality of beet influences the quantity of molasses; - want of space near the factory compels the management to adopt special measures for removal of waste and by-products - rainy weather in the fall increases the quantity of pond slime. However, the concensus of opinion is that to a certain extent the waste and by-products are easier removed and at less expense in proportion to the capacity of the factory and the quantity of beets worked over.

As mentioned above. in the waste which occurs during the working over of the beets there exists a large quantity of fodder substances. Although the principal idea is to manufacture the main product - sugar, yet the quantities of molasses obtained during each campaign fluctuate according to the quality of the beets and the methods employed in extracting the sugar The more molasses there is offered, the less will be the price thereof. In consequence of efforts being made to market the molasses obtained according to its richness, the era of low prices for molasses is passed.

By reason of the factory's increased utilization of molasses in making cattle feed, either by mixing it with other nutritive substances or by the production of dry slices, molasses is an important item to increase the earning capacity of the factory; this enabled the factory to install a lucrative self-supporting branch establishment adjoining the factory that absorbed the molasses produced and worked over in making sugar. Likewise, the loading and transportation of molasses to a distance is simplified and carried out under more sanitary conditions.

A considerable quantity of molasses is worked over in the factory with dry slices or mixed with dry slices. More than half of the German Sugar factories are equipped with a slice drying plant and a good profit is the result; they forego in this way losses that would occur in the siloeing of wet, fresh slices. This by-product is carried away with teams owned by shareholders or contracting beet planters according to contract, either free of charge or by payment of a modest sum per ton. Under the head of othee fodder-substances are mentioned tap roots, they are caught by special devices and either flushed to their destination by water or lifted to the seed barn, and by a special elevator apparatus, there mixed with other fodder sometimes chopped up fine and the sugar extracted The feed value thereof is uncontested, but the small pebbles adhering thereto are often a drawback and often have to be given away in many cases so as to get them out of the factory as fast as possible.

Waste that is designated as a fertilizing element, such as scum, mud earth can only be removed from the factory after the campaign is over - on account of the dampness and sliminess of these substances.

The residue of lime combinations is the most acceptable form in which the co-operative farmers like to cart it away.

Almost all waste above mentioned is disposed of profitably with the exception of ashes or slag, which lies about in heaps in the vicinity of factories - side by side with sweepings, refuse deposits (in apparatus) some farmers cart away, some of the ashes and slag for road mending, but the major portion has to be carted away by hired - or factory teams which causes considerable expense to the factory There are numerous particles of combustible coal, still in the slag, which could be worked over, but for this purpose, too large a plant and equipment would be necessary. It would not be lucrative to make ash briquettes either, as the capital invested in a Briquette plant could not earn a fair profit nor interest, and, as the space at the factory is not large enough for storing all the refuse resulting from several campaigns, so the only thing to do is to get it carted away as cheaply as possible.

Rails are connected with the boiler house ; by means of these and iron carts they are dumped outside of the building.

COST OF PRODUCTION OF RAW AND CANE SUGAR IN CUBA.

EXCERPT FROM THE PRAGERZUCKERMARKT, JUNE 25, 1913, PAGE 639.

We notice in the "International Sugar Journal" statistics given out by Consul General Starrett, U. S. A. in Cuba, relating to the cost of production of sugar in Cuba, from which is seen that the cost of production of any single factory would not be a correct criterion for the average Cuban production, as the difference is very considerable.

In the modern factory equipped with improved machinery, situated at or near a harbor, where the factory stock companies cultivate their own land and run their own railroads, where everything is properly managed, there sugar may, and can be, produced at 1.25 cents per pound (453.6 grammes) and even transported on board ship.

On the other hand, there is no doubt that many of the older Cuban factories could not possibly produce sugar at less than something over 2 cents - which is very close to the margin where a profit could be made. Wherefore, the only satisfactory way to ascertain the correct average cost of production is to choose a factory of average capacity to establish the annual production and the cost thereof.

This is what Mr. Starrett has done. By taking 4 years as a basis for the average production he finds - that the average production amounts to 9,651 long tons (at 1016 Kilog.)

As Cuban Sugar cane shows about 14%, an average Cuban factory will therefore show a rendement of 78%; they therefore, theoretically, would require 87,786 tons or practically 90000 tons sugar cane.

The average yield per acre (0.4047 hectares) Cuba is 22 tons.

Total expenditure is 60 dollars - during each succeeding year 14 dollars per acre during a period of about seven years. Therefore, the average cost of planting and working the cane after 7 years will be 20 dollars per acre. The cost therefore, of producing sugar cane is 90 cents per ton.

The cost of working over the cane into raw sugar is 50 cents to a dollar per ton of cane. Therefore, a good average for all Cuban factories is 75 cents. To this must be added the overhead charges, inclusive of interest and taxes, amounting to a total of $104,250.

The following table will show the total average cost of production of sugar at the factory:

Raising and planting 90,000 tons cane at 90¢	$81,000
Harvesting same and loading on carts at 70¢ per ton	63,000
Transporting and loading on wagons, " 40¢ " "	36,000
R. R. freights and transportation to factory 30¢ per ton	27,000
Cost of working over cane at 75¢ ...."....".......	67,500
Overhead charges, general exp. depreciation, renewal of equipment, etc., ...	104,250
	$378,750

Therefore, 1.75 per lb. total cost of production for 1 lb. Raw Sugar (production cost at factory).

In English money 7.8 penny per lb. or 8.3s. 4d. per long ton exclusive of freight, expenses from factory to point of destination which are estimated at 0.1 cents per lb. and the cost of production amounts to a total of 1.85 cents per lb. raw sugar.

DEVELOPMENT OF THE SUGAR INDUSTRY 1888 - 1913.

- by -

PROF. DR. ED. O. v. LIPPMANN.

EXCERPT FROM THE PRAGER ZUCKERMARKT, JULY 2, 1913, PAGE 662.

Like all other agricultural industries, the Sugar Industry of Saxony has undergone many notable changes which were brought about by technical, commercial, economical and political factors.

True to the teaching of Achard, according to which sugar is produced in the field, but is only extracted in the factory - the leading sugar men devoted their energies, already twenty-five years ago, to raise beets that united quality and quantity, and to utilize these in a way to get the best results at a minimum expense.

The Bernburger Experiment Station, in conjunction with learned men here and abroad, have tried to solve these questions and their efforts have been attended with success.

Numerous experiments have been made in relation to the fitness of the soil for beet culture, the possibility of its extension, the best methods of cultivation, the most suitable agricultural implements, the distances of rows, the best methods of singling and hoeing and the most appropriate fertilizing to be done; we do not wish to underestimate the enormous work of thousands of diligent hands and minds, and we must consider as the most precious lesson, that all these questions cannot be met with a general answer and that in individual cases appropriate answers could only be given by considering local meteorological and economical conditions and by being studied for a consecutive number of years by men of learning and eminence in sugar questions.

Regarding fertilization, we may refer to differences of opinion that arose over deep-and surface fertilizing as well as over local and periodical admission of certain fertilizers finally over the endless number of experiments with potassium salts of all kinds (phosphates, superphosphates, "Thomas meal"), Nitrate Combinations (Nitrates, Salts of Ammonia, Nitrogenous Lime, Kalium Nitrate, Kitchen Salt, Lime and Gypsum, Stable Manure, Liquid Manure, and finally, "catalytic substances") employed according to all the rules of well calculated combinations.

The thorough scientific research work of Experiment Stations relating to nutritive conditions, the amount of nutrition and organic changes that take place in the beet in the first and second year of growth, and with reference to the simultaneous influences of all the aggregate conditions of growth and the importance of their combined effect - the experiments in pots that have been ridiculed for years, although these experiments have taught us valuable lessons.

We have likewise learnedthe value of every one of the fertilizers and that their effectiveness depends in a high degree, on biological conditions (Flora microbes), on their chemical reaction (that must be neither too acidical nor too alkaline), as well as on their mechanical properties, such as capacity of aeration and hydrogenous combination - an important item is the abundance of water - available for the development of the beet. It is still remembered how the extraordinary dry summer of the year 1912 not only prejudiced the yield per acre to an extraordinary degree, but also the properties of the beet - especially through the accumulation of the dangerous nitrogenous substances.

It is now an established fact, that the far-reaching meteorological conditions are manifesting themselves in more varied ways than was at first supposed, and are evidenced for the distribution and accumulation of the ash element in roots and elements.

Long ago the conviction gained ground that sugar is formed in the beet leaves under the influence of sunshine or rather (the sun's energy) and today, it is an established fact, and there is no sensible person who will tolerate the "defoliation" or stripping of leaves which was so much in favor in days gone by - which is now looked upon as depriving the beet of its essential organs of assimilation; but opinions differ as to how sugar is formed in the leaf, how it is carried into the roots, how it accumulates there and what importance to attach to the form unfolding and surface development of the Beet. The so-called shooting upward of the beet is presumably influenced by meteorological conditions.

