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RICE AND COFFEE.—The San Francisco quotation for rice, August 4, was 3½ cents at sixty days credit. The stock of New Orleans rice in California is light, and will remain so, for several months; but with Louisiana on one side and Japan on the other, both producing large crops for export, it is not probable that the price will advance at present. * * * Kona coffee was quoted, under the same date, at 18½ cents. This is a low price, but if care is taken in sorting and packing, there can be no doubt that the highest or fancy prices can be obtained for such lots.

SUGAR in New York was quoted at 3⅜ cents on August 4, and it is believed that it will not materially change for the next three months or until the new crop of European beet sugars is placed on the market.

—One factor in the sugar market, of which no mention has been made, when referring to future prices, is the increased tax on the consumer, under the new European sugar laws. A rise in price invariably affects the consumption, especially with the laboring classes. If this decrease in consumption be only ten per cent. of the amount consumed the previous year, it must be added to the supply available for

export, which, for all Europe, will aggregate a considerable amount, and it must operate to keep prices at the present or lower level. There can be no correct estimate made now, as to what extent the new European laws will affect the price of sugar after the close of 1896.

Publications Received.—The shade-tree insect problem in the Eastern United States. By H. O. Howard, Entomologist, U. S. Department of Agriculture. Illustrated.

—The principal insect enemies of the grape. By C. L. Marlatt, First Assistant Entomologist U. S. Department of Agriculture. Illustrated.

An exchange estimates the California orange crop for 1896 at 2,800,000 boxes, or two-thirds of a full yield. The crop will sell for $5,000,000, which is an excellent return from an industry only fifteen years old. About $33,000,000 have been invested in the orange groves of southern California. There are in bearing 10,000 acres, and 20,000 more acres are planted.

The journalistic profession certainly meets with due appreciation in Sweden. The London *Athenæum* tells us that the Storthing has just decided on giving two State grants of 1000 kroner each to young journalists to enable them to gain experience in foreign countries, and the editors of newspapers are henceforth to have the free use of the State railways when traveling in the exercise of their profession.

An interesting scheme is on foot in England to bring the producer into contact with the consumer in provisioning the household. It is to do the marketing by postals. The object of this movement is to do away with many of the trickeries of trade, and enable the consumer to procure without much trouble fresh home-grown produce at a less price than is now paid for very inferior articles. Instead of sending the servant around to the grocer's or provision merchant's, the housewife writes an order on a postal card and drops it into the nearest post box. The next day the goods are delivered at the door.

REGARDING eucalyptus trees in Italy, a lady tourist, writing from the city of Nice, says: "We delight much in the Italian people, and in the beautiful groves of Australian gum trees, which abound here. You can have no idea what lovely trees these are when properly cultivated, as they are here. I wish I had my camera to get a photo of them. This little town is thoroughly scented with eucalyptus, and the honey is strongly flavored with it. Arbor day is now coming round, and thousands of trees will be planted in parks and school grounds."

A SURPRISE was sprung on the people of Chino recently, by Richard Gird and his representative demanding possession of the Chino ranch lands and property from the Chino Ranch Company on account of the failure of the ranch company to meet their obligations or to comply with the terms of the contract of sale and purchase of ranch entered into in 1894. Richard Gird again assumed the control and possession of the ranch and property. General satisfaction is expressed by every one in Chino at the turn of affairs and is manifested by smiles on the faces of all. Every one appears to realize the fact that an old friend has returned to them. So says an exchange.

WE agree with Charles Dudley Warner that there is no place like the country for boys and girls to grow up in. You find a wholesome, purer atmosphere, and the coming in contact with nature plants in the heart of the future man or woman seeds that will bring a rich harvest of true righteousness that never grow in the soil of city life. Look at the men and women who have influenced and made the history of our country, most of them were born and bred in the country. Ask any man or woman who was born in the country if they ever regretted it, and you will find scarcely one who is not thankful of the experiences and happiness that came to them in their childhood in the country.—*Ex.*

IT will be remembered that a communication from Dr. W. Maxwell, Director of the Hawaiian Experiment Station, was published in the April number of the PLANTERS' MONTHLY relative to the rate and mode of growth of the banana plant.

This article has been republished in the *Botanisches Centralblatt* of Cassel, Germany, in English and in German. It has also been translated and published in France, showing the interest that has been taken in Europe in the article. It stated facts relative to this valuable and rapid-growing plant, which have surprised and greatly interested even the savans of Europe, who, though they knew that it was a rapid grower, were astonished with the statement that its leaves developed a growth of two feet in three days. Perhaps our remarkable climate and the rich volcanic soil of Punchbowl have something to do with this extraordinary result.

Lantana.—A planting correspondent writes: "A great outcry is being made by some of the sub-deputy Foresters of India against this useful and beautiful plant—the greatest curse, they say, 'ever imported into India, worse than the thistle or rabbits in Australia!' And they repeat the old yarn about 'the first plant being brought out in a flower-pot thirty years ago.' It would be difficult for even a forester's assistant to write greater nonsense than the above. I have known the lantana in this garden of India for well nigh forty years, and then it was fully as luxuriant on the hills around Kandy as it is now. Moreover, very close observation leads me to the conclusion that it has done more to renovate the Kandyan hills than all the imported or municipal manures. My only regret is to see it dying out in the unequal struggle with that more doubtful and less beautiful interloper, the sunflower. The Grevillea is another plant which is doing splendid work in renovating our hill-sides."—*Ceylon Trop. Agriculturist.*

Science in the Service of the Schools.—Boston a year ago employed for service in the public schools a number of physicians at a small annual salary. Their duties were to visit the schools under their personal care each morning, and examine the children who gave any evidence of physical disturbances. The result was that 14,666 children were examined. Over 9000 of these were found sick, 1800 of them ill enough to be sent home; 437 cases of infectious diseases were discovered, including 70 cases of diphtheria, 110 of carlest

fever, and a great many of measels. Among other important discoveries was that of children suffering from impaired hearing and sight This physical condition was not suspected by either parents or teachers. In Utica tests of the eyes of children were made by the teachers, under the direction of an oculist, and it was discovered that one-sixth of the children in the Utica public schools were suffering from defect of vision. Some of these cases were extreme. A number of the children were practially blind in one eye. Tests were made as to the sense of hearing. The result of these physical examinations was a re-arrangement of the seating of the chilren, those suffering with defect of hearing or sight being given advantageous positions in the room—an act of justice which makes a difference between a child suffering from physical limitations having the opportunity for education, or being defrauded of educational opportunity.

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THE BEET SUGAR INDUSTRY IN AMERICA.

The great success that has attended the beet sugar industry in Europe, but more especially in Germany, and the still greater success that has been obtained in California, strengthen the belief that this industry is on the eve of a rapid development in some sections of the United States. American statesmen see the futility of exporting a hundred millions of dollars annually, which can as well be kept in the country and distributed among American farmers and laborers, who now find it difficult to obtain employment. The announcement that Colonel Spreckels is about to engage extensively in beet sugar enterprizes in California will attract public attention and lead others to follow his example. An American agricultural journal, referring to this subject, says:

"The wide extent of territory over which this crop can be made to succeed gives assurance for the future that sugar may become one of the leading products of the United States. Hundreds of tests by the State experiment stations have demonstrated the fact that the best sugar-beets can be raised in this country, and that the crop can be made profitable both to the farmers who raise the beets and to the sugar-refiners who convert the roots into the commercial article.

Germany began the manufacture of sugar from beets that yielded only 5 per cent. of sugar, and, by selection and long years of careful calculation, the percentage of sacharine matter in the beets was raised to 12 and 14; but here in our country beets yielding from 14 to 18 per cent. are raised without special selection or culture.

"We pay annually to foreign countries for sugar about $100,000,000, and should this vast sum be saved by American farmers raising enough sugar for home consumption, the results would be most gratifying The world's sugar crop for 1894 surpassed that of any other year in the history of the industry, but the increase was the greatest in beet-sugar. The Germans in particular have greatly increased the supply of beet-sugar, and they have succeeded so well in their undertaking that cane-sugar is rapidly being crowded for the supremacy.

"The building of a beet-sugar factory is an expensive undertaking, and it requires considerable practical demonstration of the wisdom of such investments to induce capitalists to put their money into them. A good factory costs all the way from two to five hundred thousand dollars, according to its capacity; and, in addition to this, a guarantee of sufficient raw material to keep the factory going must be obtained. The farmer and the capitalist must work together in order to produce beet sugar. Unless the factory is built for extracting the sugar from the beets, there is no market for the products of the farmers; but, on the other hand, the best-equipped factory in the world is handicapped unless a specified acreage of sugar-beets is guaranteed. The cost to raise a ton of beets is from $2.50 to $4, and the average yield is from ten to twenty tons to the acre. Factories pay $4 per ton for good sugar-beets—a trifle more or less if the beets vary in their sugar contents. The profits from raising the beets can thus be readily figured out; but, as in all other farming, the actual amount made will depend, after all, upon the methods and economy of the farmers. The difference between ten and twenty tons' yield to the acre illustrates the varying results obtained by growers—a difference usually between good and bad farming."

THE LOUISIANA SUGAR SCHOOL.

We regret to learn that this institution is to be temporarily suspended. This appears to be one of the direct results of the war in Cuba.

The students native in Louisiana pay $100 fees per annum, and all foreign students $200 per year. As the foreign students made up one-half of the total number, and were almost all Cubans, it is seen that the school received two-thirds of its revenues from outside. This source being totally cut off by the Cuban war, the school could not be self-supporting, which end was aimed at by the directors.

The Sugar College, however, will not be dissolved, we understand. It is being, in some way, transferred to the New Orleans University, where the sugar course of instruction will be given. The same sugar professor of chemistry is retained, but mechanics, engineering, etc., will be taught by the University professors.

The University stands in the same "Audubon Park" as the experiment station and sugar house, and the students will continue to have the same freedom and use of the teaching values of these institutions.

The sugar experiment station is quite distinct, financially, from the sugar school, although they were run for convenience together. The experiment station, it appears, has the U. S. Government, as well as the State, behind it for support, and its work is being, and will be, pursued with greater vigor than ever, for the simple reason that the critical state of the sugar industry in Louisiana makes the necessity an increasing one for experimenting in every line that may give aid to the State's greatest industry.

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THE largest cargo of beet sugar ever carried across the Atlantic in one ship arrived from Hamburg, on board the British steamship Montezuma, in command of Captain Taylor. It consisted of 64,877 bags, which equal about 8109 tons, the rough value of which is $405,450. The duty on this cargo roughly calculated on a basis of 40 per cent. equals $162,180.

