CONTENTS.

THE HAWAIIAN PLANTERS' MONTHLY

PUBLISHED FOR THE

HAWAIIAN SUGAR PLANTERS' ASSOCIATION

[Entered at the Post Office at Honolulu, T. H., as Second-class matter.]

VOL. XXVII.] HONOLULU, OCTOBER 15, 1908. No. 10.

SUGAR PRICES FOR MONTH ENDING OCTOBER 12, 1908.

1908.	Centrifugals.	Beets.	Parity.
Sept. 14	3.90¢	9s 7½d	4.01¢
" 15	3.95¢	9s 6d	3.99¢
" 16	3.95¢	6s 6¾d	4.00¢
" 17	3.95¢	9s 6¾d	4.00¢
" 18	3.95¢	9s 6¾d	4.00¢
" 19	3.95¢	9s 8¼d	4.03¢
" 21	3.95¢	9s 7¼d	4.01¢
" 22	3.98¢	9s 9¾d	4.06¢
" 23	3.98¢	9s 7½d	4.01¢
" 24	3.98¢	9s 9d	4.04¢
" 25	3.98¢	9s 6d	3.99¢
" 26	3.98¢	9s 7½d	4.01¢
" 28	3.98¢	9s 7½d	4.01¢
" 29	3.98¢	9s 6d	3.99¢
" 30	3.98¢	9s 6d	3.99¢
Oct. 1	3.98¢	9s 6d	3.99¢
" 2	3.98¢	9s 6d	3.99¢
" 3	3.98¢	9s 6d	3.99¢
" 5	3.98¢	9s 5¼d	3.98¢
" 6	3.98¢	9s 6d	3.99¢
" 7	3.98¢	9s 6d	3.99¢
" 8	3.98¢	9s 6¾d	4.00¢
" 9	3.98¢	9s 8¼d	4.03¢
" 10	3.98¢	9s 8¼d	4.03¢
" 12	3.98¢	9s 9d	4.04¢

Messrs. Willett & Gray in their "Weekly Statistical" of the first and eighth of October state:

RAWS.

October 1.—In the absence of sales during the week under review the market quotations remain nominally unchanged, although efforts to sell a cargo of Javas at the current quotation failed for want of a buyer and the sugar is going into warehouse rather than meet buyers' views at a lower level.

The outcome of the present inactivity depends upon Europe to a large extent and the beet sugar markets have shown a small receding tendency, October being quoted at 9s. 6d., against 9s. 7½d. last week. The fluctuations are small under continued reports of favorable weather for the beet crop thus far, but the weather of October will prove critical, for good or bad development. With close reference to the weather conditions, Mr. F. O. Licht of Magdeburg publishes a preliminary estimate of the beet crop of all Europe ranging from 6,350,000 tons to 6,785,000 tons, an average of 6,567,500 tons, against an outturn last year of 6,532,000 tons.

Cuba crop reports continue favorable, with one central still working and the Six Ports stock reduced to 34,000 tons.

Another cargo of Javas has arrived at the Breakwater unsold and is offered at 10s. 6d. c. i. f., basis 96° test, equal to 3.98c. landed.

Receipts for the week were 46,102 tons, the bulk of which was Javas, the amount included from this country reaching 30,546 tons. Meltings continue unchanged at 40,000 tons and are likely to remain fairly large for reasons given under "Refined."

October 8.—It is now over two weeks since there have been any actual sales of sugar on which to base quotations. In the meantime a few hundred bags of San Domingo sugars have been taken over by a refiner, the price to be fixed by the next sale to be made.

The nominal quotation for Centrifugals has continued at 3.98c. per lb., 96° test, although efforts to sell Java sugars in port as low as 3.93c. basis have failed, and three cargoes have gone into warehouse for account of their English owners. These sugars were not wanted by refiners at the moment, as their own imports are sufficient for their present requirements.

It does not follow, however, that because there are no buyers at 3.93c. for these cargoes, that the next sale will be on as low a basis, because these sugars are now out of the market, and a rise in Europe, which looks promising, may change the whole situation to a firmer basis.

Following our regular weekly cable from Mr. F. O. Licht that the weather is unfavorable for the beet crop, we have received today from our London friends over the cable that the markets are firm, with an upward tendency, on account of the crop suffering from drought.

The quotation comes 9s. 6¾d., an advance from 9s. 5¼d. during the week. If the foreign improvement continues our nominal quotations may still be nearly realized on next sales.

The receipts for the week have been unusually large—61,140 tons against 46,102 tons last week, but meltings have also increased, owing to the free arrivals and the rather unusual demand for cane refined products for canning and other uses in the absence of all stocks of beet refined in the country, as noted below.

The weather in Cuba has remained favorable for the crop prospects. One central is still working, but will soon stop. The stock is 31,000 tons, against 34,000 tons last week and 52,500 tons last year.

Our Java cable reports favorable weather for harvesting, and September shipments 72,000 tons, with American options, making 210,000 tons afloat with American options, against 160,000 tons at same time last year.

These Java cargoes are what our refiners mostly rely upon for supplies until the next Cuba crop matures, most of these cargoes being understood as already bought by them.

From the middle of November to the middle of December there may be a good selling period for the unsold Javas if Europe continues to hold firm and is not adversely affected by any war outbreak, which is now somewhat threatening over there. Independent of a money stringency, however, at the beginning, requiring prompt sales of new crop beet sugar, there is no reason for a change in the advancing course of European sugar markets for some time to come.

NOTES.

DIVERSIFIED AGRICULTURE.—There are many who can remember the days when this community was almost entirely dependent upon the successes of the whaling fleet for its subsistence, when the culture of sugar cane, or other agricultural products, was looked upon with but little favor. After the decline of the whaling industry the people turned their attention to the raising of sugar cane and rice, and ever since the granting of the Reciprocity Treaty by the United States sugar and rice, and for a few years coffee, have been the staple articles of export, and in fact, almost the only ones. In very recent years the growing of pineapples has been successfully started, and this industry promised to become important and profitable. Unfortunately the production of pineapples has largely exceeded the consumption, and even now, before it has outgrown its infancy, this industry is facing a crisis.

The very existence of this country depends upon the land and its products; we have no mining or manufacturing industries,

excepting those of the latter which are directly dependent upon agriculture. Blot out the sugar industry and the Hawaiian Islands, until other industries were established, would sink back into a mere historical name.

There are many clouds hovering over the sugar industry of the United States and of this Territory,—the possible annexation of Cuba, and a large increase of sugar production there at prices with which we cannot compete, the lowering of the tariff on sugar from the Philippine Islands and consequent stimulus of production there, and the possible reduction in the tariff of sugars coming to the United States, permitting the importation of large quantities of cheap European sugar. Should any of these possibilities become an accomplished fact, the sugar industry of these Islands would receive a blow which would effectually put a quietus upon a majority of the plantations now operating.

It is a mistake for a country to rely absolutely and entirely upon one industry for its prosperity. Long continued prosperity cannot be expected for Hawaii while it relies solely upon the sugar industry.

We believe that there are many agricultural products which can be grown in this country and can be made profitable, if there were applied but a fraction of the intelligence and capital that have been put into the sugar industry. It is not our purpose to enter into a discussion of the kind of crop that can be profitably raised,—such a matter is one that rests with the expert agriculturist. But we believe that efforts should be made by the plantation interests to experiment with, and ascertain for themselves, what products other than sugar cane can be successfully and profitably grown.