Most of the enemies of the beet belonging to the animal and vegetable kingdom are fortunately only active during individual years and individual localities - so that damage done is only temporary - as for instance, damage by plant lice. But a lasting damage may be done by "Nematodes" (if not checked) that provoke the real beet fatigue and some of the most learned eminent and experienced agronomists have devoted an immense lot of time and did a great deal of research work in persistently fighting this nematodic pest.

It is of the greatest importance to prevent the dissemination of Nematodes by carrying away and dumping on fields promiscuously, earth from beets, residue from mud tanks, etc., and if a nematodic presence is suspected, to surround the fields with "trap plants" that are favorite nematodic camping beds.

Regarding root blight, heart rot and dry rot, many causes were assigned to these diseases and various remedies were tried; we may assume that these microbes (f. i. the well known fungus Phoma Betae) are not the cause but the symptoms of disease - and that the real cause is due to the enfeeblement of individual beets brought about by unsuitable mechanical and physical properties of the soil. Furthermore, to a deficiency in suitable chemical properties, and finally, to unsuitable meteorological conditions. Beet culturists have recognized the value and importance of beet selection on family strains and they were enabled to achieve astonishing results not only in regard to the average sugar content, which, in 1888, was around 14% but now has reached 18%, but also to greater weight in beets and sugar.

This great success is also based upon a thorough study of correlation such as the relation between dry substance sugar - and invert contents, chemical properties, anatomical and hystological properties, firmness of structure, improvements in the method of planting, the treatment of mother beets, the handling of seedlings or shoots - grafting, the discovery of the bi- and triannual quality of the beet, etc.

In regard to the seed itself, it is questionable whether the methods of preparation, impregnation, disinfection, soaking, drying, peeling - are of as much use as has been supposed - no light as yet has been thrown on the relative importance of large or small balls according to the most suitable and reliable standards of trade.

REPORT OF AUGUST AULARD. APRIL 9th. 1913. TO THE TECHNICAL & CHEMICAL SOCIETY OF THE BELGIAN SUGAR FACTORIES.

EXCERPT FROM"LaSUCRERIE BELGE", JULY 1, 1913.

In all my life I have never had that feeling of monotony which pervaded my system as when traveling between Chicago and Cleveland; not a bird is seen, buildings are miles and miles apart, and in contemplating those vast stretches of desert, the first thing that strikes one is the immense number of charred tree trunks covering hundreds of miles, souvenirs left behind by a modern Attilla whose vast hordes gathered from the four quarters of the globe destroyed the forest that for thousands of years reigned supreme.

To extend further beet culture hand labor is required. Land that produces cereals, oats, wheat, Indian corn, etc., could produce sugar beets and yield immense quantities of sugar - if the beet plantlet had not to be"singled" by expert hands - and the beet is the only plant that requires this care. On account of the care which has to be bestowed upon the beet, pulling, hoeing, topping, etc., beet culture is merely "dotting" here and there the American continent, and the price of beets is about the same in the United States as in Europe, five to six dollars a ton.

The various sugar companies enter into competition with each other. Thus in Michigan, there are 17 sugar factories and the shortage of beets amounts to about 15%, bringing the beets to 34.50 per metric ton ($6.65.)

California, with its ten beet sugar factories has 42,341 hectares planted to beets (105.624 acres) and produces very rich beets. I have not been as far as California - it is 5 days journey from New York, but I had the pleasure of meeting on several occasions a very amiable and expert sugar manufacturer, Mr. Robert Oxnard, of the Oxnard family, the true pioneers of the Beet Sugar

Industry in the United States. I likewise met Mr. Duperee and Baird, of the American Beet Sugar Company, comprising 6 sugar factories, two of which, Chino, and Oxnard, are in California.

The last named city, named after the Oxnard family, has 2500 souls, it is about 625 kilometers from San Francisco and 108 kilometers from Los Angeles, the queen city of Petroleum; it has a sugar factory with a capacity of 2,000 tons of beets per 24 hours. California which has only 1-20/100 inhabitant per square kilometer, is a splendid country, 14 times the size of Belgium; produces immense quantities of fruit and has an ideal climate. The beet is sown about the end of October and is harvested in July, August, and September; which means that it remains in the ground two to three months longer than in Europe, and it is perhaps due to this fact that the Beet is rich - 84 purity is the average of American beets. The working over of such beets is difficult, and the molasses production enormous in comparison with our production of molasses. That's why the Californian factories have to use the Steffens process which somewhat complicates the work.

Perhaps we could give Italy and Spain a lesson by what is done in California, and as it seldom freezes in these countries, it might be profitable to leave the beet in the ground the same length of time as in California, where an average of 20% is attained.

In the United States, as well as in Europe, scarcely has a sugar factory been erected in one place, when another springs up to compete with it. This is human nature; a man can't see his neighbor prosper quietly without trying to make him share the cake with him.

In the United States, Crystallized Sugar is sold directly to the consumer in the shape of granulated, at the same price as powdered crystallized of the refineries.

The Consumer has paid in 1912, sugar duty paid 57.61, which would bring 100 Kg. to 36.90 = per short ton $63.00, should the proposed bill become law.

Let us see whether the American Beet Sugar Industry could still exist under these conditions.

Let us suppose that beets worked over cost 15 francs per ton, = $2.90, and if 130 Kg. of sugar - 286 pounds - is got out of a ton of beets, they are making a profit which would satisfy any of our Belgian Sugar manufacturers. However, this does not mean that the American Government should withhold its encouragement from the tillers of the soil,---Beet growers and indirectly , the Sugar Industry.

The coming into power of Mr. Wilson, of the democratic party, has worried our colleagues beyond the Atlantic very much, and they justly fear that taking off the duty will deprive them of a greater or lesser bounty which they have enjoyed hitherto. The shares of the American Beet Sugar Company have gone down from 400 to 135 francs - $77.20 to $26.05! Which proves, my dear colleagues, that under all degrees of latitude and climate, sugar is the play-ball of legislators and politicians, and it would be better for all sugar people to go into the business of making cotton sun-bonnets rather than sugar.

As long as the American Continent will have only 12 inhabitants per square kilometer, beet culture will be a mere chance crop, and agricultural wealth for many years to come, will remain unused.

Mr. Woodrow Wilson has agreed with the chief politicians to reduce the duty on sugar to a minimum - perhaps a slight duty will enable the beet factories to exist and to compete with the Refiners who have never looked with favor upon the Beet Sugar Industry,- and we, - as sugar manufacturers extend our sympathy to our colleagues in America and hope that the day may come when their rich soils will produce all the beets and sugar their country needs without having to import any cane sugar at all - for sugar cane is our enemy, now, and ever will be.

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I T A L Y.

OFFICIAL GOVERNMENT STATISTICS.

CAMPAIGN 1912 - 1913.

EXCERPT FROM DIE DEUTSCHE ZUCKERINDUSTRIE, JULY 4, 1913. ----

Province.	No. of Factories.	Beets Worked Metric Tons.	Short Tons.	Average Sugar Content.	Sugar Production. Tons.	Short Tons.
Allesandria	1	13,810	15,223	16.21%	1,827	2,014
Ancona	2	28,194	31,078	14.14	2,554	2,815
Aquila	1	59,584	65,679	16.09	7,345	8,096
Bologna	3	127,590	140,642	14.82	16,305	17,973
Cremona	1	39,575	43,624	13.96	4,378	4,826
Cuneo	-	--	--	--	--	
Ferrara	7	316,750	349,154	13.97	41,483	45,727
Firenze	1	23,209	25,583	15.00	2,920	3,219
Forli	2	128,207	141,323	16.09	17,236	19,098
Mantova	1	44,211	48,734	13.31	5,391	5,942
Napoli	1	25,114	27,683	13.40	2,821	3,110
Padova	1	115,488	127,302	13.71	11,674	12,868
Parma	1	32,368	35,679	12.74	4,125	4,547
Perugia	2	43,054	47,458	14.50	5,873	6,474
Piacenza	2	62,643	69,051	15.29	8,020	8,840
Ravenna	3	190,020	209,046	15.10	23,025	25,381
Rovigo	4	244,880	269,931	13.01	25,053	27,616
Siena	1	20,491	22,587	16.82	3,119	3,438
Udine	1	23,423	25,817	12.56	2,190	2,414
Verona	3	133,661	147,335	12.87	14,367	15,837
Vicenza	1	37,223	41,031	13.08	4,100	4,519
		1,709,495	1,884,376		203,806	224,655

Italy's Stock of Sugar 31st December 1912 was 144,412

Metric tons.................Short tons 159,185

JUBILEE CELEBRATION OF THE DUTCH SUGAR INDUSTRY.
(100 YEARS)

EXCERPT FROM DIE DEUTSCHE ZUCKERINDUSTRIE, JULY 11, 1913.