EDITOR PLANTERS' MONTHLY:—I enclose for your attention a little chart showing the California fruit season. It may be of interest to some of my island friends—particularly the banana and pineapple planters—as showing the best time to make consignments of fruit to the Coast.

Yours, very respectfully,

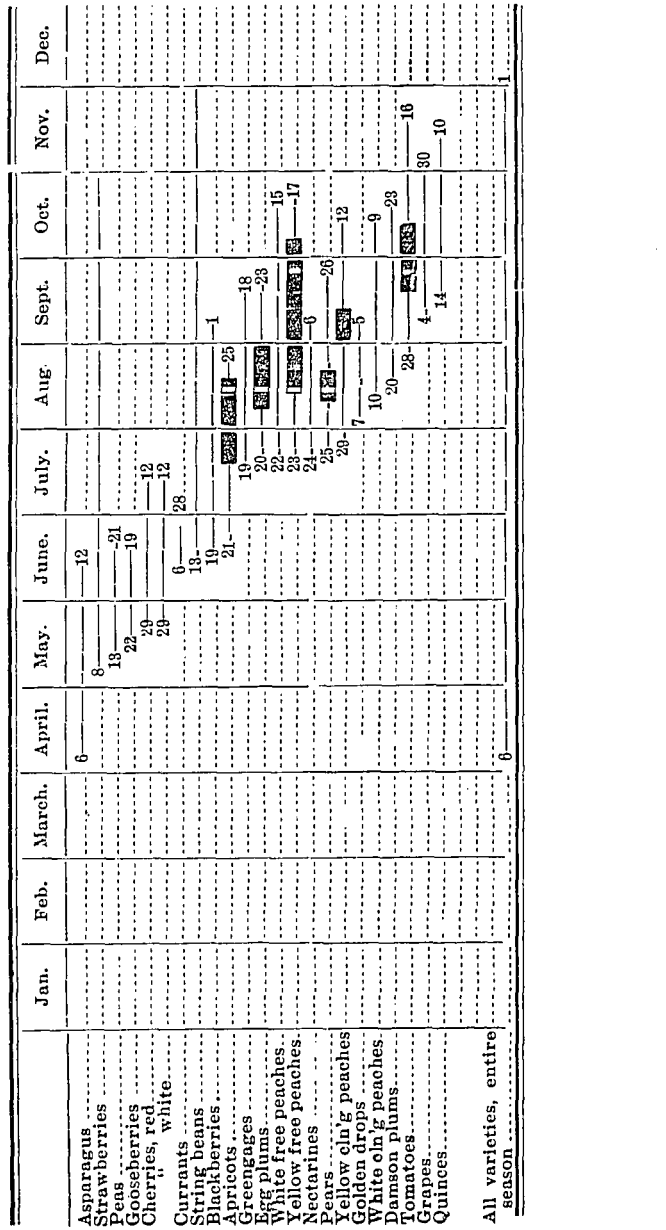
HERBERT DYER,
Formerly of Ewa Plantation.

San Francisco, Cal., July 7, 1896.

DURATION OF THE CALIFORNIA CANNING SEASON—BY VARIETIES.

Showing earliest and latest day's packing for period of thirty-seven consecutive years in San Francisco. Prepared by the Cutting Fruit Packing Company. Established 1858. San Francisco, Chicago, New York.

EXPLANATION: —— Entire season. ▓▓ Heavy period.



HAWAIIAN SUGAR VIA CAPE HORN.

The shipment of Hawaiian sugar to New York, via Cape Horn, have been larger this year than during 1895. In all fourteen vessels have sailed, with full cargoes, carrying in the aggregate 54,499 tons of sugar, all of which has been shipped by Messrs. W. G. Irwin & Co., of this city, and consigned to the American Sugar Refining Company of that city. Two vessels are yet expected to load, which will take about 5100 tons additional, making a total for the year, of 59,599 tons.

Date.	Vessel.	Bags.	Pounds.	Tons.
February 7	Reaper	36,465	4,537,966	2268.1966
" 26	W. F. Babcock	56,608	7,031,157	3515.1151
" 29	Indiana	37,201	4,639,185	2319.1185
March.. 19	Iroquois	55,127	6,804,286	3402.286
" ..31	Kenilworth	62,572	7,725,801	3862.1801
April .. 10	Henry Villard	39,106	5,003,981	2501.1981
" 27	Roanoke	88,455	10,737,733	5368.1733
May.... 20	Pactolus	41.596	5,280,696	2640.696
" 13	Dirigo	81,986	10,038.336	5019.336
June.... 1	John McDonald	58,988	7,287,211	3643.1911
" ... 13	Jos. B. Thomas	48,315	6,008,978	3004.978
" 30	Commodore	50,450	6,184,157	3092.157
July ... 21	Tillie E. Starbuck	51,268	6,374,213	3187.213
August.. 5	Belmont	43,333	5,358,814	2679.814

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OXYDATION OF SUGAR IN EVAPORATORS.

TO THE EDITOR OF THE PLANTERS' MONTHLY :—It is a well known fact that, by oxydation of sugars under certain conditions, various organic acids are formed. Observations I made in the course of investigations on the matter of entrainment suggested the presence of such acids in the vapors resulting from the evaporation of cane-juice in the vacuum pans and multiple effects.

The water obtained through condensation of vapors becomes opaque on standing, and yields, when boiled, a reddish precipitate. The regular occurrence of this induced me to more closely examine the condensate.

On addition of ammonia to the latter, ferreous hydrate is precipitated, showing that the iron occurs in its lower form of oxydation. By evaporatng the clear liquid after separation of the iron a yellow syrup was obtained, giving, on addition of alcohol and sulphuric acid, the characteristic odor of

ethylic formiate. This indicated the probable presence of formic acid. In order to separate the latter and other volatile constituents from the sugars and other non-volatile bodies, a portion of the condensate was acidulated with sulphuric acid and distilled. The acid distillate, after being neutralized with the soda and evaporated, left a crystalline mass, highly hydroscopic. A solution of this residue, added to a solution of argentic nitrate, produced a fine precipitate of metallic silver; mercuric nitrate was reduced to metallic mercury, mercuric chloride to calomel, thus confirming the presence of formic acid.

By heating the dried residue with arsenic, the unmistakable odor of kakodyl appeared, a reaction characteristic of acetic acid respectively acetates. An attempt to determine the acids quantitatively proved unsuccessful, for, upon the distillation of the condensate, the non-volatile substances, sugars, etc., became carbonized before all the volatile acids had been driven off. These experiments, however, served to demonstrate the presence of other non-acid reducents, as will be seen below, where the observations during one of the tests are given as an example: 800 c.c. of the condensate were distilled, and the distillate collected in fractions of 100 c.c. each. These were treated according to the method advocated by Jones, (Am. Ch. Jour., 1895, 17-539) for the determination of formic acid. Another portion of 800 c.c. of the same sample were treated in like manner after acidulation with sulphuric acid.

	Number of c.c. of a decinormal solution of potassic permanganate required for the oxydation of 100 c.c. of the distillate.		Number of c.c. of a decinormal solution of alkali required for the neutralization of 100 c.c. of the distillate.	
	I. Distilled per se.	II. Distilled with acid.	I. Distilled per se.	II. Distilled with acid.
1st Fraction	21.4	19.4	1.2	3.2
2nd „	8.0	8.0	1.1	3.5
3rd „	7.0	6.8	1.1	3.7
4th „	6.6	6.6	1.2	3.7
5th „	6 8	10.0	1.2	4.0
6th „	7.6	19.6	1.4	4 8
7th „	10.0	29.2	1.8	6 8
8th „	31.2	169.0	6 8	45.6

It will be seen that the consumption of permanganate is in excess of the quantity required for the oxydation of such an amount of formic acid as would correspond to the acidity indicated. Reducing bodies formed during the process of distillation possibly contributed to the high degree of oxydability of the last fraction. The relation between the acidity and the consumption of oxygen in the first fractions, however, points to the presence of non-acid reducents of a boiling point lower than that of water—possibly the aldehydes mentioned by Berthelot as products of the oxydation of sugars. The samples cited were subjected to distillation immediately after their being taken.

As the above-described method had not been satisfactory in this case, for the purpose of ascertaining the percentage of acid, some indirect means of attaining this object had to be resorted to. If it be borne in mind that the condensate, when fresh, is clear, and does not change the color of litmus, it would seem reasonable to use the amount of iron held in solution as a measure of the acid. For the purpose of calculation, it is assumed that all the iron is combined with formic acid, as this latter seems to be the preponderant acid.

In numerous instances I have determined the iron, as ferric oxyd, and found that its percentage varies with the concentration of the boiling contents of the evaporators; in other words, the higher the density of the juice or masse-cuite, the greater will be the quantity of acid formed in the vapors.

The apparatus in use for sampling the vapors is similar to the appliance usually employed for this purpose with the one modification, that a cold-water-pipe leads through it, which acts as a surface-condenser for the vapors. The quantity of vapors condensed in the sampling apparatus is proportionate to the total water evaported in pan.

The foregoing observations lead to the conclusion that the acids condensed dissolve their full equivalent of iron from the pipe through which they pass on their way to the vessel collecting the sample.

The percentage of iron in the condensate varies from .003 to .025, averaging .0134; .0134 grs. iron are equivalent to .0349 grs. ferreous formiate, or .0220 grs. formic acid. The sampling apparatus yields an average of 3000 c.c. of the condensate per

hour. The relation between the area of the openings in the sampling tube and the area of the vapor pipe is 1:3.0. We thus find that the acid generated in the vacuum pan during twenty-four hours amounts to (expressed as formic acid) 5386 grammes, or approximately 12 lbs. The amount of sugar entrained within the same time varies between 20 and 40 lbs.

The actual amount of acid must necessarily be in excess of the 12 lbs. given above, as all other organic acids which may be present possess a higher molecular weight than the one chosen as representative. I hope that further investigations may furnish more information concerning the nature of those acids.

E. Hartmann.

Laboratory of the Onomea Sugar Company, July, 1896.

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FERMENTATION OF SUGARS IN THE SUGAR HOUSE.

Editor Planter's Monthly:—A few weeks ago in a few notes on fermentation in the sugar house I referred to some of the reasons why some sugars ferment and others do not. I wish now to present a few more notes on the same subject, which perhaps will make clearer the position I take in the matter.