It would seem from recent experiments that the growing of tobacco and cotton may be profitable. There are large areas of land, much of which is controlled by the plantations, and unsuited for sugar cane, which could well be put under cultivation with some other product such as cotton or tobacco. We are not advocating or suggesting the abandonment of cane fields for other crops so long as the growing of sugar cane is profitable, but we believe that the course of wisdom is to experiment with other crops, ascertain if they can be made profitable, and if so, to utilize lands not suited for the growth of sugar cane. The beginning of such industries rests largely in the hands of those who control the sugar plantations and who have the capital to invest.

Tropical agriculture differs from that of the temperate zone in one important particular, which is that most of the tropical crops are perennials, and that most tropical products require manufacture before being salable. A farmer who grows wheat or corn or apples can sell his product immediately without any manufacturing process whatever. This is not true of tropical products. Tobacco is not salable until has been fermented; sugar must be extracted from the cane by expensive and intricate milling pro-

cesses; vanilla, coffee, sisal, and almost every other paying crop require a larger investment of capital than would be necessary for an equal acreage of any temperate-zone crop, because of the manipulation required to transform the raw material into a finished marketable article. Furthermore, the time limit adds to the necessity for larger investment, in that most tropical crops can not be harvested in a short season. One must wait three years for vanilla, two or three years for sugar, two years for pineapples, and four or five for coffee, rubber, and sisal. Tobacco, which in its cultivation is an annual, can not be marketed in less than fifteen months because of the curing and fermentation the leaf must undergo. It is absolutely essential that the grower should have sufficient resources or credit to carry himself through these unproductive years. Business ability is as important as knowledge of agricultural methods.

Our people could well profit by the experience of the West Indies. Jamaica has led in the path of new industries and is now one of the most prosperous of the West Indian colonies. The results obtained there were due to the fact that local circumstances compelled Jamaica to abandon the one crop system and develop its many other agricultural resources.

Another instance is that of the Island of Antigua. A recent report of the Imperial Department of Agriculture for the West Indies contains the following statement:

"In 1898, the prosperity of the island was at a lower ebb than it has ever attained before or since.

"The sugar industry was in a deplorable condition. Under the influence of bounties and cartels the market price for sugar had sunk to a ruinously low level; the methods of manufacture in vogue were antiquated and extravagant, and the industry was faced with the prospect of immediate extinction, which would probably have involved the financial ruin of the colony.

"Of subsidiary industries of importance there were none. The island stood or fell with the sugar industry.

"The condition of the laboring classes could not well have been worse. Laborers' wages had attained a minimum value, poverty and starvation were wide-spread, and all cultural operations undertaken by the peasantry were of the most meagre and inefficient description.

"At the present time, prospects have materially changed for the better, the sugar industry is in a comparatively stable condition on account of the better market conditions incident on the abolition of bounties by the Brussels Convention. A considerable proportion of the crop is manufactured on up-to-date and economic lines, and material cultural improvements have been introduced.

"The introduction of Sea Island cotton cultivation has added a most valuable industry to the resources of the island, and has resulted in the attraction of new blood and additional capital, and

the re-introduction into cultivation of large areas of land formerly in waste.

"The condition of the laboring classes has much improved, wages have risen, and a ready and remunerative market has been provided for peasant canes through the erection of central factories.

"In consequence, the area cultivated by peasants has largely increased, and in addition, the general level of agricultural practice among them has risen.

"Local merchants are unanimous in admitting that, at the present time, trade is better and the condition of the island more prosperous than at any time during the past twenty years."

Another consideration is that in a country of only one staple product, the disturbance caused by over-production and consequent low prices for that product, is much more disastrous. It is felt in every direction, and there is nothing to counterbalance the movement. Whereas, if the industries of the country are diversified, a depression will seldom extend along the whole line, and the variety of products will have an equalizing effect. For this reason alone, if for no other, encouragement should be given to the raising of products other than sugar cane, suitable to the soil and climate of Hawaii.

HAWAIIAN SUGAR CROP, 1907-1908.—The total cutturn of the crop of 1907-1908 of the Hawaiian sugar plantations is 521,123 short tons. The details of production are as follows:

	*Tons.
Hawaii—	
Hawaii Mill Co., Ltd	2,818
Waiakea Mill Co	9,761
Hilo Sugar Co	12,853
Onomea Sugar Co	17,006
Pepeekeo Sugar Co	7,590
Honomu Sugar Co	7,511
Hakalau Plantation Co	12,834
Laupahoehoe Sugar Co	7,944
Ookala Sugar Plantation Co	5,195
Kukaiau Plantation Co	2,141
Kukaiau Mill Co	1,427
Hamakua Mill Co	12,355
Paauhau Sugar Plantation Co	10,448
Honokaa Sugar Co	7,657
Pacific Sugar Mill	3,459
Niulii Mill and Plantation	2,452
Halawa Plantation	1,958
Kohala Sugar Co	4,914
Union Mill Co	3,259

* 2000 lbs. to the ton.

Hawi Mill and Plantation	7,125
Hutchinson Sugar Plantation Co	9,628
Hawaiian Agricultural Co	10,274
Puakea Plantation	661
Olaa Sugar Co., Ltd	15,795
Puna Sugar Co., Ltd	1,691
Puako Plantation	403
Kona Development Co	1,000
	180,159
Maui—	
Kipahulu Sugar Co	1,843
Kaeleku Plantation Co., Ltd	3,026
Maui Agricultural Co	22,627
Hawaiian Commercial & Sugar Co	56,150
Wailuku Sugar Co	10,072
Olowalu Co.	1,765
Pioneer Mill Co., Ltd	27,146
	122,629
Oahu—	
Waimanalo Sugar Co	4,242
Laie Plantation	971
Kahuku Plantation Co	6,519
Waialua Agricultural Co., Ltd	30,376
Waianae Co.	5,686
Ewa Plantation Co	33,919
Apokaa Sugar Co., Ltd	984
Oahu Sugar Co	35,320
Honolulu Plantation Co	18,996
	137,013
Kauai—	
Kilauea Sugar Plantation Co	3,194
Makee Sugar Co	7,408
Lihue Plantation Co	14,445
Grove Farm Plantation	2,508
Koloa Sugar Co	7,361
McBryde Sugar Co., Ltd	11,294
Hawaiian Sugar Co	21,633
Gay & Robinson	2,675
Waimea Sugar Mill Co	1,790
Kekaha Sugar Co	8,283
Estate V. Knudsen	731
	81,322
Grand total	521,123

TAFT PLEDGES PROTECTION TO AMERICAN SUGAR.—In a speech at Greeley, Colorado, October 2nd, Mr. Wm. H. Taft, Republican candidate for president, defined his position on the sugar tariff. He said:

"I understand you are interested here a good deal in beet sugar, and I also understand that some people have intimated that I was against beet sugar. I deny it.

"I would not do anything that would injure the beet industry in any way, and the Republican platform pledges the Republican party to take no action which will not leave adequate protection for the beet sugar interests."

Mr. Taft here referred to the Democratic platform pledge to put trust-made products on the free list and continued:

"We say to regulate the trusts, to stamp out their evil, but not to punish the innocent with the guilty—not, in order to bring the sugar trust within the law, to destroy the farmers who raise beet sugar, the men who work in the beet sugar factories and the innocent beet sugar producers."