On the tenth of July, 1913, the Technical Association of Manufacturers and Refiners of Sugar celebrated their Jubilee at Amsterdam. One hundred years ago the first sugar was extracted from the beet. Dr. E. O. von Lippman, the celebrated and eminent authority in all things pertaining to the sugar industry, honored the Assembly with his presence and favored us with a communication from the vast storehouse of knowledge which this eminent gentleman has at his command.

Dr. van Loon, the director of the Steenbergen Sugar Factory, pointed out the economic benefits derived from the Sugar Industry. From 1872 to 1882, 22000 to 23000 metric tons (24,251 to 25,353 short tons) of sugar were produced in Holland; in 1888, 32,000 metric tons (35,274 short tons) were produced in 31 factories. In 1896 140,000 metric tons (54,322 short tons) were produced; in 1912 the total production amounted to 310,000 Metric Tons (341,713 short tons), which were sold for 38,750,000 Gulden ($15,577,500), assuming that on an average 12½ Gulden ($5.02) was paid per bag.

Average sugar extraction 15% from beets. 2,067,000 Metric Tons (2,278,454 short tons) of beets were worked over.

Value of beets averaged 14.5 gulden per metric ton ($5.30 per short ton).

Expenses per Metric ton of sugar beets:

Wages and salaries	1.40 Fl.	(56.28 cents)
Coal - Lime rock	1.25 "	(50.25 ")
General cost, Insurance, ...	0.40 "	(16.08 ")
Transportation	0.75 "	(30.15 ")
Written off	0.80 "	(32.16 ")
	4.60 "	$1.84.92 "

Number of workmen 10,688, including those employed during the campaign only.

Beetgrowers pay out 100 fl. per hectare ($40.20) = $16.27 per acre.

In 1912 69,000 ha. (170,499 acres) were planted to beets as against 20,000 ha. (49,420 acres) in 1891.

If you get a yield of 35 to 40 metric tons (39 to 44 short tons) per hectare. it will net 37500 x 14.50 fl. = 544 fl. = ($218.68)

Wages: 100 fl. per hectare ($40.20);

Artificial fertilizer 65 fl. per ha. ($26.13);

Net profit per hectare ....379 florins ($152.35) no other crop would bring in this amount.

By-products 27 - 27,000 Kg.tops and leaves per Ha. (30 short tons) and 16% dry pulp, a total of 6,500 Kg. per ha. (6.61 short tons) valued at 25 florins ($10.65); quite a respectable sum.

As to the future of the Sugar Industry, Dr. van Loon expressed himself as follows:

One-third of Holland's production is consumed in the country - the other two-thirds are exported in the shape of refined sugar. Consumption will scarcely increase if the high consumption tax is going to remain 27 fl. ($10.85) per 100 Kg.

Mr. Spakler whose great-grandfather was one of the first sugar manufacturers of Holland 100 years ago, said the price of sugar rose in consequence of Napoleon's blockade to 250 Mk. ($59.50) per 100 Kg. and to abstain from eating sugar was to be called patriotic. Maple sugar was used as a substitute for sugar, and in France, a prize of 1000 Frcs. ($193.00) was offered for sugar to be commercially extracted from grapes - but very little success was achieved in that direction.

The first experiment in beet planting was made in Holland in the year 1809 (near Hoon). Beets could then be bought at 92 Pf. per 100 Kg. about $2.00 per short ton. In the beginning, the sugar yield was only 0.4%, later on, 2%. The operating factories were very primitive.

A rasping device was installed which was kept in motion by horses ambling around a circle; the juice was expressed by means of hand presses and was thickened in boiling pans, it was allowed to crystallize in open clay dishes - Albumen was brought to a curdling stage by addition of sulphurous acid to the juice and 24 hours afterwards, it was neutralized by an addition of lime.

Dr. von Lippman in his remarks referred to Achard's work and to the tremendous progress made since 1802.

There were 120 Refineries in Amsterdam and each refinery refined daily, the tremendous quantity of 25 bags of sugar (about 25 Dz.) !!! or 770 lbs. To clarify this quantity of sugar, 500 eggs were used if no blood was employed and when a dispute arose as to the best method, either to use eggs or blood, the Justice of the Peace had the power to order eggs or blood to be used, and he invariably favored eggs. It sometimes took 2 months before the loaves were ready for the market, and if the profit fell below 33 marks per 100 Kg. ($7.85) it was no longer profitable to carry on the refining business. At that time the motto was:

Good alkaline juices are playing the same part on behalf of the factory as blood in the human body.

Great was the joy in Arnheim when they succeeded to finish a loaf of sugar in 30 hours instead of having to wait 30 days as formerly.

The most notable stages of progress were after 1800. The use of bone black, the use of the vacuum pan. and other things too numerous to mention, but our thanks are due to Professor von Lippman, for his interesting and instructive speech on this auspicious occasion.

R U S S I A.

EXCERPT FROM DIE DEUTSCHE ZUCKERINDUSTRIE, PAGE 643, JULY 18, 1913.

REGULATION IN REGARD TO SUGAR PRICES AND PRODUCTION:

The Minister of Finance has proposed that sugar prices for native consumption should be regulated as follows, as to quantities :

1) Sugar (unrestricted trade) 81,000,000 puds = 1,327,000 Metric tons (1,462,752 short tons)

2) Reserve quantity not to be put on the market, except by special order emanating from the Minister of Finance.

3) Normal production 108,000,000 puds = 1,655,000 Metric Tons (1,825,000 short tons)

4) Limit for sugar prices, including consumption tax for white crystallized sand sugar, Kiew District.

PRICE TO BE PAID:

From 1st. September	to 31 Dec. 1913,	R. 4.00	(5.66 cents	)
" 1st. January	" 31 Aug. 1914,	R. 4.10	(5.84 "	)

If during any week the price limit is exceeded even when quotations in other districts are higher (including freight, storage, etc.) than those in Kiew District, the Ministry of Finance has authority to release such quantities from reserve stock, as he may deem fit.

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BEET DISEASES.

EXCERPT FROM THE CENTRALBLATT FÜR DIE ZUCKERINDUSTRIE. P. 1578.

July 26. 1913.

LEAF SPOT: Caused by a mushroom Crecospora beticola - bright circular spots surrounded by a red or brown rim.

CURLY TOP: Leaf tops curl, California disease, caused by the bite of field locusts, Eutettix tenella.

ROOT ROT: Rotting of Roots.

CROWNGALL: Cancer-like growths (crop-like) caused by Bacteria, caused by a mushroom -- Urophlyctis pulposa -- and by Bacteria tumefaciens.

NEMATODE: Root knot; Hecterodera -- Root knot, etc. radicicola - occurs not so often on beets as on other root crops where they appear on the roots, knots of the size of a pea, filbert or gallnut-like excressences; on beets however,. these excressences, Heteroda Schachtii, are just large enough to be visible to the naked eye, being swellings about the size of a pin's head.

EXCERPT FROM "LONDON TIMES" (REPRINT IN LITERARY DIGEST) p. 166.

ISSUE OF AUGUST 2, 1913.

CONFIRMING T. G. PALMER'S ARGUMENTS.

The Americans have dealt with their resources, and deal with them today, in the pioneer spirit of sheer wanton pillage. The soil especially has been so shamefully mishandled that its crop producing power is both actually and relatively on the decline. The United States presents the curious anomaly of a land that is still three parts virgin, still in the chrysalis stage of its growth, still astonishingly under-populated, and yet faced with a rural problem not essentially different from our own in Great Britain.

In spite of a lavish expenditure by the States on agricultural colleges, of exceptional advantages in the way of soil, climate, and market facilities, and of a steady inrush of the best European peasants, the American farmer remains all but the worst in the world.

He has settled on the land like the locusts, exhausted it, and moved on; and although the products of the farm supply not far short of half the materials used by American manufacturers. and account for some 70% of the country's exports, the time is not far distant when the United States will be hard pressed to feed its own people.

Agriculture, the only indispensable industry, is also the only industry in America that, taken as a whole, is still unorganized. The American farmers as a class - there are some exceptions, particularly in Wisconsin and among fruit growers of the Pacific slope, - have not yet mastered even the elements of modern methods of marketing and distribution; they receive for themselves, it has been calculated, less than half of what the public pays for the produce they raise; their political influence is strikingly disproportionate to their numbers and their economic importance.

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RUSSIA.

EXCERPT FROM DIE WOCHENSCHRIFT DES ZENTRALVEREINS FÜR RÜBENZUCKERINDUSTRIE AUGUST 13. 1913. (page 611)

KIEW. RUSSIA.