As I have already stated, the germs of fermentation, bacteria and their spores, and the spores of many species of mould are present everywhere in and around a sugar mill, in the air, and on the surface of walls, floors, ceilings and containers of all kinds; and because one sugar ferments and another does not, it is not because one contains the germs of fermentation and the other does not, but because the conditions are in the one case favorable and in the other unfavorable for the development of the germs present in both. This assertion is based not only on facts recognized by every bacteriologist, but also on a somewhat exhaustive microscopical examination of raw sugars of all grades carried on during the last two years. The conditions necessary for development, the requisite amount of moisture, ash, nitrogen as well as the food proper have been referred to. Temperature is of course an important condition, but aside from artificial conditions, the temperature is so uniform that so far as the special

subject in hand is concerned it may be neglected. I challenge anyone to produce a single bag of raw sugar by the processes of manufacture as ordinarily carried on in these islands, which does not contain the germs of various ferments in sufficient number to bring about the fermentation of said sugar, if the conditions were proper.

I will cite a single instance showing the prevalence of germs, etc., in the air. A sample of clarified juice had been sterilized by boiling for some hours and stored in an ordinary boiling flask, closed as is usual in such cases with a plug of cotton wool. This sample had remained undisturbed and unchanged for ten weeks. Wishing to remove some of the juice to another vessel, I turned the flask on its side removed the plug and quickly poured out part of the contents, replaced the plug and returned the flask to its place. The time during which the flask was open did not exceed five seconds, and neither the neck of the flask nor the inner side of the plug had come in contact with anything except the air, and yet at the end of five days the surface of the juice in the flask was covered with quite a thick growth of mould, which on examination proved to be *Penicillium Glaucum* one of our common moulds, which secretes invertose and consequently inverts cane sugar.

To give some idea how the conditions necessary for development of ferments vary in different sugars I give below analyses of No. 1, No. 2 and No. 3 sugars dried on the same day :

	No. 1 Sugar.	No. 2 Sugar.	No. 3 Sugar.
Moisture	0.267	1.171	2.444
Sucrose	98.1	93.7	88.8
Glucose	0.22	0.66	0.94
Ash	0.395	1.170	2.200
Nitrogen	0 046	0.095	0.080

The No. 1 and No. 2 sugar were made from the same juice of not very high purity : The No. 3 was from juice of much better quality two weeks previous. It will be noticed that the No. 3 contains less nitrogen and not very much more ash than the No. 2.

To ascertain the effect on the moisture, ash and nitrogen content of No. 1 of returning No. 3, the following experiment was made : One strike of straight No. 1 was boiled ; one strike of No. 1 in which No. 3 had been melted in water and

pumped into the syrup tanks; and one strike of No. 1 in which No. 3 had been melted in the clarifiers. These were all made on the same day with the same juice; the same quality of No. 3 was used and was returned in such proportion that if continued would return all the No. 3 made. Below are analyses of the sugars:

	No. 1 straight.	No. 1 and No. 3 returned to syrup.	No. 1 and No. 3 returned to clarifiers.	No. 3 which was returned.
Moisture.....	0.494	0.885	0.800	4.505
Sucrose.....	98.5	97.5	97.5	86.0
Glucose	0.33	0.40	0.37	1.27
Ash	0.156	0.216	0.176	2.840
Nitrogen	0.028	0.044	0.042	0.224

In color the No. 1 straight was yellow while the No. 1 to which No. 3 had been returned was grey. All were equally dry to the hand but it will be noted that the No. 1 to which No. 3 had been returned contained much more moisture, as well as more ash and nitrogen.

Approximately equal weights of these four sugars were taken from the sample bottles and quickly placed in sterilized water; the flasks were plugged with cotton wool and after shaking to facilitate the solution of the sugar were allowed to stand ten days. The solutions contained approximately ten per cent. solids and were all neutral to litmus. At the end of the second day all the solutions had become bleached and at the end of the fourth day evidences of fermentation were apparent in the solution of No. 3. At the end of ten days the flasks were opened and all the solutions examined. The three solutions of No. 1 were each still neutral, no gas had been given off and there was no appearance of viscous fermentation. The solution of No. 3 was decidedly acid; 100 cc. of the solution required 8 cc. of decinormal alkali to neutralize it.

Portions taken from the top, bottom and middle of the solutions as contained in the flasks were examined under the microscope. There was not found in the solution of No. 3 any form which was not also found in the three solutions of No. 1. Among the forms noticed were the bacteria which have been found associated with the production of lactic and butyric acid as well as *Lenconostoc Mesenterioides* referred to in my former notes. The spores of some species of *Mucor* (a mould) were present in large numbers, and there was a

growth of a form more related to the *Algae* than to Bacteria, probably *Crenothrix*. These micro-organisms were all present in quite large numbers.

In the manipulation necessary in transferring the sugars from the sample bottle to the sterilize flask there was of course the possibility of contamination from the air, but such contamination could be only of a small number of organisms and these if they increased would produce fermentation. Since then no fermentation had taken place in the solutions of No. 1 sugar and the germs of fermentation were present in large numbers, these germs must, most of them at least have been present on the sugar in the sample bottle.

The samples used in making these solutions were taken directly from the centrifugals.

It is possible that fermentation may take place in these solutions of No. 1 sugar after a longer period of time and experiments to ascertain this are now progressing.

Kohala, July 13, 1896. EDMUND C. SHOREY.

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SUGAR IN LONDON.

It is generally acknowledged in the market that the existing state of things is almost entirely due to the ease with which large speculative commitments can now be entered into, and to the extraordinary development of speculation generally in connection with sugar, which is really dominated by a lot of operators, some of them almost unknown to the home trade. Nevertheless, it is these gentlemen now-a-days who settle the price of the day, and at their command sugar bought in the morning is either dear or cheap in the evening. The sugar merchants hang on the lips of their masters, and if one of the latter, however obscure, chooses to sell a few tons as a "bear" on speculation, or if he is forced to sell by financial necessities, the entire stocks of sugar throughout the kingdom are put down or up. A sale of fifty tons in this way causes the price of the stock of sugar honestly bought, landed and paid for, to be put down or up to the extent of 3d. or less in a day. What this stock amounts to there are no returns to show, but 100,000 tons is probably a safe estimate, and 3d. on that equals £25,000. A more absurd position can not be imagined.—*London Produce Review.*

BEETROOT SUGAR MANUFACTURE SEVENTY YEARS AGO.

The following letter, taken from the *Mechanic's Magazine* of February 26th, 1825, sounds rather strange in these days of modern progress:—

SIR:—As your correspondent, S. E., in Part 13 of the *Mechanic's Magazihe* expresses his desire for any information respecting the proper "process for obtaining sugar from red beetroot," I will with pleasure give the few particulars which I have received from the man who conducts the *first* manufactory established in France, I regret, however, to add, that from my imperfect acquaintance with the French language my account must be received as doubtful, though I believe in the principal points it is correct.

The beetroot is first well scraped, and when perfectly clean is placed in a wooden groove, about twelve inches long, at one end of which turns a broad wooden wheel, covered with short iron spikes; and in the opposite end of the groove is closely fitted a plug of wood which is pushed by hand against the beetroot, the iron-spiked wheel at the same time turning round and gradually reducing the root to a pulp. A trough, placed immediately under, receives the pulp, which is then mixed with quicklime to destroy the acidity. The pulp is next boiled over a slow fire never exceeding a certain heat. This last process is repeated two or three times, while an attendant skims off the impurities which rise at top. The pulp is, I believe, next separated from the saccharine juice by straining it in wire sieves; it is then put into large stone jars, and left in an airy place to cool. This produces the coarse brown sugar, which is afterwards refined by the usual process.

S. E. has understood that "fourteen pounds weight of beetroot produces one pound of raw sugar," but I think my informant told me that the proportion was "five pounds of raw sugar to one hundred pounds of beetroot."

The process of reducing the root to a pulp seemed to me unnecessarily slow, as there are but two grooves, fitted each with one root at a time. A little simple machinery might easily be made to work twenty or thirty grooves, and the same wheel, or barrel somewhat like that of an organ, would just as easily reduce the increased number to a pulp as the present contrivance does only two roots. * * *

I remain, Sir, yours, T. R.

P.S.—The above manufactory is near the Palace of Chantloup, the residence of Count Chantloup, whose permission I obtained to visit it.—*The Sugar Cane.*

THE FUTURE OF FARMS AND FARMING IN THE UNITED STATES.

(ANNUAL REPORT FOR 1895 OF J. STERLING MORTON, U. S. SECRETARY OF AGRICULTURE.)

The farms of the United States, averaging 137 acres each, are valued at more than $13,000,000,000. Those farms number four million, five hundred and sixty-four thousand six hundred and forty-one (4,564,641), and their average value in the census of 1890 is $2909.

The farm family, including hired help, averages six persons. By their own labor, with an additional investment upon each farm of about $200 in implements and $800 more in domestic animals and sundries (making a total farm plant of $4000), those families made for themselves during the year, out of the products of the earth, a wholesome and comfortable living.

The same farmers have, with part of their surplus-products, also fed all the urban population of the United States, poor and rich alike. Cereals, meats, vegetables, fruits, eggs, milk, butter, cheese and poultry have been supplied the village and city markets of the United States in abundance. It is probably safe to say that more than 40,000,000 of American citizens not living on farms have been so furnished with all the necessities and luxuries known as products of the varied soil and climate of the States and Territories of the Union.

During the fiscal year 1895 the United States exported to foreign countries domestic commodities, merchandise and products aggregating in value $793,000,000. The aggregate value of the agricultural products included in that sum was $553,215,317. Of the total exports Europe received a valuation of $628,000,000, or 79 per cent. of the whole.

Thus American agriculture, after feeding itself and all the towns, villages and cities of the United States, has also sold in the outside world's markets more than $500,000,000 worth of products. So the farmers of the United States have furnished 69.68 per cent. of the value of all the exports from their country during the year 1895.

But this large number of consumers, consisting not only of our own citizens, but of the citizens of all nations, have not been gratuitously fed, though their supplies have been con-

stant and abundant. With sound money of the least fluctuating buying power—money on a parity with and convertible into gold the world over—American farmers have been remunerated for their products.