THE YEAR'S SUGAR OUTPUT IN CUBA.—Concerning the Cuban sugar yield this year the Havana *Post* says in an editorial appearing in its issue of October 3:

Considering the fact that Cuba was treated last year to one of the most disastrous drouths in years, the figures of the agricultural department showing that the decrease in the output of sugar was only 6½ per cent. behind that of last year are the least bit surprising. The grinding of the Santa Lucia mill until recently increased to reasonable proportions what had been considered heretofore as the smallest crop since 1902. That year, when drouth and other conditions caused a small crop, the price going to 7 reales per arroba, 871,913 tons of sugar were produced. The product of the 1907-08 season shows a surplus of 93,798 tons over that year.

As last year's crop was unusually poor, the coming crop promises to equalize things by being unusually good, and if reports from planters all over the island are borne out, the production of 1908-09 will surpass by a large margin the 1906-07 crop of 1,452,049, which was the banner sugar year for Cuba.

In its issue of October 2 the same paper prints the following:

With the shutting down of the Santa Lucia mill, which kept grinding until just a few days ago, the department of agriculture yesterday issued the official figures covering the 1907-8 sugar crop. A decrease equal to 6.5 per cent. in the tonnage as against the previous crop is shown.

According to the statement, sixteen mills did not grind during the past season, but this does not alter the total, for the cane from their fields was ground at other nearby mills, with the same result in the output, which was much lower on account of the dry season experienced in Cuba before the last crop.

The following are the official figures issued by the department, which also includes a comparison of the crops from 1902 to date:

	1906-7	1907-8	Shortage
Number of mills working	184	168	16
Arrobas of cane ground.	1,234,494,406	815,917,247	438,577,157
Bags of sugar produced.	9,947,130	6,757,047	3,190,688
Equivalent in arrobas...	128,215,274	87,037,840	41,177,439
Reduced to tons.....	1,452,049	985,711	466,338

The following is a tabulation of sugar crops for the past six years:

Years—	Bags.	Tons.
1902-1903	5,997,238	871,913
1903-1904	7,061,400	1,029,379
1904-1905	7,318,780	1,105,547
1905-1906	8,163,996	1,129,813
1906-1907	9,947,130	1,452,049
1907-1908	6,757,047	985,711

CUBAN SUGAR CANE CROP ESTIMATES.—Consul Max J. Baehr writes from Cienfuegos that in spite of many predictions early this season, that the sugar cane crop of Cuba would not exceed last year's low yield, reports from all points are that not for many years have the prospects been so bright for a heavy crop as at the present time. Sugar men say that light rains in August, followed by good rains in September and October, will give to Cuba the heaviest cane crop in the history of the island. The rains have come at a time when they were needed, and the cane could go through until September without a great deal of rain, but September is the critical month when it is absolutely necessary. The season for cutting opens in December and runs until March and April. This year the season ran late, delaying shipments considerably.

CUBAN SUGAR REVIEW.—*Government Statistics of Production of Island's Chief Industry.*—General Julian Betancourt, chief of the bureau of agriculture of the Cuban Government, furnishes interesting data regarding the sugar industry of the island, which Consul Max J. Baehr, of Cienfuegos, summarizes as follows:

The pamphlet is published in the Spanish language and divided into two parts. One deals with the harvest of 1905-6 and the prices of sugar, and the other with foreign trade in so far as it is connected with the sugar industry in 1905, 1906 and 1907.

According to the first part, in the harvest of 1906-7, 186 sugar mills were running, 5 more than in the harvest of 1905-6 and 7 more as compared with the harvest of 1904-5.

The amount of cane grown in 1906-7 by the 186 mills was 14,214,946 English tons, as against 12,532,997 tons in 1905-6, mak-

ing, therefore, a notable increase in the one year. This large amount of cane was grown on an approximate area of 849,000 acres. The sugar production of 1906-7 was 1,444,310 tons, the largest in the history of the island and 214,574 tons more than in 1905-6 and three times more than that of 1904-5.

Alcohols and native rums naturally had a large increase during 1906-7. In this year there were manufactured 7,016,432 liters of aguardiente (native rum or brandy) and 1,514,535 liters of alcohol, as against 3,909,849 and 1,249,577 in 1905-6.

Molasses statistics are also interesting. In 1907 there was exported 34,532,065 gallons of the sweet liquid, with a money value of $936,789, as against 31,530,389 gallons, valued at $774,627, in 1906, and 28,130,263 gallons, valued at $794,542, in 1905.

Exportation of Crude and Refined Sugar, Etc.—Part second or the foreign commercial view of the crops is equally interesting. The exportation of crude sugar during the three years of which the government report treats, according to the custom house record, were: In 1907 1,292,776 tons, while in 1906 the amount only reached 1,180,615 tons, and in 1905 1,077,193 tons, thus showing an approximate increase of 100,000 tons each year in exportation. According to these statistics, however, a short crop is more to be desired than a large one, because the increased prices at which the product is sold bring in far more money to the country than does the large crop. The value of 1905 exports were $71,753,337, while the crop of 1907, though the largest in the history of Cuba, brought only $57,909,932, or about $14,000,000 less. In 1906 the crop, though small, brought such good prices that $64,720,336 was realized.

Extraordinary advance has been made in the exportation of refined sugar. The archives show that the exports in 1905 did not reach a ton, passing 8 tons in 1906, while in 1907 the total reached 3,311½ tons, increasing from $129 to $1,198, and then to $137,739.

Totaling the sugar, molasses, sweets, candies, aguardiente, rum and other distilled products Cuba exported, the values obtained are: 1907, $66,012,570; 1906, $58,969,916.

Importations of machinery, sacks for sugar, barrels for molasses, etc., in 1907 amounted to $1,445,254.

Comparison of exports and imports shows a balance in favor of Cuba in this industry of $63,368,276 in 1907 and $55,556,970 in 1906.

MEXICAN SUGAR GROWING.—*Excellent Natural Conditions are Aided by Cheap Labor.*—Consul P. Merrill Griffith, of Tampico, submits the following report on land values in Mexico, and the cost of planting, cultivating, and harvesting the cane crop.

One of the leading industries of Mexico, and one that has advanced most rapidly during the last five years, through the

introduction of improved agricultural and milling machinery and the adoption of more scientific methods in the cultivation of the cane, is the production of sugar.

There is an excellent demand in Mexico for all sugar produced, and all grades find a ready sale at good prices. A few years ago the demand among the Mexicans of the middle and lower classes was for brown sugar exclusively now they demand also granulated or white sugar manufactured into pilons.

The amount of sugar produced depends upon the character of the soil and the location of the land. In this section the yield averages from 25 to 40 tons of cane to the acre. The saccharine matter from this quantity of cane amounts to about 65 per cent. of the weight, and the quantity of white centrifugal sugar produced from 7½ to 10 per cent., or from 130 to 150 pounds of sugar to the ton.

The cane raised in this section of Mexico, in comparison with that raised in most sections of the United States, has a higher Baume, usually running from 9 to 15, and the sucrose contents in proportion. The stalks grow from 13 to 15 feet high, have from 32 to 36 joints, and often measure from 7 to 8 inches circumference at the bottom. It has been stated by persons of practical experience that sugar can be produced here for less than 1 cent gold per pound, which enables it to compete successfully in almost any market of the world.

HAWAIIAN CHEMISTS' ASSOCIATION ANNUAL MEETING.

The second annual all-day meeting of the Hawaiian Chemists' Association was held in Honolulu on October 19. The forenoon was taken up with a business meeting and the reading and discussion of the following papers: "Glucose Determinations," by S. S. Peck; "Deterioration of Sugars," by R. S. Norris, and "Handling of Press Cake," by J. E. Biela.