The release of three million puds of sugar for internal consumption ordered by the Minister of Finance has not had the desired effect, namely, to lower prices, on the contrary, there was a slight rise.

This is due to the fact that apart from the last instalment of sugar released by ministerial decree there are no other stocks available and the demand for sugar is so great that speculators are reported to have sold in anticipation of the above mentioned release, more sugar than was actually released. The concensus of opinion of members of the Sugar Exchange is that the 3 million puds will not be adequate to cover the requirements for inland consumption and 2,000,000 more puds will most likely have to be released for that purpose.

Contracts for deliveries of sand sugar at the station of southwestern railroads were entered into at 4.18 roubles per pud = (5.961 cents per lb.) or $119.22 per short ton, and 4.25 roubles per pud (6.06 cents per pound) = $121.20 per short ton, and in the Trans-Dneiper district from 6.06 cents per pound (4.25 roubles per pud to 4.40 roubles) 4.40 roubles = (6.27 cents per pound) = $125.48 per short ton. There is a rise in prices also for refined sugar.

4.90 roubles per pud is the lowest quotation at present (Aug. 13, 1913) = 7 cents per lb. = ($140 per short ton). Prices for future deliveries have a downward tendency, as the reports from various parts of Russia regarding the beet crop are very favorable.

The Minister of Finance submitted a decree for fixing the sugar contingent for home consumption for 1913/14 at 81,000,000 puds, i. e. (1.463,576 short tons) to which the Council of Ministers assented.

The reserve stock to be kept intact until the Minister orders a release thereof to be 80,000,000 puds = (1,444,520 short tons).

The total production to be 101,000,000 puds = (1,823,706 short tons).

The highest price in the district of Kiew shall be 4 roubles per pud = ($114.08 per short ton) for the first half of the campaign and 4.10 roubles per pud = ($116.94 per short ton).

Sugar consumption today is three times larger than it was eighteen years ago.

EXCERPT FROM LaSUCRERIE INDIGENE et COLONIALE, AUGUST 27, 1913, p. 196.

THE ROLE THAT MINUTE CHEMICAL SUBSTANCES PLAY IN AGRICULTURE.

GABRIEL BERTRAND.

Let us examine at this meeting one of the most interesting questions from a theoretical and practical point of view, the chemical composition of plants; the part played by certain metalloids and metals that are found in small proportions in nearly all plants. Prominent phytophysiologists whose research work was concentrated on the elementary composition of plants are fully agreed on one point, namely, that about 10 elementary substances are necessary for the upbuilding of the tissues and the proper functions of plant cells: Hydrogen and Oxygen, the two combined forming water, i.e. from 75% to 95% of the total weight of the living plant, carbon which combined with the two preceding constitutes cellulose sugar, oil and other substances called hydro-carbonates. Azote which with the three mentioned goes to make up albumen, gluten and protein, sulphur and phosphor, finally potash, calcium, magnesia and small quantities of iron. All these taken together, these 10 simple substances are absolutely necessary to the normal development of plants, the absence of any one of them will hinder and prevent the utilization of the others and consequently impede or stop the growth of the plant.

If there is conveniently placed in a saucer of pure water a grain of Indian corn, a bean, a grain of oats, buckwheat, etc., germination will speedily take place; a plantlet will appear developed by absorbing water and by reason of the initial supply of plant food brought along by the grain itself, and carbonate acid contained in the atmosphere, - but this phenomenon of vegetation only lasts several days; for want of a new supply of food the plantlet quickly dies.

If, on the other hand, to the pure water is substituted a saline solution containing azote, sulphur, phosphor, potash, calcium, magnesium and a little iron, the plant develops normally, blooms and bears seeds. and if properly handled the harvest is not inferior to that obtained under ordinary conditions from the soil.

If with a second experiment we deprive the water of its solutions, the aggregate of which produced such good results, a poor harvest will result and the plant will not develop better than in pure water.

On the other hand, if a complete analysis of a plant is made and the aggregate weight of all elements is added together about 99.9% of the total weight is found, so that almost within one thousandth the constituent parts of plants are built up by the aid of six metalloids and four metals, and that those metalloids and metals go to form in consequence of their various combinations, the enormous quantities of sugar, starch, cellulose, oil, etc., which the manufacturers extract or transform and that human beings and animals find in the vegetable kingdom the substances necessary for their daily sustenance.

These facts notwithstanding their simplicity are the fundamental principles of agriculture.

It is evident that the plant has to be provided with the food it requires if a good harvest is to be obtained.

As far as carbon is concerned each plant finds more than enough of it in the atmosphere to supply its wants. If the soil gets an abundant supply of water in the shape of rain or irrigation then only the other elements have to be attended to. In most cases the soil is rich in combination of calcium, magnesium, iron, sulphur, that the agriculturist need only supply the needed potash, azote and phosphor, which he does by fertilizing.

In adding proper quantities of nitrates, phosphates, amonia and potassium salts he supplies the needed plant food to the soil and enables it to absorb all the substances necessary for its component parts. We got this theory from Duhamel, Saussure, Sachs, Boussingault, Liebig, George Ville, about fertilizing and the practical value thereof is now confirmed by all agronomists.

This theory however, does not take into account the balance between the 99.9% and the 100% which would make a perfect analysis. Of what bodies is this small quantity composed? First of all, as has been often verified of silica maganese and aluminum, there is very little of each of these simple substances in the plants, sometimes less than 1/10,000 and even 1/100,000. Plants that grow on the seashore or in the sea like the Fucus and Seaweed contain more chloride and sodium than the others; gramineous, ledge, equisetaceous (bristle-shaped) are relatively rich in silica; there are some in which aluminium are found, but these are exceptions which does not prevent us from considering as very general the fact that the plants contain only very small proportions of each of these 5 new elements, the names of which I have indicated, - silicium chlorine, sodium manganese and aluminium are in the plants in such small proportions that it is very difficult to form an idea as to their nutritive value.

Most of the phytophysiologists doubt that they play any part in nutrition, some deny that such is the case. To explain their presence in the plants they say that the roots are capable of absorbing indiscriminately all soluble substances contained in surroundings in which they develop.

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Factory News

Deutsche Zuckerindustrie

August 15th, 1913.

Sugar Industry Sweden, 1911 - 1912.

The duty levied on sugar to the 31st of December 1911, was 15 oere (4.02¢), and from the first of January 1913, 15.5 oere (4.15¢) per Kg. for all sugar:

Refined sugar	14.5	oere	(3.86¢)
Raw "	9.5	"	(2.54¢)
Syrup	10.	"	(2.68¢)

Beet Harvest and Sugar Production.

In 1911 and 1912, eight districts planted beets,- Ostgotland, Gottland, Blekinge, Krstranstad, Malmo, Skaraburg, Halland, and Kalmar.

Factories	Area	Beets	Raw Sugar
24	29,052.4 Hectares or 71,787.0 Acres	824,069.9 Metric tons or 837,126.0 Short tons	127,378.2 Metric tons or 140,409.0 Short tons

Molasses	Sugar Percentage	Molasses Percentage
11,244.9 Metric tons or 12,394.0 Short tons	15.44	1.36

Fourteen of the factories raised some beets themselves, and four of them raised beets on a large scale. Average of beets raised on factory owned land 3.1% (but Helsingborg raised 17%. Linkoping 14%, Sabeholm 11% and Engelholm 12%) For each 1/10% of Sugar over 14% an additional fluctuating price is paid of 2.37 to 2.79 Kronen,- per 100 Kg. 63.51¢ - 74.77¢, or per 100 lbs. 28.89¢ to 33.88¢.

Average price 2.56 Kronen (68.60¢)

Total value of beet harvest in 1911 and 1912, 21 Million Kronen ($5,628,000).

Sugar content is reported each week during the whole campaign. It fluctuated for the whole Campaign between 15.04 - 17.77%. Average time of operation from October 6th to 31st of December.

Total product	Metric tons	Short tons
1st product	122,206.9	134,709.0
2nd "	5,171.3	5,700.0
	127,378.2	140,409.0

Prices for Molasses fluctuated between $4\frac{1}{2}$ to $7\frac{1}{2}$ oere per Kg.

Beet Slices obtained, 403,391 metric tons (444,658 short tons) which were exclusively used for cattle feed. Price 20 oere per Dz. of Beet Slices.

Surplus of raw sugar on September 1st, 1912 in stock in refineries and sugar factories, 567.707 Dz. (62578.7 short tons).

There are also so called sugar beet slices, in which some sugar is retained selling for 10 Kronen per Dz., but beet growers who are under contract with the factories for beet deliveries pay only 4 Kronen per Dz, equal 220 lb. (80.4¢). These beet slices were dried with an addition of molasses and 121,355 metric tons (133,770 short tons) were manufactured.