The exact amount paid for the products of agriculture consumed in the United States during the year is not known, but it must have aggregated hundreds of millions of dollars. But all products, *i.e.*, those consumed at home and abroad, were in :

1870 (including betterments and addition to stock)	$2.447,538,658
1880	2,212,540,927
1890	2,460,107,454

No absolutely credible method of estimating products for 1895 is available at this time, but since production has not increased to any considerable extent, and the farm value of many of the chief products has decreased to a remarkable degree, it seems reasonable to assume a decrease in the total valuation of farm products since 1890. Say, as a rough approximation, the valuation is $2,300,000,000.

In the presence of these facts, in the front of these figures demonstrating that agriculture in this Republic has during the year fed itself, supplied all citizens of the Union engaged in other vocations, and then shipped abroad a surplus of over $500,000,000 worth of its products, how can anyone dare to assert that farming is generally unremunerative and unsatisfactory to those who intelligently follow it ?

How can the 42 per cent. of the population of the United States which feeds the other 58 per cent., and then furnish more than 69 per cent. of all the exports of the whole people, be making less profits in their vocation than those whom they feed when the latter supply less than 31 per cent. of the exports of the country ?

For the purpose of illustrative comparison, transfer the $4000 agriculturally invested in each farm of 137 acres to the choicest Wall street investment. Risk that money in railroad first-mortgage bonds, in bank stocks, or any other allegedly safe security which may be found a favorite among Shylocks, brokers, plutocrats, monopolists, money-power manipulators and multi-millionaires, and if it returns 6 per cent. it is a remarkably profitable investment in the eyes of capitalists. Therefore, $240 dollars is the annual income.

Follow the transfer of the farm money with that of the farm family to urban residence. Now, with the same labor in the city or village can they attain by hard work every day in the year, adding their wages to the $240 income, as much of independence, wholesome living and real comfort as the same amount of money in the land and the same heads and hands working on the soil generously and healthfully bestowed upon them, in the sweet quiet of a home, amidst flowers, trees, fruits and abundance on the farm ?

But the declaimers of calamity declare that the farms of the United States are sadly burdened with mortgages. The census of 1890, however, develops the fact that on the entire valuation returned for farms there is only a mortgage of 16 per cent. It will be borne in mind, too, that many thousands of acres of mortgaged lands of great value which are returned as farms were such only before they were mortgaged. They were purchased to plat as additions to cities like Chicago, Brooklyn, Kansas City and Omaha, and ceased to be farm lands as soon as mortgages representing part of the purchase price were recorded. Such lands are, therefore, wrongfully included and returned as farms. They show an aggregate of many millions of liabilities.

On each $10,000 of rural real estate there is, then, an average incumbrance of $1600. And when the fact is recalled to mind that a large part of all farm mortgages is for deferred payments on the land itself, or for improvements thereon, what other real or personal property in the United States can show lesser liabilities, fewer liens in proportion to its real cash-producing value ? Certainly the manufacturing plants of this country, neither smelting works, mills, iron and steel furnaces and foundries, nor any other line of industry, can show less incumbrance on the capital invested.

Railroad mortgages represent 46 per cent. of the entire estimated value of the lines in this country. On June 30, 1894, 192 railroads were in the hands of receivers ; they represent $2,500,000,000 capital—nearly one-fourth of the total railway capitalization of the United States.

On that date how relatively small was the amount of money in farm mortgages compared to the value of the lands securing them ?

During the year 1894, according to the five reports made that year to the Comptroller of the Currency, the average indebtedness to their depositors of the national banks was $1,685,756,062.45. Besides the above, State and private banks, loan and trust companies and savings banks owed their depositors during the same period an average of $2,973,414,101, making a total of $4,659,170,163.45.

And in this year, 1895, by the responses of national banks to four calls thus far made upon them by the Comptroller of the Currency, their aggregate indebtedness to depositors is shown to be $1,719,597,911.33; State and private banks, loan and trust companies and savings banks show an aggregate indebtedness to their depositors of $3,185,245,810, making a total of $4,904,843,721.33.

These figures show an enormous and constant indebtedness of the banks and bankers alongside of which the money in farm mortgages and the debts owed by farmers are relatively insignificant. The debts of railroads, bankers, manufacturers and merchants entitle them, and not the farmers, to be called the "debtor class" in America.

In 1880, 44 per cent. of all Americans engaged in gainful occupations were in agricultural pursuits. Applying the same ratio to the total population, we should have a farming population in the United States for 1880 of 22,068,434. The returns of the Eleventh Census show that the rural population has increased by 4,078,522 during the decade 1880—1890. Adding this to 22,068,434, we get a rough approximation of the farming population in 1890—26,146,856, or 42 per cent. of the total—and the number of farms in the United States in 1890 being 4,564,641, the average number of persons on each farm would thus, approximately, be six.

There were in 1890 improved farm lands in the United States representing an area of tilled and productive fields amounting to 357,516,755 acres. At that time the United States contained 65,000,000 people. Therefore, each citizen of the United States, with an equal per capita distribution of farm products, was entitled in the year 1890 to receive the cereals, vegetables and other products evolved from 5½ acres of cultivated land, less the amount consumed for the maintenance of domestic animals. These figures illustrate the

importance of having some other than an exclusive "home market." No legislation, however encouraging or protective, will be able to create an American demand, appetite and digestion of sufficient magnitude to consume all that American farmers produce. Human beings capable of eating the food products of even 2½ acres each year have not yet been developed. Until they are, or until the population of the United States has been quadrupled, foreign markets for farm products are essential to the prosperity of the plowmen and planters of this country.

It will be observed that between 1880 and 1890 the proportion of the people engaged in agriculture declined 2 per cent., and that to-day there are only 42 persons in rural pursuits to 58 in mercantile, manufacturing and other callings common to the great populational and industrial centers. Fifty-eight per cent. of the people cannot always be satisfactorily maintained upon the profits of exchanges among themselves in the villages and cities. Food for all must come from the earth—from tilled fields. The population of the United States in 1915—a quarter of a century after the census of 1890—admitting that the increase will diminish very materially as compared with that of each preceding quarter of a century since the Government was established, will, no doubt, number 120,000,000.

The value of farm lands, being governed by the relation of the supply of those lands to the demand for them, will, therefore steadily increase. The area or supply remains stationary, or, from careless tillage, decreases. But the added millions of our population augment and intensify demand. Therefore the prices of farms must in the next twenty years, and possibly in ten years, advance more markedly than those of urban real estate. The owners of fertile fields, however, must understand now that agriculture is swiftly becoming a scientific profession. The more the farmer cultivates his mind the better and more profitably he can cultivate his fields. The Department of Agriculture has expended during each of the last two years a greater per cent. of its appropriations in the application of science to farming, to correct tillage and fertilization, than ever before.

Each season teaches anew the imperative necessity of more

and more scientific knowledge for those who are to plow and plant profitably. The markets of the world will finally be invaded, captured and held by those who produce cereals and meats, vegetables and fruits at the least cost, and can therefore most cheaply sell. Competition is fiercer every year. American inventions, improved implements and machinery for saving labor on the farm and for saving the fruits of that labor are exported to Africa, Europe and South and Central America. Thus our own recipes and contrivances for cheap production are used abroad to strengthen the abilities of foreign farmers to contend with our own in foreign markets. Information direct from Russia, from Argentina and from Africa tells of larger sales of American agricultural implements and machinery annually in each country.

Thus competition is made far more formidable by the increased use in foreign parts of our own improved machines and implements with which American manufacturers more than ever are supplying them. In view of such a state of facts, farmers must, to be successful, study probable demand and adjust supply to its needs. Forecasts of markets and their conditions can, by diligent study and attention, be so accurately made as to nearly always secure producers against loss. The profits of planting must largely become premeditated. The struggle to obtain for the offerings of the American farmer the markets of the globe is fiercely carried on between him and every other farmer in the world. They are brothers in agriculture, as were Abel and Cain, "bringing the fruits of the ground" for approval. He who brings the best and cheapest will find approval in welcoming purchasers and remunerative prices. The success of the farmer of the future, therefore, depends more upon mental than upon manual effort.

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PRACTICAL NOTES FOR FARMERS.—Continued.

[CONDENSED FROM CORRESPONDENCE WRITTEN FOR THE MACKAY STANDARD, BY J. D. HENNESSEY, LATE EDITOR OF THE AUSTRALIAN FIELD.]

There is one matter which has much to do with successful cultivation, and seems to be little understood. I refer to the influence of tillage on soil moisture, and the successful growth

of crops during dry seasons. Now, first of all, there is a popular error that land sheltered from the sun by a crop is kept moister than uncropped land. This belief has, no doubt, arisen from the fact that, owing to dews and shades, the surface soil is damper. But let us get at the facts, for the agriculturist wants to know the causes of increase or decrease in his returns per acre, under certain conditions.

First, then, all plant food is absorbed by the plants in a state of solution. In perfectly dry soil there cannot be any growth. A crop is continually pumping up moisture through its roots. I may prove this by an illustration. Most people know that evaporation lowers temperature—thus, a water bag cools the water by the evaporation which is continually going on through the material of which the water bag is made. Now put your hand upon a growing, healthy leaf under the sun. How cool it is! What causes the coolness? Evaporation which is going on through the leaves under the influence of the sunlight. So the roots are continually taking up moisture from the soil to be evaporated by the leaves of the plant, as it feeds upon the plant food thus conveyed to them in solution. The moment the moisture ceases the plant commences to flag and droop. This suggests the importance of keeping land under growing crops free from weeds, for all vegetation feeds in the same way, and every weed is pumping up moisture, and thus in dry weather is defrauding the crop.

But take another idea here. Well-manured land (that is soil in good heart containing abundance of plant food) will stand better than poorer land deficient in plant food. It is calculated that for a plant to add one pound of additional matter to its weight it has to evaporate through its leaf surfaces from 250 lbs. to 300 lbs. weight of water; therefore, the poorer the soil the greater the necessary evaporation of water for it to extract the plant food necessary for its proper growth. Of course the character of a season will greatly affect the growth of a crop and its evaporating power; but I am referring now to an average dry season in Australia.

An illustration of this important subject of the evaporation of plants is to hand from the experimental station at Rothamsted, England. And let me say that this is a matter

which every farmer and dairyman or other grower of crops or green stuff should try and thoroughly understand. During a hot and dry summer a crop of hay grown on manured land yielded 29½ cwt. per acre, while another grown on unmanured land yielded only 5¾ cwt. per acre, but the first in yielding a return of nearly six times of the second, had only absorbed two inches more of water from the soil. The conclusion is, that well-manured soil not only gives a larger yield acre for acre, but will, in proportion to its greater yield, require less water to supply itself with plant food, and therefore stands drought much better.