In the afternoon a visit to the plant of the Honolulu Gas Co. was made, where an interesting and instructive lecture and demonstration on "Practical Gas Making from Oil" was delivered by Mr. Harry Strange, the superintendent. From the gasworks the members went to Kalihi, where the fertilizer works and acid plant were inspected.

The annual banquet in the evening was held at the University Club. The affair was brilliant and unique, the toasts being interesting and in some cases exceedingly humorous, and the menus printed on filter paper in keeping with the spirit of the affair.

Most of the delicacies were served in vessels familiar to laboratories, from soup in covered casseroles to ice cream in porcelain evaporating dishes, while cream for the coffee was measured out

to each in cubic centimeters from a graduated glass burette. The table was beautifully decorated with maile and flowers in glass graduated jars, and was further adorned with groups of laboratory apparatus, the center piece being a large glass retort, set up for distilling over a gas burner. The amber-tinted distillate was caught in a liter flask and served to the diners in beakers. Following is a list of those present:

Wm. Ebeling, Hilo Sugar Co., Hawaii; Jas. W. Donald, Honokaa Sugar Co.; J. E. Biela, Laupahoehoe Sugar Co.; Geo. W. Smith, Dr. O. E. Wall, Noel Deerr, L. Lewton-Brain, H. L. Lyon, R. S. Norris, A. E. Jordan, S. S. Peck, F. T. Dillingham, W. J. MacNeil, Harry Strange, R. A. Duncan, C. C. James, R. A. Lyon, J. Schmidt, J. A. Verret, F. E. Greenfield, A. M Schmidt, T. D. Collins, Alfred Kraft, Waialua Agricultural Co.

The Hawaiian Sugar Chemists' Association was organized on November 24, 1902. The invitation to the chemists in the various mills to form this organization met with a ready response, and the list of members for the first year included practically every sugar chemist in the Islands. The most important work done the first year of its existence was the adoption of a uniform method of mill control. With the final establishment of this method, interest in the society seemed to die out, especially as regards the members on the islands other than Oahu; so last year it was decided to reorganize on broader lines, so as to include in the membership all chemists, and in its papers and reports subjects of general chemical interest, whether connected directly with the sugar industry or not.

The first presiding officer of the new association, renamed the Hawaiian Chemists' Association, was Mr. Noel Deerr, and it is principally due to his efforts that its first year has been such a successful one. He inaugurated a system of quarterly meetings, a paper or papers being read at each one and discussed. For the benefit of those members who are not able to attend, the papers have been printed in the Hawaiian Planters' Monthly.

---

*EXPERIMENTAL ENGINEERING IN THE SUGAR HOUSE.**

A generation ago it was not unusual to regard an engineer as one who had an inborn intuition for mechanics, and who was capable of evolving designs from his inner consciousness; with the rise of advanced technical calculation there has appeared on the scene, as a complement to the engineer who has learnt his

* Louisiana Bulletin No. 107. Preliminary tests of Sugar House Machinery.—E. W. Kerr, M. E.

business from shop experience only, a highly trained and technically proficient individual fully equipped to undertake the experimental study of machines and of the utilization of power.

As a consequence many branches of industry have received extended study and are in a fair way to become reduced to the rank of exact sciences; so far, however, the engineering side of the sugar house has been but little studied, to judge from the very few articles to be found scattered amongst the English literature devoted to the sugar industry. This paucity of information is certainly not due to lack of material of which an abundance exists; to mention only a few of the important problems awaiting study there may be cited the necessity for investigations of the horsepower required to operate sugar mills in connection with mill settings, the most efficient surface speed of rollers, the most appropriate curve for the trash turner, the degree of superheat (if any at all) most economically used in evaporation, the most efficient form of heating surfaces in evaporators, problems connected with the combustion of bagasse and with the most efficient utilization of steam.

It is therefore a matter of interest and note that a start in this direction has been made by the Louisiana State University. Bulletin 107 of that institution contains an account of a number of tests conducted under actual conditions by Mr. E. W. Kerr; the first test therein described deals with the power required to operate a six-roller mill 34″ by 84″ and Krajewski crusher. When grinding at the rate of 49.26 tons of cane per hour it was found that the horse-power developed by the engine varied from 170 to 240; tests made when running light indicated that about 36 H. P. or 15% of the maximum H. P. developed were observed in engine and mill friction not including in the latter term the power absorbed in the trash turner. A second test was concerned with the efficiency of the cane carrier and the surprising result arrived at that of the power supplied, only 13.7% was used in actually lifting the canes the remainder being used to overcome friction; on an average it was found that a carrier 600 feet long transporting 49.26 tons of cane per hour with a total lift of 27 feet required on an average 9.8 H. P.

Tests made on the power required to run centrifugals are also described in which it was observed that the power required to run a centrifugal is approximately only 25% of the power required to start it.

It is stated that future experiments are in course of preparation and the publication of the results obtained should be awaited with interest by all concerned with the design or handling of sugar house machinery. N. D.

A NATIONAL AWAKENING TO THE NEED OF FOREST PRESERVATION.

"In the last ten years," says the Yearbook of the Department of Agriculture for 1907, "forestry has advanced in this country from an almost unknown science to a useful growing profession. In that time the number of technically trained foresters has increased from less than a dozen to over 400. Ten years ago there was not a single forest school in the country; now there are several professional forest schools which rank with those of Europe, and a score more with courses in elementary forestry whose usefulness is steadily growing. Forest lands under management have grown from one or two tracts to many, aggregating 7,503,000 acres, scattered through 39 States. The National Forests have increased from 39,000,000 acres, practically unused and unprotected, to 165,000,000 acres, used, guarded, and improved both in productiveness and accessibility. The number of States which have State forests has increased from 1 to 10; and of those which employ trained foresters from none to 11. The membership of forest associations has increased from 3,600 to 15,800. Ten years ago, except for a few of the foremost botanists, European foresters knew more about American forests than did the people of this country. In Europe they were then using preservatives to prolong the service of beech ties, and so adding from twenty to forty years to their life. Here, on the other hand, scarcely a treated tie had been laid, though there are now 60 treating plants, 27 of which treat ties exclusively, and an engineer who recently returned from Europe reports that both in size and mechanical perfection the treating equipment of this country is ahead of any to be found abroad.

"And yet American forestry has only safely passed the experimental stage and got ready to do something. Action, immediate and vigorous, must be taken if the inevitable famine of wood supplies is to be lessened. We are now using as much wood in a single year as grows in three, with only twenty years' supply of virgin growth in sight. Only the application of forest knowledge with wisdom, method, and energy in the next ten years can prevent the starving of national industries for lack of wood.

"California tanbark oak, hitherto considered of principal value for the tannin in its bark, has been found through timber tests to be suitable for cooperage and wagon manufacture. In strength it compares favorably with eastern oaks and hickory. Eucalyptus planting has been given much attention in California. (The interior of one of the largest buildings in Los Angeles was finished in eucalyptus imported from Australia at $250 a thousand board feet.) This tree grows very rapidly and is especially adapted to that region. Four companies have been formed which will plant in the aggregate several thousand acres with eucalyptus.

It is with this tree that the Santa Fe Railway is planting 8,650 acres near San Diego to test its suitability for the production of ties.