In 1911 and 1912 there were 10 refineries at work:

	Metric tons	Short tons
In stock September 1st, 1911	25,924.	28,577
In Bond	20.	22
Production refined	123,163.	135,762
	149,107.	164,360
Put on the market in 1911-12	115,695.	127,531

Income for Government 17,802,992.75 Kronen.

Production of Table Syrup 1911-12	3281	Metric tons	-	3617	short	tons
Sold	3129	"	"	3449	"	"
Balance	151	"	"	168	"	"
And previous stock	977	"	"	1077	"	"

Table Syrup pays no duty.

In addition there were 13,667,000 Kg. imported, 10 oere duty (2.68¢)

EXCERPT FROM ZEITSCHRIFT DES VEREINS DER DEUTSCHEN ZUCKERINDUSTRIE
SEPT. 1913. pp.804-819.

ADDRESS OF DR. BARTENS
BEFORE THE GERMAN SUGAR MANUFACTURERS. BERLIN, SEPTEMBER 1913. AT THEIR ANNUAL MEETING.

In addressing the German Sugar Manufacturers at their annual meeting, Dr. Bartens, Berlin, stated as follows:-

Gentlemen:-

The subject upon which I have the honor to address you was not of my own selection, it has been graciously assigned to me by the Chairman. I hesitated somewhat to speak about the Sugar Market, or rather "Trade in Sugar"; experience having taught me to be rather careful in playing the prophet. Therefore, I will not shoulder any responsibility if any of you, based on what I am going to say, are going to transact business in sugar (hilarious applause), for you might arrive at certain conclusions based upon my statements, and should a change occur under certain conditions, the consequence of such a change would disprove any conclusion that you had arrived at. However, I admit that there exists a universal desire to exchange ideas now and then, on the subject of the "Sugar Trade".

When we speak of the state of the sugar market, we understand thereby the technical state of the sugar market and the Bourse brought about by concurrent effects resulting from trading in the market (in futures and cash). These two items are sometimes antagonistic to each other and sometimes harmonious. Consideration of the state of the sugar market may be limited to the most important basis of co-operation or acting against each other; that is to say, the real relation between supply and demand as it shapes itself from day to day and week to week, and this is the point which I especially wish to elucidate.

Not to burden you too much with figures, I take the liberty by permission of the Chairman, to submit to you some tables in which the most important data on sugar are compiled. I will not go into detail about these tables, but only say a few words concerning them so that you may be able better to understand them.

Gentlemen, in considering the state of the sugar market as a whole, all depends on the relation between sugar consumption and available stocks, embracing quantities on hand at the beginning of a campaign and quantities produced. If you consider the world consumption during the campaign 1901 - 2.-- 1911 - 12, you will see how it is calculated.

First of all the initial stock on hand is recorded. These initial stocks are made up by weekly verified quantities on hand in the principal countries of production and at the principal ports, not omitting the quantities afloat - as they are reported weekly from London by Czarnikow- which include shipments from the far East, Java and the Philippines,to Europe and the United States; in those stocks are likewise included the quantities stored in the United States and Cuba.

The stocks available in Russia have likewise been mentioned in my tables - but separately from the others - so that both give a clear idea of what is the world's available stock as near as possibly can be ascertained.

I admit that in these available supplies not every ton in existence will be included - for each country has at all times a certain quantity on hand. Let us bear in mind that Italy, Sweden, Denmark and the Balkan states always begin their campaign year with a certain stock on hand; but these are not included in my tables.

The fiction occurs that these countries at the beginning of each campaign have the same supply on hand always.

The world's total stock in column 3 were on the first of September: 1,805,100 metric tons to these, each production in the respective campaigns is added. These productions comprise the beet sugar production and the cane sugar production, i.e. the beet sugar production as the International Association of Sugar Statistics report it. All beet growing countries are included, so that in this production also, the English production (United Kingdom) is included. Likewise, I included the North American production of beet sugar. Apart from that, I have in the main, followed the statistics of Willett & Gray.

The British East India production is likewise included, but its role is not important for the world market, as British India consumes about all she produces. At the beginning of a campaign, both taken together, World's Stocks and Production - gives us the total supply. From this total supply we deduct the stocks available at the end of a campaign (including Russian stocks), then we have indirectly the calculated world's consumption (indicated in line 9). Then in table 2, I have indicated this consumption in the principal centers of consumption and you will find there that about 3/4ths of the world's consumption takes place.

The rest of the world which is indicated in last line but one, comprises no more than 1.4th of the total world's consumption. Further divisions could be made for the consumption figures in individual countries. There are a good many small countries in which the consumption figures are known. I did not put them in my tables so as not to overburden the thing.

If we apply the results of our comparisons in these tables and apply them to campaign 1912/13, we would be justified in saying this:

This year's production was record-breaking, exceeding all previous production, not only in beet sugar districts but also in cane sugar countries.

Of course, we have only provisional figures from Cuba. You know, gentlemen, that estimates on the Cuban production are on hand; the figures given are 2,250,000 metric tons, some of it is already housed. According to the latest communications received from the well known Cuban statistician, Mr. Guma, Cuban production to the end of March was 1,232,000 metric tons (1,358,034 short tons). In order to produce a total of 2,250,000 metric tons (2,480,175) short tons), and additional amount of 1,000,000 metric tons will have to be extracted from the cane in hand. 1,018,000 metric tons is an enormous quantity compared with the productions during a similar period in previous years.

Cuba has produced during the same period of 1912, about 900,000 metric tons, i.e. about 100,000 tons less; in the year 1911, April to the end of campaign, only 500,000 metric tons. In the year 1910, only 700,000 metric tons have been produced during the same period.

These figures show that if the highest estimate is around 2,250,000 metric tons - about 100,000 tons will have to be taken off these figures. Until now, the Cubans have had a great deal of luck with their production and the conditions surrounding it, and the rainfall reported in February last, has done the crop no harm. On the contrary, they rather like seeing some rain, but when the real rainy season - due in April or May, suddenly sets in and continues, it influences production unfavorably.

But apart from Cuba, the production figures are absolute and final. We also have a birds-eye view of the Russian production figures, and I must ask you to make a slight correction in the table submitted herewith. You have here in the figures of 1912-13, initial stocks of 1,805,100 metric tons (1,989,651 short tons). This includes Russian figures and a production of 18,279,000 metric tons. This world production is perhaps too large by

100,000 metric tons , because I inserted 100,000 tons too much for Russia, so that we have not a stock of 20,084,100 metric tons, but only 19,984,100. What significance has this stock of sugar?

It is therefore very important to know how these stocks are going to be disposed of during this campaign year and what will be the attitude of consumption.

In order to have a good standard of comparison, we must leave the campaign year 1911-12 entirely out. The bad harvest of 1911-12 would scarcely justify us to consider this year as a proper one to include in our figures. but we can safely take 1910 - 11.

It depends on what the coefficient of increase in the world's consumption is to be. I believe that the percentage of increase of 5% - as compared with the total consumption of 1910 - 11 - is not too high, but will approach the actual percentage, if during the next few months normal conditions prevail.

If the world consumption has increased by 5% as compared with that of 1910-11, that will mean that there will be on hand 500,000 tons more at the end of the campaign year than at the beginning.

These figures show - and you all are aware of this fact - that we have plenty of sugar during this campaign and strenuous efforts will have to be made to dispose of this sugar.

Now look at Table 3, you will find there a comparison of exports in the most important countries with imports at the end of Feby. 1913 and 1911; I may mention that Great Britain has incorporated her consumption to the end of March, and Germany has embodied her exports also to the end of March. If you add the figures of Germany, France, Austria, Hungary, Great Britain, Belgium, Holland and the United States, you will find that consumption in these countries has increased by 5%, and their exports by 28%, and if you combine consumption and exports of these countries, you will find an increase of 11%.

By reason of considerable exports during this period and by reason of the fact that certain countries - like Germany, Austria, Hungary and Holland - have over 5% percentage of an increase in consumption we might assume that perhaps for the last half of the campaign we would also have more than 5% increase in consumption. But I doubt whether we are justified in assuming this.

You will remember that in the summer 1911, the visible consumption was especially high in consequence of the advance tax, levied thereon, as during the summer months the crop failure was known to be a fact. For this reason, I did not go beyond an increase in percentage higher than 5%.

If you therefore treat the grand total of the world's consumption of 1910 - 11 along with the coefficient of consumption of 5%, then you will establish the fact that at the end of this campaign there will be 5,000,000 more than at the beginning. Thus all visible stocks including the Russian - will amount to 2,260,000 tons. You have a world stock of 1,805,100 metric tons (1,989,761 short tons); you have a grand total of world production of 18,179,000 metric tons, so that you have available 19,984,000 metric tons (22,028,363 short tons) the world consumption will amount to 17,700,000 metric tons (19,510,710 short tons) an increase of 5%. Wherefore, in round numbers, 2,250,000 metric tons will remain in stock.