But another very important matter comes in here, which is often insisted upon by agricultural experts; but which, I think, needs to be popularly explained—that is, the cause and cure of surface evaporation. The previous remarks show the importance of keeping all the moisture we can in the soil for the use of the growing crops; but the opinion among farmers as to the best means of retaining it differs very materially. Now let me say, at the outset, that more often than not, on light soils in a dry, but not droughty, season, crops suffer from want of sufficient moisture on account of excessive evaporation. This takes place, it will be remembered, through the leaves of the plant, and also direct from the surface of the soil; for the soil itself has the power to suck up water from below by means of what are called capillary tubes.

A simple illustration will explan this. Everyone knows that the best and quickest way to water plants in pots is to stand the pot in a saucer and pour the water into it. In half an hour's time the water has been sucked up from the saucer by the dry soil, and it is found to be moist to the very surface. The water ascends from below by minute capillary tubes. This capillary action may be watched by placing one end of a lump of sugar in some tea or coffee, or by placing one edge of a piece of blotting paper upon some spilt ink. The fluid in each case runs upward into the texture of the substance. In the same way the bottom moisture in the soil is continually making its way up to the surface, where it escapes into the air as vapor. Now, the agriculturist who wants a big crop must, as far as possible, stop this, and the only prac-

tical way to do it is by breaking off the capillary tubes so that they cannot reach within an inch of the surface. This is done by thorough cultivation. Thus it is seen how important it is to leave room between crops to hoe or work a cultivator, and also to never let the surface soil become caked. In caked surface soil the capillary tubes are intact, and are hard at work every hour of the day lifting the moisture to the surface, where it evaporates and is lost. By keeping the top layer of the soil loose these tiny tubes are broken off and the air is admitted to the surface soil, so that it transmits less heat to the subsoil, keeping it cooler, and thus in two ways the farmer fights the drought.

You see the crop wants every possible pound of water in that soil for the purpose of growth and development, and the aim of the agriculturist must be to shut off every possible means of exit, except through the leaves of his crop; so that every pound of water is made to do its proper work, in furthering the growth of the plants, before it can get through their leaves, by transpiration into the atmosphere.

Now this applies to every crop that is grown. And to those who have not got a Planet Junior horse-hoe cultivator, my advice is to get one; it will pay for itself twice over, and more, in one season. There is no use in working it deeply among the growing crops; an inch, or less even of thoroughly worked surface soil acts wonderfully as a mulch, and as a preservative against the surface evaporation of misture. It is not tillage that is wanted, remember, but a slight surface mulch; and the man who, by cultivation, keeps his growing crops continually in this state will be agreeably surprised in the increase in his returns per acre. One half inch of stirred surface soil may, in a dry season, mean all the difference between success and failure in a crop! That statement has been made before, and it has been laughed at by men who thought they knew everything; but so have a number of other things been laughed at that are equally true. Let the men who think that surface cultivation in dry seasons lets out the moisture carefully read what I have said, and give the above plan a fair trial and they will find the proof of the pudding in the eating of it.

A have no faith in the talk, common among some people,

about Australia being left behind. The fact is, we Australians are helping to make the pace for half the world; and with all our partial knowledge in regard to matters agricultural among so many of the rank and file, are wonderfully quick at picking up new ideas and making use of them. Then, too, our geographical position (half way between the new world of America and the old of Europe) is all to our advantage, for here we get the best of both in the shape of agricultural implements and machinery, and can pick out that which we find best suited for our own requirements. I was struck with this at the show. Tools and implements from all parts of the world—but notably from America—were displayed there in actual work. Take up an English book on modern agriculture and you will scarcely meet with the name of a single foreign manufacturer. Go on to an English farm, and the plows and draining tools, and cultivators and hoes and machinery are English manufacture, but that they are not always the best adapted for our soils and condition is proved by the fact that some of the oldest English firms are now imitating the style and shape and pattern of plows and other implements which were originated and thought out in the United States. In the matter of machinery and implements, Australia is Anglo-American, and this certainly has its advantage.

It would be noticed in the show that English-made implements have the appearance of being more substantial in their build. And, in some cases, this is an advantage; but recent years have shown a tendency on the part of makers to combine strength with lightness, by the use of tubular and grooved steel wherever possible, for it is now generally recognized that every additional pound of unnecessary weight means a greater tax upon the horse. Compare, for instance, one of the old scarifiers (still, I am sorry to say, largely used in some districts) with the Planet Junior No. 6, all steel horse-hoe and cultivator. If every old-fashioned tool of the kind referred to could be destroyed throughout all Australia it would be a benefit to agriculture. Every implement merchant of note was showing these Planet Junior tools at the show, and wherever they have been adopted they have proved a boon to the purchaser.

There is one truth which needs to be reiterated over and over again everywhere among farmers, with equal industry, the man with the most modern improvements will beat all competitors.

It is said that it was the American war which gave the first great impetus to the invention and perfecting of labor-saving tools. Hundreds of thousands of men were suddenly called away from the field and the farm. Who was to grow the food and carry on the processes of agriculture? The urgent need called for a marvellous exhibition of ingenuity. Necessity became the mother of invention, and labor-saving implements in all directions made their appearance to do the work of the fathers and sons who had gone to the "front." This is what our American cousins say, and is certainly true, that about this time remarkable strides were made in the perfecting of labor-saving tools for the various processes of agriculture.

That cultivators are growing in favor for breaking up land is unquestionable, and the pains taken by implement-makers to remove what are regarded as defects in plows is evidenced by the remarkable number of patents filed in the patent offices of both England and America and the Colonies. Over 1000 patents have been secured in Great Britain alone, and as each one, on an average, includes several claims for distinct improvements, there must be several thousands of improvements of the different parts of the ordinary plows in use. I shall not attempt to enumerate even the principal kinds of plows; all that I will say to the new chum is, if possible, get someone who is competent to advise you, to see your farm or orchard before you buy your plow. The buying of that one implement may almost decide your fate. If you must have a general-purpose plow (and, between ourselves, I believe they are mostly a mistake) see that it has a steel beam, steel breast and steel share. But take advice, friend, and, if your place is not a stiff soil, remember that one man with three horses will do as much work with a good double-furrow plow as two men and four horses will with the best single-furrow plow ever made. But its a matter now-a-days which no one can dogmatize upon; before a man buys a plow he should know his land and decide exactly the kind of work he expects it to do.

DAIRYING.

The previous talk in regard to soils and crops is of special importance just now to the Australian dairy farmer. The strides made by countries such as Denmark and Sweden are almost wholly attributed to their accurate and advanced knowledge of practicual agriculture. Denmark and Sweden have achieved their very decided measure of success, in spite of an unkindly climate, which necessitates the stall-feeding of cattle during a great portion of the year, and in many parts unkindly soil where there is no pasture. What would Australian farmers think of dairying in a country where cattle had to be stall-fed all the year round? That is said to be the case in large areas of dairy-farming country in Sweden, and yet Great Britain derives about one-eighth of all its supplies of butter from that country, although at the average price paid for butter in good years, the milk cannot yield the Swedish dairymen more than about 3½d. per gallon. Depend upon it, there is no up-to-date dairying now-a-days on native grasses. The man who is content to go on without artificial grasses and green stuff may make a bare living, but he will never make dairying a success.

Butter-making is becoming a lost art in many English farm-houses, simply because the farmer finds it is better to sell his milk at from 5d. to 6d. per gallon than to turn it into butter from 3¼d. to 4d. per gallon. Dairy statistics show that England has only one cow to provide milk for thirty-two persons; Wales, one cow for six; Scotland, one for nine; Ireland, one cow for three. It will be seen that English farmers are under no special necessity to make butter, for, with a population of 27,501,362, the number of cows is 1,759,083, which, assuming that the average cow produces 500 gallons of milk annually, would give thirty-two gallons per head of the population.

As far as my experience serves me, there is no intensive dairying worth speaking of in Australia. To put in a word, "intensive" dairying, is to make the most of a small area; to keep say fifty cows in full milk all the year round on fifty acres and grow everything, or almost everything, upon the place. Of course the whole thing depends upon having the

man at the head of affairs to plan and put the plans into practical effect. There's many a man has as much as he can do to keep twenty cows on two hundred acres, while others can, and do, run a cow, or nearly so, to every acre of their farms.

It may be as well to point out, first of all, the advantages of making every square yard of the farm do its full share of the work. To get the most you can out of everything means saving of time in going to and fro. The old idea of putting sheds and yards a long way from the house on account of dirt and smells is exploded, for intensive dairying says: You must have no dirt and no smells—there is not room for them, and no necessity. It is a question of careful planning and good arrangement. The loss of time in tramping about most farms is deplorable, and, to a large extent, through the buildings and yards and pigsties, etc., being unnecessarily scattered. Intensive dairying aims at much, in little, in everything upon the farm, and especially when connected with irrigation; its the thing which pays, and which it is a pleasure to be connected with, while the saving in the way of fencing, gates, and general wear and tear, is, on the face of it, very great.

To begin with the herd, for that is the essential matter in darying, I would again urge the necessity for high breeding and good temper there; better to give ten pounds for one thoroughly good cow than the same amount of money for five scrubbers. And, in regard to the bull; better by far to pay for service than use an inferior animal. I was impressed with something I met with some time ago from the pen of Dr. G. Wilson, in regard to the intelligence of well-bred animals, and, as it bears upon cows just as much as horses, I give the extract. He says: "There is just as much difference between the intelligence of blooded animals and scrubs as there is between the intelligence of educated and uneducated persons. As a rule, educated men are as 'kind as kittens.' Thoroughbred equines are altogether different animals. They 'take' to education as a calf does to milk, and seem to delight in being tutored. In acquiring knowledge, there is as much difference between them and scrubs as there is between bright white men and African negroes. They pos-

sess the brain, and know or learn many things by intuition." Now the Doctor's remarks touch the very heart of the highest success in dairying. Kind disposition in a cow with bright intelligence, and good treatment, means plenty of butter fats, and the man who runs a dairy with vicious, kicking and ill-tempered animals will never achieve success. But good temper is one result of good breeding.