"Prominent among the projects carried forward by the State forester of California was the publication of a comprehensive bulletin on the commercial production of eucalyptus. Preservative treatments of cedar, pine, and fir ties and poles, conducted in coöperation with the Forest Service at Los Angeles, showed that a 40-foot pole, worth $7.50, can be preserved with creosote at a cost of $2 so as to secure additional service worth several times the additional cost. The State fire patrol was materially strengthened.

"Hawaii, early to take up forestry, conducts systematic, practical work under two main heads—the maintenance of protection forests on important watersheds, and the planting of waste and barren areas with useful trees. Lectures are given by the superintendent of forestry before the students of the College of Agriculture. An examination was made during 1907 of the forest back of Hilo, Hawaii, which it was found necessary to preserve as a protection to a watershed. It has been demonstrated that rubber grows well in Hawaii, and a large area will be planted with rubber trees, which afford a good forest protection to the land. A Hawaiian corporation has agreed to furnish an American railroad with 500,000 ohia cross ties yearly for the next five years.

"The progress of forest work in Washington for the past year is especially marked by increased activity on the part of the State and owners of timberlands to protect the timber from fire; the inauguration of forest instruction at the university and at the agricultural college at Pullman; and the better appreciation by the people of the National Forest policy. The work of the deputy fire wardens in the several counties of the State entirely prevented destructive timber fires. About one hundred forest rangers were appointed, usually at the request of mill men and timberland owners by whom they were employed. At a meeting of prominent lumbermen in Seattle a ranger service was organized for the fire season of 1908. This organization represents some 4,000,000 acres of timberland, and it is the plan to assess holdings at the rate of 1 cent an acre for fire protection. Other timber holders of the State are doing something in the same line. One company, for example, has a force of men in the field which is as effective as the State force."

PATROL AND IMPROVEMENT OF NATIONAL FORESTS.

"The National Forests are constantly being used in more ways and by more people. Added experience is making possible the classification of the forests by types, with general instructions concerning the systems of cutting best calculated to secure in each type the production of the most wood of the best quality.

In carrying out some of the timber sale contracts utilization is now almost as complete as in a German forest. The lumbermen, though now cutting timber under regulation on the National Forests, are competing in the market with those who cut outside—a direct argument that conservative forestry is thoroughly practicable from the lumberman's point of view.

"The third year of systematic fire patrol recorded an improvement of 40 per cent. over 1906 and 65 per cent. over 1905."

Reduction of loss by fire on the National Forests.

	1905.	1906.	1907.
Area of National Forests.....acres...	97,711,455	127,167,271	162,024,190
Area of forest burned over.....do...	279,592	115,416	109,410
Proportion of total area burned over.....per cent...	0.22	0.09	0.07
Amount of timber.....M feet B. M...	152,557	101,970	31,026
Value of timber burned.....	$101,282	$76,183	$31,590

"Marked progress has also been made in securing prompt communication between the comparatively few men charged with the custody of wide areas. At present 1,185 men must guard 160,000,000 acres, an average of 135,000 acres, or 211 square miles, for each man. Ranger's cabins have been erected, and roads, trails, telephone lines, and bridges are being constructed.

"The roads and telephone lines will greatly assist in controlling fires, especially with the aid of lookout stations, which are established at strategic points. A typical example will illustrate how important are these improvements as means of overcoming distance in the administration of the forests. In the Southern Division of the Cabinet Forest there are two lookout stations from which, with the aid of field glasses, nearly a million acres are visible. The system of patrol provides that once or twice each day, and constantly during the danger seasons, rangers scrutinize the forest from these lookouts. Notice of a fire can be sent by telephone, and the roads, trails, and bridges make it possible to obtain help promptly.

"The regulation of the range by the Government has proved a decided success. No longer hustled from one place to another in competition for insufficient feed, stock is now brought through to the end of the summer in better flesh and with fewer losses than formerly. During 1907 improvement of the range by protection was supplemented by experimental investigations to determine how the amount of forage can be increased; how plants of little value can be replaced by others more useful; how poisonous plants can be got rid of or their effect upon stock counteracted by treatment; and to plan a system of handling stock that will result in the most economic utilization of the forage crop.

"Experiments in seeding portions of the range with cultivated grasses were begun, and careful detailed study was made of typical range areas to learn under what conditions the best native grasses propagate successfully. An experimental pasture was

constructed where the action of sheep under various systems of handling could be investigated, and the effect of each system upon the forage crop ascertained."

The article, from which the above are excerpts, gives a brief summary of recent achievement in forestry in the United States, a list of forest laws passed in 1907, and a directory of State forest laws, forest associations, and forest schools. It has been printed as a separate, and can be had free upon application to the Forester, U. S. Department of Agriculture, Washington, D. C.

THE FIFTEENTH NATIONAL IRRIGATION CONGRESS.

By James T. Taylor, M. Am. Soc. C. E., Delegate from Hawaii to the Congress.

(Read before the Hawaiian Engineering Association at its November, 1907, meeting.)

There was never a convention that began its session more auspiciously than the Fifteenth National Irrigation Congress, which opened in Sacramento Monday, September the 2nd, 1907.

The gathering of delegates was larger and more representative than that in attendance at any convention of a similar kind ever held on the Pacific Coast. The number of prominent men present and the enthusiasm evinced has never been equaled on any like occasion in the history of California. The Vice-President of the United States, the Governors of six States, a number of Senators and Congressmen, legislators, judges and officials of importance in all departments of the government—Federal, State and municipal—from every section of the country, were in their places when the president's gavel called the convention to order. One of the very notable groups on the floor of the vast convention hall consisted of a number of the most distinguished officials of the departments of the Washington Government, under the auspices of which is conducted the great project of conservation and development of natural resources.

A number of official representatives of foreign governments were on hand to participate in the proceedings of the congress.

In addition to these governmental figures the delegate body included hundreds of men of prominence in every line of human activity from every portion of the United States. No convention ever held in this country has brought together so large a proportion of distinguished men.

The opening function was one of great brilliancy. The vast auditorium, constructed expressly for the occasion, was magnificently decorated with bunting and flags and rare foliage.

Every detail that could add to the pleasure and comfort of the delegates was perfectly worked out. Nothing was omitted. A perfect service was provided to prevent confusion and facilitate the business of the congress, and it resulted in the preservation of the best order and a complete absence of annoyance and delay.

Delegates and visitors were seated without the slightest disorder and when the time fixed for opening the convention arrived, everything was in readiness to proceed.

Promptly at 1:30 p. m. Executive Officer Beard introduced Governor Chamberlain, president of the National Irrigation Congress, who took the chair. After an invocation, the "Irrigation Ode," a superb composition written for the occasion by Mrs. G. McClurg of Colorado, was sung by the Ogden Tabernacle choir of two hundred voices, one of the finest musical organizations in America. The rendition of this masterpiece was a magnificent performance and evoked thunders of applause.

Mayor Beard, in a clever speech of a few minutes' length, welcomed the delegates and visitors to the congress at Sacramento and extended to them the freedom of the city during their stay. He was followed by Governor Gillett, who offered to the city's guests the larger and far-reaching hospitality of the State. He gave them out of hand everything that California possesses, to have and to hold and to enjoy during the time they were within her borders, and said it was such a gift as no other State, and no other Governor, could offer. The Governor's talk won the audience by its heartiness.