You will naturally find these totals of stock to be relatively large if you compare them with those of recent years in which all these stocks were quite as large. and we must likewise bear in mind that with an increase in the world's stocks the consumption likewise increased, therefore consumption may tend to absorb increasing stock. Thus we would not be far from the real figures if we assume that in this direction there will likewise be larger stocks at the end than there were in the beginning of the campaign.

Gentlemen, should however, my estimate of the world's consumption be incorrect, and that on the contrary, it would be larger, then the final stocks would be smaller and if consumption increases by $7\frac{1}{2}$, we would no longer have a surplus at the end of a campaign. Initial stocks would counterbalance the final stocks.

You will bear in mind that my statistics on the Russian stocks are less at the end than at the beginning of a campaign, but the stocks in the other countries would be somewhat larger - for in these alone, we find the factor that governs the world's markets.

Referring to Russia's last campaign you all are aware of the fact that Russia had the misfortune of experiencing a bad harvest as all beets could not be pulled and a considerable portion of those that were pulled could not be shipped to the factories. Difficulties were also experienced in harvesting other crops.

In consequence of continued rains, the ground was very wet; a delay in the harvesting of cereals likewise took place in Germany and for this reason not enough labor was available to pull the beets at the proper time. The roads were almost impassable. I, myself, spent some time in Russia last year - and if any of you gentlemen ever have been in that country, especially in the southwestern beet districts, in the Kiew district, the district of the so-called "black earth" in the Tchernosiom, you will be able to get an idea of the disastrous effect of rains upon the condition of roads. In those regions there are scarcely any but cross roads - regular highways and macadam roads are very few in Russia due to a scarcity of stone - the stone necessary for road-building has to be brought mainly from Finland. Only big central cities have well constructed roads between them, but the agricultural districts , the flat country region and the Steppes, have broad cross-roads. These cross-roads are enormously broad for as soon as it rains the wheels of vehicles soon make deep ruts which necessitates starting a new road on the side, which, in its turn, is abandoned as soon as the ruts get too deep. This caused almost a calamity last Fall in Russia.

The factories were short of beets,40,000,000 tons (44,092,000 short tons) remained in the ground; the quality of those delivered to the factories deteriorated on account of the delay in extracting the sugar as most factories continued operation to the end of March. A general yield of only 13% was obtained - consequently the Russian production was very small.

There still was a large stock available from the previous campaign, although Russia was able to export immense quantities of sugar by reason of the regrettable consent of the Brussels Convention, and had, notwithstanding this fact, large final stocks available with which to cover the demand from inland consumption; exporting houses also from their so-called natural markets Finland and Persia.

The question now is, what will be the attitude of Russia in the next campaign? The markets were somewhat easier during this campaign, thanks to the disposition of Russia to throw her stocks freely on the market. But will Russia let her stocks go during next campaign? That's the question. This question was answerable lately: that there is no likelihood of Russia exporting abnormal quantities during the next campaign, as a decrease of beet acreage was anticipated.

But lately, it was reported that the Russian factories are exerting themselves to induce the small farmers to plant beets extensively, but I doubt whether during this campaign they are going to get enough acreage so as to be in a position of largely increasing their exports during next campaign.

Gentlemen, the world's sugar markets of the near future will be considerably influenced by the acreage devoted to it. If I have pointed out the increase in the world consumption in relation to the total annual world supply, I did it being under the impression that we would have normal conditions. The surplus in stocks say 450,000 tons may easily be counterbalanced at any time, in consequence of a decrease in acreage which, according to recent reports, is expected almost everywhere.

In Germany, we may estimate the decrease in acreage to be 5% at least, although final figures are not as yet available. Reports from Austria-Hungary tend to show that at least 7% to 8% less acreage will be available for beet culture in Bohemia and Moravia; in Hungary planting to beets will be on about the same area as last year. France is most likely going to have a decrease in acreage of about 10% where the sugar factories have to suffer from competition on the part of brandy distilleries: as the sugar beet there is the most important raw material for alcohol distilleries .

In Holland and Belgium there is also going to be a decrease in the acreage for beet culture. It is therefore probable, that the sugar market is going to take a turn for the better in consequence of decreased production and that under normal conditions, by taking the average world production into account, a very small surplus in stocks is expected.

Of course, in all this, you have to consider production of sugar and its consumption to be normal, that is to say, if conditions resulting from a ware are not taken into account. All winter, the sugar market was in an unsettled condition - the fact of war being in sight. You all know that efforts are being made to insert a war clause in all treaties, agreements and contracts relating to the sugar trade - but as yet, all these efforts have been futile, simply because the German Raw Sugar Industry and the Refining Industry considered that with a war clause conditions could not be (in case of actual war) more satisfactorily circumscribed than could be the case without such a clause.

At first there was a certain enthusiasm displayed when the question of a war clause came up. It was thought possible to follow in this the example of the English market; but it was found lately, that the Austrian factories of raw sugar were slow in assenting to the creation of a war clause.

Gentlemen, disregarding these political conditions. as they would seem to exist at the outbreak of a war, which fortunately is not likely to take place in the near future, we may also mention other political causes which arose recently in various countries and which, under certain circumstances, may exercise considerable influence on the state of the sugar market. Other causes will make themselves felt later on, such as the contemplated increase in the sugar tax in Sweden. The new tariff law in the United States will also have a far-reaching effect: with this decrease in duty on sugar a decreased preferential duty for Cuban sugar will naturally follow - that increase will not be very considerable, but it is quite possible that such a reduction in the preferential duty may materially impede the rapid progress which Cuba has been making, which, in regard to our exports is the doubtful point of interrogation and is causing our sugar factories a good deal of anxiety.

Another country that may yet make a change in the sugar tax is Great Britain. We may expect a further reduction in sugar duties from this source. English consumption fluctuates; especially in March as has been the case for years past. If a reduction in the duty were to take place, then it is possible that consumption would increase considerably so as to make up for the past few months.

I regret to have to hold up my own country as giving a bad example in some respects — our Government having disappointed us in regard to a reduction in the sugar tax which we expected to be reduced on the first of October 1916.......... You know that in our military budget the sugar tax plays an important part - and such a reduction is not to take place before April 1st, 1918, and as far as my experience teaches me "Aufgehoben is nicht aufgeschoben" (To delay is not to abolish) and that we must resign ourselves and give up the idea of ever having a reduction in the sugar tax. This is highly regrettable.

I have avoided any reference to prices. Perhaps we may now hear the views of others assembled. (Applause)

(The Chairman)

Gentlemen:-

I suppose I may, in your behalf, thank Dr. Bartens for his interesting address as well as the pains taken in compiling the tables which we have before us. Dr. Bartens says it is very difficult to make a speech on market conditions of the sugar trade, and I was afraid at first that he would refuse to undertake the subject. But I was overjoyed when Dr. Bartens had consented and I must thank him personally for his courtesy in having come here to enlighten us as he has done today. (Applause)

Mr. Claassen asks why Danish sugar was admitted in the Hamburg market causing a slight depression in the price?

(Dr. Bartens): Denmark is one of the countries that has conformed to the statutes of the Brussels Convention and does not therefore, have to pay any additional duty on her imports to Hamburg; her sugar is no longer considered to be a bounty sugar, and for this reason Danish sugar is marketable in Hamburg on an equality with other sugar shipments.

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"DESTRUCTION OF THE NEMATODE"

ADDRESS BY M. BRUNEHANT, CALLED UPON BY M. VIEVILLE, PRESIDENT OF THE ASSOCIATION OF FRENCH SUGAR MANUFACTURERS.

EXCERPT FROM THE BULLETIN TRIMESTRIEL, SYNDICAT DES FABRICANTS DES SUCRE SEPTEMBER 1913, PAGE 621.

Gentlemen:-

Our President has called the address I am going to deliver "Destruction of the Nematode". Allow me to tell you that this title is too broad and my ambition to do justice to it is too limited.

Those who have had the misfortune, like myself, to make the intimate acquaintance with this dangerous microscopic worm know that its propagation is very rapid and for that very reason is difficult to exterminate and all that we can do is to use common sense so as to put up with its existence without allowing it to do much damage. I will give you a brief history of this Nematode family.

As you all know, the beet Nematode is a worm which, after being hatched, penetrates into the rootlets of the beet and other plants and preferably those of the beet; it develops rapidly. Soon the female nematodes make the outer covering of the rootlets burst and are noticed on the outside in tiny lemon-shaped excresences, about one-eighth of an inch long. If you crush this little bag and use a microscope, you will find about 40 to 50 eggs from which the species increase and multiply.