But, to be successful in dairying, it must be the one thing, and everything else must be secondary to it. Mixed farming is very well in its way—there is no need to put all the eggs in one basket; but the average farmer who tries, in these days, to dabble generally in everything, will make a very poor thing of the whole concern. If you are going in for growing wheat, make that your study, and milk a few cows for the house, and keep a few sheep etc., but let there be one thing which you do with all your might. In dairying, the days of the general-purpose cow are the past. To expect milk, butter and beef from one and the same beast is out of all reason. And do not allow anyone to mislead you here; because certain breeds of cows are now finding favor in England does not prove that they are suited for you, unless you supply a city milk trade. Then the cow which will give the most milk, winter and summer, is what you want, and the question of butter-fats need not trouble you. If you are dairying for butter, the cows which will yield the largest percentage of butter-fats are what you want. Breeding, feeding and all else must be made to turn in this direction.

(*To be continued.*)

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CULTIVATION OF COFFEE IN MEXICO.

The cultivation of coffee in Mexico dates from the commencement of the present century, and it has long been known that many districts in various parts of the country are probably as well suited to the growth of the plant as any in the world. The unsettled state of the republic, however, retarded progress in this as in many other respects, and it is only of late years that the capabilities of the country as a coffee producer have attracted the attention which they undoubtedly deserve.

The almost total failure of the coffee plantations in Ceylon and all Eastern countries, and the recent bad coffee harvests in Brazil, together with the fall in silver and the consequent reduction in the price of land and labor in this country, have encouraged planting in Mexico, and the profits which have already been obtained seem to justify a further extension of the industry. Under these circumstances and in view of the fact that before long a considerable amount of British and American capital will probably be invested in coffee plantations in Mexico, some information on the subject which has been obtained from good sources may perhaps prove of interest.

A considerable area in various States in Mexico is suited to the growth of coffee, but as many conditions are required to ensure its profitable cultivation, great care should be taken in selecting the site of the proposed plantation.

The following are the principal points to which attention should be paid:—1. Soil; 2. Climate; 3. Communications; 4. Labor.

1. *Soil.*—The coffee plant can be cultivated on various descriptions of soil, but it thrives best on light, porous loam of considerable depth, which has not before been brought under cultivation. Clay land should generally be avoided as unsuitable.

In Mexico the best land is generally covered with virgin forest, and clearing it is the first operation the planter has to undertake. A rolling surface is to be preferred, as it affords greater facilities for drainage, but very steep slopes are not as a rule to be recommended.

2. *Climate.*—The best temperature is one varying between 65 deg. and 85 deg. Fahr., which can be obtained in nearly all of the States in the Mexican Tierra Caliente. Frost kills the plant, and the fierce rays of the tropical sun if untempered by abundant moisture are almost equally injurious. Most authorities on the subject agree that coffee thrives best where the rainfall is at least 100 inches per annum, and where it is pretty evenly distributed throughout the year. It should be noted, however, that coffee has been and is cultivated with some success in districts (such as Cordova, in the State of Vera Cruz), where the rainfall is far less. Immun-

ity, or at least protection, from high winds is very desirable. An eastern exposure is to be preferred where the weather is generally cloudy, and a western in a sunny climate. Some writers attach great importance to the height of the plantation above the sea, and assign limits of altitude for the choice of a site. It has, however, been shown by experience that suitable climatic conditions are to be found at a wide range of elevation, and that coffee of the highest quality can be grown almost at the sea level, notably in Liberia. In selecting a site for a plantation too much attention cannot be paid to soil and climate, and it has always been found to be good policy to give even a comparatively high price for land where these were thoroughly satisfactory.

3. Facilities of communication are also of great importance. Railways have been much developed of late years, and their extension is being carried on rapidly. Still, some districts which would otherwise be very suitable for coffee planting will probably for some time to come be too inaccessible to be recommended.

As freight is generally cheaper by water than by land, a navigable river in the neighborhood of the plantation is to be preferred even to a railway. In many parts of the country roads can scarcely be said to exist, and the necessity for railway or water communication to within a moderate distance of the plantation is even greater than it would be in more advanced countries. It must also be borne in mind that the cultivation of coffee is almost always combined with that of other crops, some of which are very bulky and cannot easily be disposed of without facilities of transport.

4. It is very desirable to settle in a district where labor is easily obtained, and although some authorities maintain that imported laborers are more easily controlled, the expense of introducing them is considerable, and many practical difficulties have to be overcome.

The wages paid vary in different districts, but the average rate for the whole country was officially estimated in 1892 at 37c. Mexican currency (or 9½d.) per diem. Since that date prices have certainly risen, and the daily wage is now generally placed at about 50c. (1s. 1d.). Both employers and employed frequently prefer piece-work to a daily wage, parti-

cularly for such work as clearing land before planting the coffee.

The Mexican laborer requires careful handling if the most is to be made of him. A rich soil and a tropical climate supply nearly all his requirements, with little effort on his part, and he will not easily submit to harsh or unfair treatment from his employer.

Many planters find it advantageous to give their laborers small allotments, which they can cultivate themselves, in addition to their wages. They maintain that the laborers themselves appreciate this system, and that where it is in force they become more disposed to remain working on the same estate.

In some districts the labor question is the planter's chief difficulty. The coffee plants must be kept clean, and the berries must be picked at the proper time. These operations cannot be postponed, and it is useless to undertake coffee cultivation without a sufficient supply of hands.

As the coffee lands are almost invariably covered with forest or jungle, the planter's first task is to clear this away. The brushwood is cut out with the "machete," a species of cutlass; and the heavy timber is afterwards felled with an axe. Such timber as can be used on the estate or can be disposed of is then removed, and the remainder is afterwards fired. On most plantations in Mexico it is usual to preserve the large trees for shade; but in districts where the best climatic conditions exist this is unnecessary. Much shade is in itself detrimental to the full-grown coffee plant, and localities where it is required owing to great sun heat and lack of proper moisture should be avoided. Although there can be little doubt that where the climate is most suited to the growth of the coffee plant shade is unnecessary and even injurious, the practice of having most of the larger trees of the natural forest as shade for the coffee trees is so general in Mexico that it cannot be passed by without fuller notice. Many persons possessing considerable experience of coffee planting in Mexico will even be found to maintain that shade is absolutely essential, and it is quite possible that in the districts with which they are best acquainted such may be the case. On the other hand, in countries where coffee has been

extensively cultivated for a longer time than in Mexico, the plant certainly succeeds better without shade. Further experiment is perhaps required before a definite conclusion can be arrived at as regards this country, but it will scarcely be denied by the most enthusiastic supporter of the Mexican system that the tendency has been to make the shade too thick. The truth seems to be that coffee can be cultivated profitably in districts which are not naturally suited for it, and that in some of these shade is really necessary to protect the plant from the excessive heat of the sun. Owners of land in comparatively hot and dry districts may find it necessary to shade their plants with forest trees or, in extreme cases, even with bananas, but such localities should be avoided by persons who have a free hand in the selection of a site for their plantation.

When the clearing of the land is commenced, a suitable spot is selected for sowing the coffee-bean, in order to establish a nursery, to be made use in the following year. Trees required for the first planting are generally purchased from existing coffee plantations. The spot selected for the nursery should be thoroughly cleared of trees, should be easily irrigated, and of average fertility. In Mexico it is usual to leave some of the trees as shade, but in other places it has been found that the drip is injurious to the young plants, and that it is far better to arrange a shade of cut brushwood. Long ridges are formed with a width of from four to six feet, with walks between, in order that the workmen may later on reach the plants when it is necessary to clean them. In forming the ridges the earth should be well broken with hoes to a depth of at least six inches, the stones picked out, and the surface smoothed down. The ground is then ready for the coffee-bean. The beans are dispulped and allowed to foment, so as to admit of the saccharine matter being washed off. When this is done the beans that float on the top of the water are taken away as being unsuitable, and those which sink to the bottom are placed to dry for one day in the sun, and for two additional days in the shade. They are then ready to be sown.

The sowers make small furrows in the earth with a pointed staff across the ridges, at a distance of five inches

apart, and two and a half inches deep. Another laborer follows, placing the coffee-beans in the furrows four inches apart, until the ridge is finished. The beans are then lightly covered with well-sifted earth, without being pressed down, and are afterwards watered with a sprinkler. Subsequently the ground is watered every two or three days, and in from forty to sixty days the plant begins to grow. Care must afterwards be taken to keep the ridges free from weeds, and in about eight months the plant is ready for transplanting.

Slightly different methods are sometimes adopted, and sometimes the young plants found growing underneath the coffee trees are planted direct in the plantations, but this system is no longer considered a good one, and has been generally abandoned.

The time for sowing varies in different States, and in some of them sowing is carried on at all times of the year. It is desirable, however, to time the sowing of the seed in the nurseries in such a way that the plants may be from eight to nine inches high in the planting season. It may be noted that in Mexico the plants are often kept much longer in the nurseries, but this plan has not been found to answer in other countries, where the scientific study of coffee cultivation is much more general than is the case here.

In transplanting the trees to their final destination, the laborers should be given a base line, from which a rope should be stretched at right angles, with marks at the required distances, say six feet apart. An acre of ground holds about 950 trees, planted six feet apart, with seven feet between the rows. This opening is very generally adopted, though some planters in this country prefer to plant at greater distances. Special care should be taken in planting the trees that the tap root is not twisted or bent. Nipping off the tender portion, if done in the right way, does not materially affect the growth of the tree, and obviates the danger of its being turned up, which in a year or two kills the plant. The other precautions to be taken in planting do not require special mention, as they are such as would commend themselves to anyone having even a slight knowledge of arboriculture. The best part of planting is the early part of the rainy season.

Irrigation and also manuring are sometimes resorted to in Mexico, but if a suitable site has been selected, neither will be necessary on a new plantation. It may be added that the practice of manuring the nursery ground is not a good one, as it unfits the young plants for their ultimate destination.

It is very necessary that the young trees should be kept clear of weeds, a matter to which in Mexico insufficient attention is generally paid. Weeding should be carried out every month, and though it is an expensive operation, the cost of the labor will be amply repaid by the yield of coffee. Hand weeding is to be preferred as being both cheaper and more effectual.

In Mexico, where empiric methods have hitherto largely prevailed, there is some divergence of opinion on this subject. In other coffee-growing countries, however, no doubt is entertained that the plant should be topped at five feet from the ground, the object being to confine the sap, so that not only primary branches but secondaries and tertiaries may also bear their crop from nine inches from the ground upwards. On rich soils the trees may be allowed to grow taller than on poorer lands. Topping should be done with a knife, and only on the matured wood, otherwise the wound will bleed and the tree will be ruined. The trees are generally pruned between the second and third year, after the crop has been gathered. The operation is repeated in subsequent years, and the plant is kept as far as possible in the shape of a low symmetrical bush, without straggling or unproductive branches. On badly managed plantations, and particularly where the shade is too thick, the plants become drawn up, poorly furnished, and comparatively unproductive.