Governor Chamberlain responded to these addresses on behalf of the congress. After paying a glowing tribute to the enterprise and hospitality of Californians, Governor Chamberlain said in part:

"The Federal Government has under consideration and construction projects of reclamation in Arizona, California, Colorado, Idaho, Kansas, Montana, Nebraska, Nevada, New Mexico, North Dakota, Oregon, South Dakota, Utah, Washington and Wyoming, covering more than three million acres, much of which is in private ownership and the balance owned by the States and the United States. The work entails the expenditure of vast sums, but the money involved is a mere bagatelle in comparison with the benefits received and to be received in providing homes for thousands and adding millions to the wealth of the Nation.

"In addition to the work now being done under government supervision, contracts have been entered into with private contractors for reclamation of large tracts of land in all the States which have accepted the provisions of the Carey Act. Some of these are making favorable progress; my experience has been, however, that whilst the government moves slowly, the work done by it is more substantial and in the end better, and more lasting results are likely to be attained."

Vice-President Fairbanks was the next speaker, and when he arose he was greeted with a storm of cheers.

Mr. Fairbanks has always been an earnest and influential advocate of all that the congress stands for. He has attended several previous sessions and has always manifested the liveliest interest in the movement and its purposes. He spoke in part as follows:

"The effect of irrigation in this Western country can be appreciated only by those who are familiar with it from personal observation. The change made in the conversion of an arid waste into fruitful fields seems almost incredible. There is no more radical transformation to be found anywhere than in the parched valleys and plains which have been irrigated, and which prior thereto produced nothing but sage brush. The most unproductive land has become the most fertile. From the worst, it takes rank with the best. There are promising fields today where there was no sign of habitation before we entered upon the present reclamation policy, and what has been done is but a part of what we shall acomplish if we faithfully adhere to the policy upon which we have entered and carry it out to the limits of its possibilities.

"We have long since passed the experimental stage, and it only remains to push the work wherever feasible with the utmost vigor.

"The reclamation of every ten or twenty acres of land means the creation of a homestead which will comfortably support a family of industrious, intelligent and patriotic American citizens.

"The development of irrigation by the National Government must have a profound and far-reaching influence upon the general subject of irrigation throughout the country. It will tend powerfully to the extension of irrigation into portions of the country which have hitherto relied largely upon rainfall in the cultivation and growing of crops. There is no more important subject for the consideration of farmers in many of the humid and semi-humid regions than that of so-called supplemental irrigation. We must prepare more and more for the increased demand upon our food supply which comes with the multiplying millions of our population. Therefore, the development of the subject of irrigation is of interest not only to the farmers of these great Western regions, but to farmers and consumers everywhere.

"We do a substantial and permanent service to our country by enlarging the area into which men and women may come from congested cities and find occupation for their energies and homes for their heads. Let a man own a piece of ground which he may cultivate, put him into partnership with nature, and it will intensify his love of country and make him a more stable, conservative and patriotic citizen. Increase the home builders and the home owners of the Republic and you augment its real abiding strength.

"The development of the Reclamation Service in this Western country means the increase of migration hither of many desirable citizens.

"Closely related to the subject of irrigation is the work of forestry preservation. The two subjects go hand in hand. We have pursued a somewhat reckless policy with regard to the forests of the United States. In some sections of the country, in fact in almost every section, we have denuded our lands of timber in what now seems to have been almost a wanton fashion. We have thought only of today, having no proper regard for the future. The demand of the country for timber needed to build our railways, construct our cities and homes, has been tremendous. We have cut away our forests and paid no attention to the necessity of taking steps for their ultiuate restoration.

"We now see that some of the older countries in their experience have seen that it is necessary to adhere to a rational, scientific forestry system, not only in the interests of our future forests, but in the interests of the important subjects of irrigation and navigation. It is but a truism that if the forests are swept away the rainfall quickly flows into the streams and is washed into the sea, whereas if the trees are properly preserved upon the watersheds the rainfall and melting snows are stored in nature's reservoirs and are gradually fed into the streams for the benefit of both agriculture and navigation.

"We have not fairly begun to appreciate the full value of our streams and rivers. We have not fairly begun to appropriate them to the benefit of our agriculture, industry and commerce. The waters which come down from the sides of these mountains may be converted into electrical power and carried hundreds of miles with but little loss to the initial energy, and appropriated to lighting and heating cities, operating mines and driving the wheels of industry. We have thousands of miles of rivers which may be made navigable with the benefits flowing from their use in carrying commerce. There are thousands of miles of rivers which are navigable in a degree but which should be deepened and improved so as to meet our growing needs.

"It is impossible to give too much emphasis to the importance of this subject. Our rivers are the natural highways of commerce and the growing density of our population and the increase of our production makes it essential that there should be additional facilities to insure cheap and ready transportation. The capacity of the railways of the country is already taxed to the utmost, and the rapid development of traffic makes it necessary that we should largely augment the means of carrying it in the future.

"Moreover, there is no better equalizer of rates than water competition. Water transportation is a perpetual and certain guaranty against monopoly on the part of the common carriers. We are earnestly carrying forward the construction of the Panama Canal, confessedly a work of great importance, not only to our commerce but to the commerce of the world. Important as this matter is, it is not more important than the improvement of navigation upon many of our rivers. The improvement of navigation

upon them may well go hand in hand with work upon the great canal. The one is in a very considerable degree the complement of the other. This is a large subject and must be considered in a large way.

"Upon such an occasion as this I would not venture to obtrude politics—nothing could be more inappropriate. The fact is that we have a surfeit of politics. What we need most is more business and less politics. Unless the business affairs of the people are arrested by unwise policies; unless the seeds of distrust are sown among ourselves; unless commercial unrest is encouraged by doctrinaires, we shall continue to expand our industries, and the great West will continue to grow and fulfill her mighty destiny. Can we stand prosperity? We are in the midst of a prosperity the like of which was never before seen. Can we utilize it to our benefit? Can we retain it, or will we distrust each other and involve it all in hopeless confusion? There never was an hour when it was more important that we should be governed by sober judgment. We should sedulously cultivate a tolerant spirit and a spirit of justice toward each other. We should not forget that confidence is the sure foundation of prosperity and progress, and we should have a care that we do not undermine it."

At the conclusion of Mr. Fairbank's address Gifford Pinchot, government forester and personal representative of President Roosevelt at the congress, delivered the following message of the Country's Chief Executive, which came by telegraph:

"I send you hearty greetings, and my earnest wishes for the fullest success of your convention. I congratulate you on the progress of the great movement you represent. There is no movement more emphatically for the benefit of the small farmer and the small ranchman. There is no other way to assist the actual settler and homemaker who owns and tills his own land so powerfully as through this movement of yours for the wise use and preservation of the waters and the forests. The Reclamation Service and the Forest Service are directly adapted to help the small man make and maintain a prosperous home; and they are doing it. These services were recently inspected on the ground by the Secretary of the Interior and the Secretary of Agriculture, who have them in charge, and I congratulate you on the high standards of integrity and efficiency they have attained.

"It is a matter of sincere satisfaction to learn that you will not confine yourselves to questions of irrigation and forestry, nor even to the control, use, and conservation of streams, vastly important as these are to every citizen of the United States. I am glad to know that you will give attention also to that problem of which forestry and irrigation and water conservation form but a part, the fundamental problem of the conservation of all natural resources. The work of the Government along the line of this greater problem cannot be made effective without the approval and support of the whole body of citizens.

"By educating, guiding and crystallizing public sentiment in this direction, by bringing the needs of the people clearly and forcibly to the knowledge of their representatives, you are rendering a service of the first importance to the Nation as a whole.

"THEODORE ROOSEVELT."