From these bags of eggs the young larvae develop and immediately invade the young roots, and their number is so large and their fertility so great, that the plant vainly trying to get new hair-like rootlets as these are, become destroyed as quickly as they are produced. During this time, a certain number of females undergo a complete change, their outer skin assumes a brownish color and chitonizes, that is to say, becomes water-tight, and whilst in this state the young larvae do not develop immediately, but are so to speak, kept in reserve for the year and in some instances for the following years.

In light soils, the propagation of the larvae is so rapid that the beet harvest may be entirely annihilated or be reduced to from 3 to 4,000 Kg. of roots without shape and extremely poor in sugar. For many years past, beet-growers in Germany, noticed what they called "beet soil lassitude", but in France (as recently as 1884), by the introduction of beets rich in sugar, the same phenomenon manifested itself conspicuously, especially in the fields of sugar factories where no other crops were grown in rotation.

Damage by nematodes, specially occurs in alluvium soil - rich in silicium and poor in potassium.

In Germany, Kuhn thought out a curative method, which did not lack of originality and which was for some time in vogue; having noticed that nematodes took up their abode in certain plants that developed rapidly, like the summer rape, for instance, Kuhn decided to sow this plant in nematodized soil and then to watch the progress and development of the nematode family in their life on the rootlets, and before the nematode had reached maturity to destroy completely the crop of rape; at the same time a vast number of other parasites were exterminated. This treatment of the soil was repeated once or twice during the summer, and the parasites were gotten rid of. But it is easily understood that great care had to be exercised to choose the psychological moment; for instance, inclement or rainy weather may counteract the successful application of this method, and incidentally mentioned, is very costly.

In France, Willod thought he could destroy this parasite by toxic methods, i.e., the ammonia waters of illuminating gas; the encouraging results obtained in the laboratory were however found to be impractical with experiments on a large scale in the field and this method was quickly abandoned.

Somewhat more of a success was achieved with coffee chicory; this plant checks nematodic development, and as soon as chicory has been successfully planted, beets can be successfully cultivated in rotation.

As nematodes mostly develop from earth and rubbish accumulated in factory and farm, these earths are excluded from beet fields and dumped into uncultivated areas or on fields whereon, for several years to come, no beets are to be planted.

In nematodic infested fields a rotation of crops was adopted with intervals of five years between each beet planting whereby 32,000 Kg. of beets with 18% sugar was obtained with very little trace of nematodes.

The use of 500 kilos of Kainite per hectare seems to favorably influence beet harvests. Thus we adopted the following rotation:

1	year	Stable Manure and chemical fertilizer	.... Beets
2	"		.... Wheat
3	"		.... Oats
4	"		.... Luzerne
5	"		.... Luzerne
6	"	500 kilos hyphophosphate, night soil mixed with residue from wool scouring, other chemical fertilizer	.....Wheat
7	"		...........Beets
8	"		...........Wheat
9	"		...........Oats
10	"	Mixed wheat, rye or potatoes.	
11	"	Stable manure and chemical fertilizer.	

"THE BEET SUGAR INDUSTRY IN THE UNITED STATES"

LEADING ARTICLE BY GEORGES DUREAU, JOURNAL des FABRICANTS de SUCRE, OCTOBER 1, 1913.

Under the title of "The Beet Sugar Industry of the United States", Mr. Truman G. Palmer, Secretary of the U. S. Beet Sugar Association, has recently published a remarkable essay in book form, on the situation of this industry. This work of Mr. Palmer is executed to perfection and has great artistic merit. It contains 128 pages, 11 x 13½", and numerous sepia photo-engravings printed beautifully on papier de luxe.

36 illustrated pages with explanatory text show the various stages of sugar manufacture in a modern factory, starting with the sowing of the beet seed and finishing with putting the sugar into bags; 73 illustrated pages show 73 of the American beet sugar factories that are in operation. The date of the erection of each factory is given along with dimensions of buildings, the capacity of plant and equipment, the extent or acreage, the amount of expenditure, etc. The author has added a short history of the beet sugar industry in the United States showing a view of the factory erected in Salt Lake City in 1852, also of the first American factory operated in 1876, in Alvarado, California, with a portrait of E. H. Dyer, the eminent industrial pioneer, who laid the foundation for the beet sugar industry in the United States.

Mr. Palmer's work likewise contains an historical sketch of the beet sugar industry in Europe, which is illustrated with portrait of Olivier de Serres, Marggraf, Achard, Napoleon Bonaparte, Vilmorin (the father of beet selection) and with different sugar factories of Germany, Austria, France, Holland, etc.

In his introductory remarks Mr. Palmer mentions that $84,000,000 have been invested since 1897 in the American beet sugar industry, for at that time Congress put sugar under tariff protection inducing thereby capitalists to help building factories with the view of promoting this home industry, so as to keep at home, about $100,000,000 paid out annually for sugar to foreign countries - as Congress argued at that time that "sugar was labor" and that labor in the beet fields of America cost $2.60 per day when in Germany it was only 45 cents, and in Java 8 - 12 cents a day. Since 1896, the American production of sugar has increased from 40,000 tons to 700,000 tons per annum, which at the rate of 4½ cents per pound represents $63,000,000; thus the farmers get approximately $30,000,000. Furthermore, the yield of other cereals grown in rotation with sugar beets has increased 100 per cent above the average yield on land where sugar beets are not grown. Every consumer is vitally interested in this increased yield, for as everybody knows, the prices of commodities fall in proportion as yields become larger.

Our essay concludes Mr. Palmer, explains why the German farmer gets 2 bushels per acre where we get only one; what struck Mr. Palmer most during his research travels in Europe was, the excellent advantages resulting from sugar beet growing and the beneficent influence sugar beet culture exercises upon agriculture in general. Beet culture means increased production of manure, increased fertility of the soil, increased yield of cereals, of wheat, and consequently furtherance of the wealth and well being of the Nation; but these thoughts have unfortunately hitherto been far from the minds of our legislators and of our people in general; hence the American legislator has given scant consideration to this important home industry.

As soon as the voters will be enlightened, it will be a difficult matter to hypnotize them again on the subject of imaginary advantages which are to result from the lowering of the tariff on sugar. From this point of view Mr. Palmer, the apostle of the American beet sugar industry has produced an excellent work tending to enlighten the masses. Doubtless his efforts will be crowned with success and we ourselves do not think that the American people will commit such a monumental mistake as to allow this valuable industry, the beet sugar industry, to be ruined; besides there are men interested in it who have ample capital and energy and who are animated with the same spirit as Mr. Truman G. Palmer, and who will not be cast down by temporary difficulties which they encounter and will face bravely the crisis through which they soon will have to pass.

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"THE BEET SUGAR INDUSTRY OF THE UNITED STATES"

TRUMAN G. PALMER.

EXCERPT FROM DIE DEUTSCHE ZUCKERINDUSTRIE, OCTOBER 17, 1913, p. 930.

This well known author has given, in a new illustrated work, a true picture of the importance of the technical progress and capacity of the Beet Sugar Factories of the United States.

It is well known that a mighty upheaval is now taking place in the United States with regard to tariff matters, and that the domestic beet sugar industry which hitherto has enjoyed the benefit of protection is fearful that these changes will work injury, in fact, bring about ruinous conditions. Based upon the same experience we have had in Europe, it does not seem that there is reason to take such a gloomy view of it, though an outsider cannot have a birdseye view of general conditions of the American Beet Sugar Industry or estimate what effect these changes may have on the existence of it. It is human nature that parties in a cause, should make a determined fight and make every effort to enlighten their countrymen and rouse them to action.

This book is eminently designed for such a purpose not only in so far as the illustrations are concerned, which show important activities in field and factory, but also the buildings and equipment of nearly all the American Beet Sugar factories. These buildings show solidity, beauty, and magnificent proportions as well.

Whatever may be one's opinion regarding the justification of the fight Mr. Palmer is carrying on, we must admit that the author of this work shows the purpose he has in view, and that a similar campaign could not be carried on more cleverly or effectively. It would be a joy to see in every industry, that is obliged to pass through a like crisis, to have as able and experienced a champion as Mr. Palmer has proved himself to be.

(Signed) Dr. E. C. von Lippmann.

THE BEET SUGAR INDUSTRY OF THE UNITED STATES

- by -

TRUMAN G. PALMER.

EXCERPT FROM CIRCULAIRE HEBDOMADAIRE du SYNDICAT des FABRICANTS de SUCRE OCT.12/13.

"The Beet Sugar Industry of the United States". This is the title under which Mr. Palmer, the very distinguished and energetic Secretary of the United States Beet Sugar Industry of America, has published an album, a book of 125 pages, with the object of making the real facts concerning the beet sugar industry in the United States known.