The coffee berry ripens at different seasons in different places, but in most localities the principal picking takes place in the late autumn, and in the winter. The berries are picked off as soon as they become bright red in color, and either the same evening or the following day the pulp is removed by means of a machine called a pulper. Small native cultivators do not, as a rule, use a pulper. They first dry the berry and then tread out the grain from the dry husks with the feet.

The berries fall from the machine into a receptacle of

stone or wood, in which they remain from twenty to twenty-four hours. They are then passed into a lower receptacle, into which water is poured, and are stamped or trampled upon until the sticky glutinous substance disappears. The beans which float on the top, being of inferior quality, are collected and dried separately, and the remainder are spread out in the yards or on mats to dry. This requires four or five days' exposure to the sun. The parchment-like skin is loosened by rubbing the berries between the palms of the hands. The coffee when dried is stored in granaries, and afterwards beaten, winnowed, sorted, and packed for export. All these operations, though somewhat complicated to describe, are really of a very simple character, and the whole art of treating the coffee after it is gathered, though requiring some care and attention, may be acquired with very slight experience. Machinery, which is comparatively inexpensive, is gradually taking the place of hand-labor, and is, no doubt, more economical, particularly on large plantations, but the older methods are still very generally employed. It has been estimated that a complete set of machinery for a large plantation would cost from £600 to £1100 On small plantations, however, a hand-pulper costing some £12, or rather more, will probably be found sufficient machinery with which to commence operations, more being added as occasion requires.

The intending planter will find a capital of £1500 amply sufficient for his requirements. It is far better to begin planting on a comparatively small scale, and to gain experience of the country and the business before embarking on an unnecessarily large undertaking. Some 250 acres is as much as a beginner should attempt to deal with, and even of this only 200 acres should be planted with coffee, the remaining fifty acres being left under timber or applied to other purposes.

Good lands for planting can be obtained at from 18s. to £1 10s. per acre, and sometimes even cheaper. If then we take the mean between these two prices, 250 acres would cost £300, and the planter with £1500 capital would still have £1200 in hand with which to meet initial expenses and to maintain himself until his plantation came into full bearing. At first sight this sum will appear unnecessarily large, but in

a country where credit is not easily obtained, and where the interest on borrowed money is very high, it is well to hold a reserve of capital as an insurance against unforeseen accidents. The failure of a large number of foreigners in this country may be attributed to neglect of this precaution.

This is a subject on which there exists an extraordinary diversity of opinion, and many estimates, though quite honestly put forward, are, in fact, far too favorable. Calculations based (as is frequently the case) on the ascertained produce of a single plant are especially misleading, for, however favorable the conditions may be, the different plants vary both in the quantity and quality of their yield, and some are altogether unproductive. Perhaps the best plan is to take the average cost of cultivating an acre, and then to give an estimate of the value of the crop for the first five years. The following figures will be found to be pretty near the mark, but, if anything, they show a smaller return than may be expected if all the conditions are favorable :

COST OF CULTIVATION PER ACRE DURING FIRST GIVE YEARS.

	Amount. £ s. d.
Clearing land	1 4 0
Staking and digging holes for 1000 trees	0 14 0
Purchase of 1000 young coffee trees	0 10 0
Planting 1000 trees	0 6 0
Replacing loss of coffee trees	0 3 0
Monthly cleaning for five years	6 0 0
Cost of harvesting 2600 lbs. of coffee, including freight, taxes, etc., at 8 Mexican cents per lb.	21 10 8
Total	£30 7 8

PRODUCE AND RECEIPTS PER ACRE.

First year	*Nil.*
Second year, 200 lbs., sold at 21 Mexican cents	£ 4 11 0
Third year, 400 lbs.	9 2 0
Fourth year, 800 lbs	18 4 0
Fifth year, 1200 lbs.	27 6 0
Total	£59 3 0

In making these calculations it has been assumed that a good site has been chosen, and that the land and its produce have been properly treated. On the other hand, the price obtained for the bean—a matter which is not entirely in the planter's control—has been estimated at a low figure. It may be mentioned, however, that scientific cultivation of the plant and careful treatment of the bean, after picking, will

often raise the value of the produce by improving its quality as much as 25 per cent.

The cost of making the nursery and the necessary roads or tracks have not been included in the above estimate, but these expenses are not heavy, and appear altogether inconsiderable when calculated per acre. Moreover, as this work is of a permanent character, it may fairly be charged to capital account. The same may be said of buildings, tools, etc., the cost of which has been estimated as low as £50 for a moderate-sized plantation. It seems unlikely, however, that anyone accustomed to live either in Europe or the United States would be satisfied with so low a standard of comfort as is implied by these figures. The cost of the house must, of course, largely depend on the habits and inclinations of the planter; but, if he be a person of moderate requirements, some £100 to £200 should cover his expenditure on this head.

In treating of the expense of starting a plantation it should be mentioned that the cultivation of other crops is frequently combined with that of coffee. For instance, maize may be advantageously planted between the rows of coffee plants on newly-cleared land. The shade is most beneficial to the trees at this stage of their growth, and the profit on the crop may be reckoned at about 25 per cent. on the cost of clearing the land.

In its fifth year of growth the coffee plant attains its full power of production, and the estimated yield for that year may be accounted the normal crop. By the time, too, the initial expenses in connection with that part of the plantation will naturally have ceased. The account for the sixth year should, therefore, stand approximately as follows:

EXPENSES PER ACRE IN SIXTH AND SUBSEQUENT YEARS.

	Amount. £ s. d.
Cleaning or weeding	1 4 0
Pruning, etc.	0 5 0
Harvesting, etc., 1200 lbs. coffee	10 8 0
Total	£11 17 0

RECEIPTS PER ACRE IN SIXTH AND SUBSEQUENT YEARS.

1200 lbs. coffee at 21 Mexican cents	£27 6 0

It will be seen that these figures would admit of liberal allowances for interest on capital and for personal expendi-

ture, and would still leave a substantial balance in the planter's favor.

In purchasing an estate in Mexico a new-comer should, as a rule, have recourse to a reliable foreign agency. Direct negotiations with the owners of the soil are often extremely tedious, and they should not be undertaken by anyone who does not possess a thorough knowledge of the country. Care must, of course, be taken to obtain a good title to the land purchased, and in most cases this can now be done without much difficulty or expense. In some districts the Indian villagers lay claim to certain rights over adjoining lands, and however unfounded such claims may be, they are sometimes a source of great irritation and consequent annoyance to the foreign planter. It will almost always be found, however, that these difficulties may be overcome by a little tact and liberality.

A foreigner buying real estate should, if he desires to preserve his nationality, take the proper legal steps to do so.

The intending planter will generally do well to spend some little time in the country before making a purchase, and should, if possible, acquire some practical knowledge of his business at an existing plantation. He will be apt to think that, by waiting, he is letting slip many a golden opportunity, but such opportunities will recur later, and the experience he will have gained will save him much loss and disappointment. A considerable number of small foreign capitalists in this country would probably admit that for a year or two after their arrival, experience was their only profit, and that it had been gained at a needlessly high price.

In order that this report may be comprehensible to English readers, all values have been given in sterling, calculated at 26d. to the Mexican dollar. Mexico, however, uses the silver standard, and though the silver price of labor, etc., has not altered very much, the equivalent price in gold has fallen considerably of late years, and remains an ever varying quantity. It is obviously to the advantage of the English capitalist settling in Mexico that the price of silver should remain low as compared with gold; first, he receives more silver dollars in exchange for his sterling capital, and secondly, whilst most of his outgoings are in the cheaper currency, any produce exported is ultimately paid for at gold rates.

In conclusion it may be mentioned that there is probably no country in the world where the settler must more exclusively depend for success on his energy and ability, and that it is far more difficult than in Eastern countries to secure the proper conduct of a business without the constant supervision of the person directly interested in it. Moreover, different problems have to be faced in different parts of the country, and in some localities coffee cultivation has scarcely yet passed the experimental stage. It is impossible to make exact calculations of the profits of an undertaking under such conditions.

The total exports of coffee from Mexico for the past five years are stated in the Mexican official returns to have been as follows:

Year	Quantity. Cwts.
1890-91	287,910
1891-92	217,216
1892-93	285,115
1893-94	370,564
1894-95	324,355

The principal coffee-producing States are Vera Cruz and Oaxaca, to which may be added Michoacan. Colima coffee is also well known in the market, though the quantity produced there is much smaller than in even the last of the above-named States.—*British Consular Report in the Sugar Cane.*

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THE DECLINE IN PRICES.

It is the habit of *Bradstreet's* to keep a comparative record of the prices of leading articles. It presents in its last issue a table which confirms those so frequently printed in the *American Grocer*. It is from the manager of the retail department of a prominent grocery store at a large Western city, which has recorded changes of prices for a number of years. This concern, it is reported by a *Bradstreet's* correspondence, does a business of nearly $1,000,000 a year (retail), "its trade being out of all proportion to the size of the city, as such things go in other and large centers of commerce and industry." For a generation "it has been conducted on a cash basis, and its methods of management have remained substantially unchanged. For that reason its prices constitute

a fair record of the scale of values for food products as paid by retail cash buyers. The old price lists are said to show the cost of such groceries as might be bought for a boarding-house or a large family, say as a Saturday order, and make a striking presentation when compared with like totals five years ago."

In preparing this table great care has been exercised to preserve quotations for like grades or quantities. "The flour was of the same brand in both years, and the butter came from the same creameries. The raisins were loose muscatels from California in both instances, and there was no change, in any instance, which could affect the intrinsic values of the articles of food. The soap came from the same works, and was of exactly the same kind." The figures are as follows:

	MARCH—	
	1891.	1896.
1 barrel flour	$ 5 00	$ 3 85
25 pounds granulated sugar	1 78	1 26
5 pounds creamery butter	1 75	1 25
5 dozen eggs	1 50	60
5 pounds prunes	80	50
1 bushel potatoes	1 25	25
3 cans tomatoes	30	21
3 cans peaches	78	51
10 pounds rolled oats	45	25
5 pounds lard	50	45
1 gallon vinegar	25	18
10 pounds buckwheat flour	35	20
2 pounds evaporated apricots	50	28
1 ham (11 pounds)	1 32	1 21
1 pound black pepper	18	12
3 pounds Java and Mocha coffee	1 04	1 00
1 gallon maple syrup	1 10	80
1 box soap	3 15	2 50
5 pounds raisins (4-crown)	80	30
5 pounds currants	40	30
1 peck navy beans	65	25
7 pounds starch	42	25
2 pounds soda crackers	16	14
Totals	$24 43	$16 71

"The difference of $7.72 is a decrease of 31.6 per cent. in the cost of the articles enumerated. Reckoned on the present cost, it is evident that a given sum will go almost one-half farther in providing a city family with groceries than it would five years ago. Where wages have not fallen and employment is as plentiful as it was five years ago, there has evidently been a marked social improvement through the lessened cost of food, and, therefore, in a sense, a higher plane of living.