Mr. Arthur Briggs and Senator Perkins followed the reading of the President's message with able and interesting addresses, which were cordially received.

Following the addresses of welcome came the responses of Governors and representatives of foreign nations. Governor Albert Mead of Washington extended the thanks of his State for the kind welcome, and Governor J. C. Cutler of Utah made a happy address.

As the Chinese Consul-General, Sun Sze Yee, did not speak English fluently, the Vice-Consul spoke for him. Mr King complimented the congress on the splendid work and declared China to be a pioneer in the work of irrigation. Franz Bopp, the Imperial German Consul-General, spoke as the representative of his country.

Andros Aldasora, sub-secretary of the Mexican Legation at Washington, D. C., was called upon as the representative of the Southern Republic, and made an eloquent address in Spanish.

CONSERVATION DAY—A NOTABLE SESSION OF THE CONGRESS.

The second day of the congress opened quite as auspiciously as the first. The attendance of delegates was large, filling the great auditorium comfortably. The deepest interest was manifested by the audience at the morning and afternoon sessions in the splendid papers and addresses. The enthusiasm of the delegates was kept up to a high pitch by a number of spirited exchanges on the floor of the convention during the progress of both sessions. Mr. Newell's illustrated lecture in the evening was immensely enjoyed by a large and appreciative gathering which included a majority of the leading delegates and prominent visitors. After the brief preliminary business of the meeting was disposed of, Governor Chamberlain, president of the congress, introduced U. S. Senator Francis G. Newlands of Nevada, father of the Reclamation Act and a member of the Inland Waterways Commission.

INLAND WATERWAYS COMMISSION.

Senator Newlands delivered a highly instructive address on the formation of that commission and the purposes of its work. After referring to the appointment of the Inland Waterways Commission by President Roosevelt, Senator Newlands said that the letter of instructions from the President enjoined upon the commission the study of all questions relating to inland waterways, with a view to recommending practical legislation upon the

subject. The President's purpose was to undertake now a plan of practical utilization, improvement and development which might in the coming years be worked out comprehensively and successfully. "Whilst the primary purpose of this inquiry is to facilitate water transportation, it is impossible to perfect the machinery of the waterways without taking into consideration the related questions of forest preservation, of irrigation of arid land, of reclamation of swamp land, of bank protection, of clarification of streams, and other kindred questions.

"Whilst these questions are important, the use of these great waterways, lakes and rivers for purposes of transportation of men and of products, is the most important. Every creek, every brook, contributes in some degree to the volume of the river or lake which should serve as a part of the great machinery for transportation, and a thorough and comprehensive plan of artificializing waterways should be adopted, with a view of securing stability of channel. It is impossible to indicate now what the form of legislation should be. Individually, I should say that some plan in which the chiefs of the great scientific services of the country could be brought together in a national board of public works, with power to make comprehensive plans and to work them out gradually, might be the most efficient way.

"The people of the United States are awakening to the necessity of utilizing the national power for the promotion of the general welfare. We nationalized banking and currency because we realized the folly of having as many different financial systems as there were States, the danger of inflation and panic arising from careless and inconsiderate State action. We nationalized irrigation because we saw the futility of subjecting the treatment of the sources, the watersheds and valleys, of streams flowing through several States. We realized that every great river must be as a unit, regardless of the State lines, and that the action of the Union on national lines was therefore essential. We nationalized the quarantine because we realized that the health and safety of the entire Nation might be endangered by the carelessness or indifference of a single State. We are now taking up the question of nationalizing the development of the inland waterways, embracing lakes and rivers and connecting canals, and including all the related questions of forestry, of irrigation, of clarification, of bank protection, of channel opening, as well as navigation; and the South in this latter movement is taking the lead for national action, realizing as it does that the promotion of interstate and foreign commerce was one of the primary causes of the union of the States as a Nation. Under national incorporation, the questions relating to inland waterways, railway and ocean transportation, will be solved."

At the conclusion of this address, which elicited the closest attention, W. A. Beard read a letter from Secretary of the Interior Garfield regretting his inability to be present, and com-

menting in the strongest terms the work and purposes of the congress. The letter wound up by asking Governor Chamberlain to "express to the congress his appreciation of the assistance it has been to the Reclamation Service."

"Congresses and conferences," added the secretary, "when conducted in a spirit of suggestive criticism, are always helpful. I am confident that the water users, either individually or through their representatives, will always find the officers of the government willing to meet them half way in the discussion and settlement of any questions or differences that may arise."

At this point the secretary of the congress was instructed to wire the following reply to Secretary Garfield:

"Sacramento, Cal., Sept. 3, 1907, the Secretary of the Interior, Washington, D. C.: Your message to Honorable George E. Chamberlain, President of the Fifteenth National Irrigation Congress, was read today and most cordially appreciated by the two thousand delegates in attendance. I am directed to extend to you the thanks of the congress."

DRAINAGE.

Hon. George E. Barstow of Texas, third vice-president of the congress, spoke on the claims of the National Drainage Association, of which organization he is the president. After extolling the hospitality of California and Sacramento, the speaker made a strong plea for the nationalization of the work of drainage. "Irrigation and deep waterways are related subjects, but why not work also for the drainage of the 80,000,000 acres of swamp lands in the various States from Maine to California? The work is too vast to be carried out on private lines and there is a demand for a national agency to do it and the people everywhere ask that it be done. The work of drainage should be placed under the control of the Reclamation Service. We have a most important precedent for the government's carrying on this work in the example of other countries. Holland, France, Germany and Italy are all doing it. The soundness of the policy of reclaiming the land stands beyond dispute, and there is no reason why drainage of lands should not be carried out."

CONSERVATION OF NATURAL RESOURCES.

Hon. Gifford Pinchot, United States Forester, followed with a brilliant paper under the above caption. He pointed out the urgent necessity of practical steps for the preservation of our fuel and lumber supply by showing the almost incredible wastage in the present use of these natural resources. He said in part:

"In 1896 Professor Shaler, an authority on this subject, estimated that in the upland regions of the States south of Pennsylvania, 3000 square miles of soil had been destroyed as a result of

forest denudation, and that the destruction was then proceeding at the rate of a hundred square miles of fertile soil per year. No seeing man can travel through the United States without being struck by the enormous and unnecessary loss of fertility by easily preventable soil wash. The soil so lost, as in the case of many other wastes, becomes itself a source of damage and expense, and must be removed from the channels of our navigable strams at an enormous annual cost.

"The destruction of forest plants by over grazing has resulted, in the opinion of men most capable of judging, in reducing the grazing of the public lands by one-half.

"The lowest estimate reached by the forest service of the timber now standing in the United States is 1400 billion feet, board measure; the highest is 2000 billion. The present annual consumption is approximately a hundred billion feet, while the annual growth is but a third of the consumption or from thirty to forty billion feet. If we accept the larger estimate of the standing timber—2000 billion feet—and the largest estimate of the standing growth—forty billion feet—and apply the present rate of consumption, the result shows a probable duration of our supplies of timber of not more than thirty-three years. It is evident that all the waste must, if possible, be prevented.

"We are accustomed, and rightly accustomed, to take pride in the vigorous and healthful growth of the United States and its vast commerce for the future. Yet we are making no preparation to realize what we so easily and glibly foresee and predict. The vast possibilities of our great future will become realities only if we make ourselves in a sense responsible for that future. The planned and orderly development and conservation of our national resources is the first duty of the United States. It is the only form of insurance that will protect us against disaster which lack of foresight has repeatedly brought down on nations passed away."