The author at first, gives the figures regarding the Beet Sugar Industry of the United States in 1912/13 (such as number of factories, quantity of sugar produced, amounts paid out to beet growers, wages in factories, etc.), and then shows how it originated and how it was developed from 1830 to 1913.

The first factory was established in 1830 in Philadelphia, by Vaughan and Ronaldson, but it did not meet with success. The factory that was the first to remain in active operation and which met with success, was that located at Alvarado, California; this was established by Mr. E. H. Dyer.

The introduction of beet culture in the United States contributed towards increasing the yield of cereals just as it did in Europe. Furthermore, Mr. Palmer shows some fine photographs with explanatory text, with reference to the different stages of beet culture, such as the spreading of manure, ploughing, thinning, hoeing, pulling, topping, shipping the beets, unloading wagons either by hand or by tipping them on an inclined plane, etc., etc.

The author's album contains likewise, photographic views of the interior of factories and of the various divisions of labor, i.e.: diffusion batteries, carbonatation, sulfitation, filtering, multiple effect, boiling, mixing, turbines, weighing apparatus, putting in bags; also of sugar storage rooms and views of pulp used in the feeding of grazing cattle and sheep.

Then there are some half tones, finely executed, of 73 American beet sugar factories, some of which I am able to recognize, as ones I visited during my trip in the United States in the year 1912.

The author concludes with a summary of the history of the European Beet Sugar Industry, incidentally reminding the reader of the work done by Olivier de Serres, Marggraf, Achard, Napoleon I. and Vilmorin, showing excellent photographs of these pioneers.

In conclusion, we may say that the Album proves that the author is thoroughly acquainted with all the economic conditions governing the international sugar industry in general, and that he has a profound knowledge of the American Beet Sugar Industry, so to speak, at his finger's ends.

The photographs with which Mr. Palmer's album is profusely decorated and illustrated, give a clear and well defined idea of the American beet sugar industry.

Mr. Palmer who is one of the most prominent American authorities on Sugar, has been, and is still, the defender and learned advocate for a tariff on sugar. The American Congress has not entirely adopted his views, but Mr. Palmer has edited a goodly number of publications, which, in a clear and concise manner, set forth the economic advantages of the beet sugar industry, which ought to enlighten the public in regard to its importance. In short, Mr. Palmer's album is a very important publication and an interesting reference book on the sugar question.

(Signed) E. S.

(Emile Saillard)

(Translation from the German)

EXCERPT FROM DIE WOCHENSCHRIFT DES CENTRAL VEREINS FÜR DIE RÜBENZUCKERINDUSTRIE

Vienna, October 23, 1913.

HOW TO REMEDY THE SCARCITY OF AGRICULTURAL LABOR.

The scarcity of labor in agricultural fields has often been pointed out, especially in Austria, where it is intensified by the fact that the lateness of the potato crop interferes with the work in the beet fields. This is partly due also to weather conditions.

In order to give prompt aid to agriculturists, the Minister of Agriculture has petitioned the Minister of Justice to permit convict labor to work in the fields. The Minister of Justice replied promptly, authorizing the District and State authorities, and the Courts, to meet favorably any request that might be made for convict labor on the part of landowners and farmers. He also stated that he had directed the Wardens of prisons to co-operate with the proper authorities in order to help in this matter.

The Ministry of Agriculture is engaged in devising means to stop emigration of field labor into contiguous countries, and to keep all the men available, at work on Austrian farms, where they are so badly needed.

All labor hiring corporations and Agencies, have been urged to co-operate with the Ministry of Agriculture to ascertain what surplus labor is available in their respective States and to offer inducement in order to direct laborers ready to emigrate to such districts in Austria where field labor is scarce. in fact, to make strenuous efforts to keep agricultural laborers in the country.

Magdeburg, Germany.

"BEET SUGAR INDUSTRY OF THE UNITED STATES".

- by -

TRUMAN G. PALMER,

SECRETARY OF THE UNITED STATES BEET SUGAR INDUSTRY, WASHINGTON, 1913.

Excerpt from the Centralblatt Oct. 25, 1913, page 123.

This work is published in English; is richly illustrated, and gives a summary of the Beet Sugar Industry of the United States. It may be called a pictorial history of this industry.

After a brief outline of the development of the Industry from 1830 to 1913, (showing the first successful beet sugar factory at Alvarado, California, built in 1879, which, in its architectural outlines reminds us of the oldest beet sugar factory, namely, Achard's at Cunern), there follow half tones, depicting beet culture from the planting to the harvesting and delivery of the beets at the factory.

Furthermore, there are descriptive legends regarding each individual factory, and a photograph of nearly all the North American Beet Sugar factories. It also gives the capacity of each plant, acreage, etc.

What strikes us particularly, is the architectural beauty in factory construction; something we had scarcely expected to find in America.

Mr. Palmer's work is very interesting, and should be useful to sugar manufacturers in that it inspires new ideas on the subject of the sugar industry.

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ROUMANIA'S SUGAR INDUSTRY.

EXCERPT FROM THE PRAGER ZUCKERMARKT, OCTOBER 29, 1913, p. 1108.

1911/12	Beets Harvested	....	260,160,448 Kg.	= (286,775 sht.Tons)
1910/11	" "	....	386,279,880 Kg.	= (425,796 " ")
1911/12	Sugar Production	....	32,556, Kg.	= (35,887 " ")
1910/11	" "	....	50,003,141 Kg.	= (55,118 " ")
1911/12	Consumption	....	33,241,206 Kg.	= (36,641 " ")
1910/11	"	....	29,861,867 Kg.	= (32,917 " ")
1911/12	Export	....	4,911,885 Kg.	= (5,414 " ")
1910/11	"	....	2,276,957 Kg.	= (2,510 " ")
	Imports	....	231,989 Kg.	= (256 " ")
		....	390,071 Kg.	= (430 " ")
Five Factories	....	Roman, ...	10,934,720 Kg.	= (12,053 " ")
		Repeceni	6,988,926 Kg.	= (7,704 " ")
		Marasti	6,535,566 Kg.	= (7,203 " ")
		Chitilla	5,429,906 Kg.	= (5,984 " ")
		Sascut	2,668,500 Kg.	= (2,941 " ")

March 31, 1912.

Bal. of stock available .... 21,169,198 Kg. = (23,334 " ")

ITALY'S SUGAR INDUSTRY.

EXCERPT FROM THE PRAGER ZUCKERMARKT, OCTOBER 29, 1913, p. 1107.

53,100 Hectares were planted to beets			= (120.363 acres)
Beets Harvested 1910/11	16,800,000	quintals	= (1,853,376 Sh.Tons)
" " 1911/12	14,400,000	"	= (1,587,312 " ")
" "Est. 1912/13	16,500.000	"	= (1,818,795 " ")

1912/13 Factories	37
1911/12 "	35
Wage Earners	15,517
Sugar Extracted	1912, 156,198 Met.Tons =172,177 sht.Tons.

SUGAR PRODUCTION:

1907	106,382	Metric Tons =	117,264 short tons
1908	135,965	" " =	149,874 " "
1909	165,311	" " =	182,222 " "
1910	110 ,795	" " =	122,129 " "
1911	170,346	" " =	187,772 " "
1912	156,198	" " =	172,177 " "
Imports.	1912 - 63,715	Met. Tons from France,Austria &c.	70,233 " "
	1911 - 79,406	" " " " " " "	87,529 " "
	1910 - 58,812	" " " " " " "	64,828 " "
Exports,	7.33	Metric tons " " " " "	8.07/100

EXCERPT FROM THE INTERNATIONAL SUGAR JOURNAL, OCTOBER ISSUE, 1913, p. 484.

THE BEET SUGAR INDUSTRY OF THE UNITED STATES

- by -

TRUMAN G. PALMER.

(United States Beet Sugar Industry, Washington, D. C.)

"This publication has been issued for the purpose of demonstrating the extent of beet sugar manufacture in the United States. It is a beautifully compiled work, consisting principally of clear photographs of every stage of beet growing and manufacture, and of 73 of the 77 modern American factories, accompanied by suitable text, and a number of clearly set forth statistics. From the latter we note that $84,000,000 have been invested in establishing the American beet sugar industry since 1897, and striking is the statement that the labor of cultivating sugar in the fields of America costs $2.60 per day, whereas it is 41½ cents in Germany, and only 8 - 12 cents in Java. In his sketch of the Beet Sugar Industry in Europe, Mr. Palmer had mentioned that Olivier de Serres was "the first to suggest the presence of sugar in the beet". This statement is refuted by our foremost historical authority, Dr. E. O. von Lippmann, who contends that De Serres should not be credited with this discovery, since the French Calvinist only mentioned the fact that "the beetroot on being boiled yields a juice similar to syrup of sugar, which is beautiful to look at on account of its vermilion colour".

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