"On the other hand, the cheapening of food products has told against farmers—especially those who had old debts to pay. The changes which were a boon to millions of city people increased the difficulties of a multitude agriculturists." —*Am. Grocer.*

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PINE CULTURE IN FLORIDA.

I have been asked a number of times this spring in regard to methods of pineapple culture, and whether it is probable that pineapples could be successfully grown at Eustis. It has thus been suggested to me that a few notes relative to general methods of pineapple culture may be of some interest to the citizens of Eustis. In considering whether pineapples can be grown here we must remember the fact that they were at one time grown to considerable extent throughout Lake, Orange and Volusia counties, but that the industry in these sections has been largely abandoned. At Orlando, however, the industry has flourished continuously, and there are now in that section some thirty acres. All growers engaged in the industry at this point consider that they are succeeding just as well or better than the growers of the Indian River section and those on the Keys. It must be admitted by anyone familiar with the industry in all portions of the State that the Orlando plantations appear to have succeeded as well as those in other regions. It is probable that many of the failures in the central sections of the State heretofore have been from wrong methods of culture. The plants throughout these northern sections must, of course, be thoroughly shedded as a protection against frost. The sheds which are being used at the present time, the method of construction of which will be explained later, cost from $400 to $500 per acre. This would seem to be an enormous outlay, which pineapple growers in the southern part of the State would not be required to expend. It is a fact, however, that pineapple growers in all sections of the State are coming to consider that shedding is a very desirable practice, entirely aside from the protection which they afford against frosts. The shed has the effect of conserving the moisture, preventing evaporation, sunburning, etc. Plants grown under sheds

fruit more regularly, and the fruit is larger and of finer quality. Growers even in the extreme southern part of the State are putting up large sheds and claim them to be a profitable investment. The sheds which have been used heretofore in the Eustis section were largely poorly constructed affairs, which were very unsatisfactory. With the proper sheds and proper cultivation, I think it is probable that pineapples can be successfully grown here as at Orlando.

HOW TO CONSTRUCT THE SHED.

Pineapple sheds are now usually made from seven to seven and one-half feet high in order to facilitate cultivation and harvesting. They are covered with three inches of slates placed three inches apart. Some use narrower and some wider strips, but the general opinion is that about one-half of the light should be cut off. The slats are usually run north and south, to better equalize the light. The sides of the shed are usually slatted up in the same manner as the top. In this region, where we are liable to have quite heavy frosts every few years, it will be necessary to board the sides up solid. This policy is practiced uniformly at Orlando. If, with this precaution, one makes preparation for severe freezes by having on hand material for small fires here and there throughout the shed it is probable that the plants could be saved in even the most severe freezes, as the slatted top and boarded sides retain the heat. The posts used for supporting the shed are usually three by three inch material, and are set into the ground a foot or two to give firmness to the shed. The details of construction may be considerably varied, according to the lumber accessible.

HOW TO PLANT.

Pineapples are normally propagated by slips or suckers, the former being lateral shoots formed on the stem underneath the fruit, and the latter from the main stem either below or near the surface of the soil. Slips are smaller than suckers, and usually require about twenty months to mature while good suckers often fruit the next year after planting. Nevertheless, as a whole, slips are preferred by most planters. The principal planting season is in July and August, just following the fruiting season. It is important that one

should plant as early as they can secure mature slips or suckers, as it is desirable to get the plants well rooted during the rainy season. The plants are generally put out in beds about 14 feet wide and any desirable length. In these beds the plants or suckers are set from 20 to 30 inches apart each way. Red Spanish are usually planted from 20 to 22 inches apart; Queens, about 22 inches; Abakkas and Smooth Cayennes, from 22 to 24 inches; Porto Ricos (the largest variety), about 30 inches apart. Before planting, the suckers should be pruned or trimmed, as it is expressed; that is, a few of the basal leaves should be pulled away and the basal end cut off squarely with a sharp knife. They are then planted in the ground from 4 to 6 inches deep and the soil thoroughly packed around the basal ends.

WHAT TO PLANT.

The varieties which are considered by most growers to be the best are the Abakka, Smooth Cayenne, Queen, Porto Rico, etc. These are all what are termed fancy sorts. The pine which is most common is that known as the Spanish, or Red Spanish. This, however, is by no means so good a fruit as certain other varieties; and, if one goes to the expense of shedding, which is necessary here, it is not likely that it will pay to grow the common variety. The other varieties are just as hardy so far as cold is concerned.

HOW TO CULTIVATE.

What may be termed clean cultivation is followed by most all pineapple growers in Florida; that is, the soil is kept bare and as free from weeds as possible. Mulching has been followed to some extent, but has not proven satisfactory. Cultivation is done altogether with a long-handled shuffle-hoe. The beds are made narrow so that cultivation may be done from the paths without necessitating the workmen to go among the plants. They are usually hoed as frequently as is found necessary to keep weeds down.

HOW TO FERTILIZE.

As in orange culture, so also here fertilization is the main bone of contention, and there are as many theories as there are planters. Cotton-seed meal, blood and bone, and ground

tobacco stems are probably used more than any other fertilizers. Along with these, sulphate of potash is frequently used to increase the amount of potash. There are a number of commercial fertilizers on the market which have apparently given very fair results. From 1300 to 2000 pounds per acre yearly of a complete fertilizer is usually considered necessary to give good results. This is generally given in two or three applications. The first application is usually made shortly after the plants are set out. If a fertilizer containing any strong chemical like high grade sulphate of potash or sulphate of ammonia is sued, it is said to be necessary to carefully distribute the material on the ground between the plants, avoiding as far as possible getting the fertilizer on the leaves. Cotton-seed meal, blood and bone and tobacco stems may be spread broadcast over the plants.

HOW TO EAT PINEAPPLES.

Most people think they do not need instruction in regard to this. But as we think it necessary to know how to eat an orange, so the pineapple-grower thinks it necessary to know how to eat a pineapple. We commonly slice pineapples the longitudinal axis of the fruit. The grower tells us to slice them parallel to the longitudinal axis. This cuts the fruit across the grain and makes them seem much tenderer.

HOW TO MARKET THE FRUIT.

It is impossible for the writer to give directions regarding general methods of marketing. It may be said, however, that the fruits are now packed in standard-sized crates. These are known as whole crates, which are 12 by 20 by 36 inches; or half-crates, which are 12 by 10 by 36 inches. There is no standard number of fruits per crate, as in the case of oranges, the number varying according to the size of the pines shipped. They are, however, sized to some extent, large and small ones of a certain variety being kept separate. It is probable that at Eustis a home market could be found for quite a number of the fruits; but we have as good facilities for shipping as other pineapple regions of the State, so there is no reason why our fruit could not be put on the market in good condition.

One gentleman at Mount Dora has a small number of pines shedded in the proper manner, which were not at all injured by any of the freezes of last winter, 1895–96. This was a rather colder winter than we commonly have. Mr. Hopkins, of Umatilla, told me shortly before he left the State that he had grown a number of pineapples for several years, and that they had done well. With these and the Orlando illustrations before us, it would seem that one can be almost sure of growing pineapples successfully here by taking the precaution to construct good sheds.—*Cor. Florida Agriculturist.*

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A BRITISH EMPIRE ZOLLVEREIN.

The Third Congress of the Chambers of Commerce of all the British Colonies has just been held in London. Hon. Joseph Chamberlain presided and he informed the delegates that England would not reject the proposal for the creation of a commercial zollverein, or customs union, between the colonies.

He spoke of the "paramount necessity for such commercial union, for it was at the root of all the problems with which they had to deal." He said it was "an essential condition that Great Britain should consent to replace the import duties upon corn, meat, wool, sugar, etc.," to protect the colonies from outside competition in the English market. The Congress agreed that "preferential treatment" should exist within the empire and a resolution was unanimously adopted stating that it was "expedient to promote such consideration and formulate some practical plan by summoning an imperial conference representative of the interests involved." The Congress further declared that a policy of retaliation by foreign nations need not be feared, as their chief rivals, Germany and the United States, had adopted a policy of preferential treatment themselves.

The necessity for a Protective Tariff in Great Britain is growing more visible every year. English politicians may be slow to perceive it, but the manufacturers are keenly realizing every day, by experience, just what is the matter. The scales of Cobdenism are dropping from their eyes. Joseph Chamberlain, being a manufacturer as well as a poli-

tician, has clearer vision than his political associates and is statesman enough to advocate a change in English economic policy.

This Congress in London has simply manifested the pressure that British and Colonial manufacturers feel. Not only abroad, but even at home their great rivals, the Germans, are pinching them. A large contract for the rails of a new railroad, to be built in the Isle of Man, was given this year to a German firm.

This created much stir and dissatisfaction among the British iron manufacturers, and was another object lesson to teach them the necessity of protecting their home market. Germany today, under the potential influence of a Protective Tariff is producing more iron and steel than Great Britain with equally as good machinery and methods, and is also displaying commendable enterprise in adapting its wares to the necessities and tastes of the people with whom the Germans wish to deal.

Germany has technical and commercial schools which scientifically teach this necessity of adaptation to markets. It has been demonstrated by experience in Russia and India, where German iron is steadily displacing that of British manufacture.

The new Russo-German commercial treaty, which favors the import of Russian cereal products into Germany, of course induces reciprocal trade from Germany into Russia. And this is an economic reciprocity which is mutually beneficial, Russia being still largely an agricultural country, with a surplus of cereals, while Germany is now largely a manufacturing nation, with a surplus of manufactured articles to export.

As late as 1893, the value of British imports into Russia exceeded that of German imports by eleven million of roubles; yet in 1894, only one year later, Germany exported to Russia goods worth fourteen and a half million roubles more than England; in fact Germany has now displaced England from its old position at the head of the list of countries exporting commodities to Russia. This is largely due to a wise policy of reciprocity shaped by the different economic necessities of the two countries.—*American Economist.*