FOREST RESERVES.

The last address of the morning was that of former Governor George C. Pardee on National Forestry. Mr. Pardee evoked a great deal of applause by his vigorous treatment of his subject. Among other things he said:

"Experience has shown that private ownership of the forests is the most prodigal and destructive ownership. It destroys too often the present and the future; it is uneconomical now because it does not pick the best and leave the poorer for the preservation of the future, and it too often makes an ill-earned, presently acquired dollar superior to the country's future welfare. As experience has shown that neither individuals, the counties, nor the State can be depended upon either to conserve or preserve the great forests which, if properly handled, would be a never ending

source of wealth to our people, the government of the United States has set aside in forest reserves a good part of the forests of the country. This has been done under the supervision of that great and wise man who has done more for this country than any of us yet realize—President Roosevelt. In so setting these forest lands aside the government does not intend to remove them from the use of the people. On the contrary, it is the government's intention, and it is now so doing, to make the forest reserves as productive of wealth to the people of the country as the German forests are to the German people. Our government realizes that, if only ripe trees are cut for commercial purposes, if the seedlings, the saplings, and the seed are permitted to grow, if the young growth be properly thinned out so that it will have an opportunity to thrive, if fire be kept out, if new forests be planted where the ax and fires have killed off the old ones, our government realizes that then the American people will have for all time an inexhaustible source of wealth and will always be sure of the multitude of things that come, directly and indirectly, from the forests.

"In the United States the forest reserves area is considerably larger than the whole State of California, and it ought to be much larger. Although these reserves have been under government control but a very short time, they have already begun to return good values to the people of the country. For instance: in the fiscal year 1904-5, the revenues of the forest reserves from the sale of lumber were $60,142.62; while, for the year 1905-6, the returns were $767,219.96—over ten times as great. Over 96,000,000 feet of lumber were sold from the reserves in 1905-6. The price of this lumber on a 'stumpage' basis, also increased from $2.50 per thousand feet to $4. It is thus apparent that the supposition is wrong that the forest reserves throttle all use of forest lands by private individuals. Any individual may secure a permit to take from the land timber in such quantities as his needs and his purse will permit. But no man may go into the land and indiscriminately cut the timber, the old and the young trees. He may cut only those which the government experts mark for the ax. Neither may he destroy by the ax or fire the seedlings or the timber. His wood or his lumber safe from the greedy grasp of a private monopoly, and the forests and their uses will be preserved for our children and our children's children's uses and enjoyment."

WATER CONSERVATION AND COMMERCIAL GROWTH.

The afternoon session on Tuesday was opened with an address by Mr. John A. Fox of the Inland Waterways Commission, on the possibilities of the task entrusted to it. He dwelt on the relation of commercial growth to the conservation and develop-

ment of the country's waterways, citing facts and figures to bear out his contention.

"There are," he concluded, "other sides for consideration of this matter in relation to irrigation. If the great forests were not destroyed, but were as they were fifty years ago, there would be no floods, and navigation would be still good. The steamers are all gone on the Ohio and almost gone on the Mississippi and Missouri. If the forests had been cared for there would be a saving of 40 cents a ton on 9,000,000 tons of freight and the raising of the stage of the water all the year round. Can we afford to spend $500,000,000 on the rivers? We can. The saving of the freight on wheat, coal and lumber, would soon pay for it. If we can save the difference between one mill and 7.6 mills a ton over the railroad rates on the 18,700,000,000 ton miles last year, it would amount to nearly $18,000,000 a year. I ask the aid of Congress to forward the work."

CONSERVATION OF SOILS.

Dr. W. J. McGee, of the Inland Waterways Commission and the United States Bureau of Soils, read one of the strongest papers of the day, taking for his subject the conservation of soils. He spoke of the prodigious quantities of the richest soil matter annually borne away in the current of rivers and streams. It is estimated that the Mississippi river carried to the Gulf of Mexico 400,000,000 tons, or two Panama Canals full each year, some years ago. Since the estimate was made the floods have increased the amount and 25 per cent. more is carried now. The Mississippi River has a great area and every year there is carried into the sea a billion tons and over 90 per cent. of the total value of the richest soils of the fields. It cannot be appraised at less than a dollar a ton—a billion dollar loss each year swept into the sea. It would cover 347,000 square miles an inch thick. Our rivers are carrying soil into the sea in an amount equal to the value of the freight carried on them. What other country than this could stand it? How can it be remedied? Clear water does not erode the banks, but loads it with sediment and it erodes. How to control it is the problem. The streams, if clear, will not cut channels, make bars or flood. Another point: water, which forms six-sevenths of our bodies, has great value in other ways and the fundamental value of all values is water."

Speaking of the great interior plain of California, Dr. McGee said: "The characteristic of the Sacramento Valley people is inordinately monumental modesty. But I have never met a resident who realized its potentiality. It contains 16,000,000 acres of the finest land on the face of the earth, with a splendid climate and a sufficient rainfall to mature crops, and the world has no other such valley. Its resources are not utilized. It has running water, the discharge of two rivers, with 140,000 second feet and

an average fall of 4000 feet. It has 50,000,000 horse-power available, worth a billion a year, or the interest on twenty billions of capital—more than is the invested capital of all the railway lines in the United States and equal to all the gold extracted since the days of ''49'."

CONSERVATION OF MINERAL RESOURCES.

J. A. Holmes of the United States Department of Agriculture spoke on "The Conservation of Our Mineral Resources." He alluded to the remarks of Dr. McGee on wastefulness of soils and water and Mr. Pinchot on wastefulness of forests, and said we must realize that we are a wasteful nation. He laid emphasis on the rapid exhaustion of the visible coal supply. "The destruction of this coal is that of a resource of the future as well as the present. We are used to thinking of coal deposits as inexhaustible, but we have heard today that it will all be gone in thirty years. In fifty years the great deposit of anthracite will be gone. These deposits were all perfected before man came on earth and since then none has been growing to replace them. But how is the coal to be extended? We are using it up so that in the next ten years the amount used will be more than in all the years before. We can not stop it because the population of the country is growing so fast. There is no known substitute to supply the want. Forest fuel and natural gas can not be depended upon and many of the oil deposits are disappearing. Other sources are uncertain. We must, then, look to conservation of fuel for the future or exhaustion will be permanent. The nation will need a continuous and cheap fuel supply. It can not get it from others. Our prosperity depends upon fuel, labor and raw material. We must have the latter if we would have prosperity."

CONSERVATION OF WATER RESOURCES.

M. O. Leighton, United States Hydrographer, addressed the Congress on "The Conservation of Water Resources."

"We are looking toward the day when our rivers shall become as easily and as effectively managed as the water in the distribution pipes of a modern city. This is the highest conception of water conservation, and when it is accomplished, the problem of flood prevention, navigation, irrigation, water power and municipal supply will have been solved. There is only one way to conserve water and that is to lock it up. Each river basin should have its reservoirs of capacities sufficient to the greatest floods and so managed that they will be ready during the flood seasons to receive the surplus waters. With the water thus under control, it can be released when needed to maintain inland waterways at navigable depths, to irrigate fields and supply cities, and in

descending to perform this service it can be used to turn the wheels of power plants.

"We do not know the amount of damage caused each year by the floods in the United States, but it is estimated that it must be more than $100,000,000. It is interesting to contemplate what sort of a flood prevention or sinking fund one might establish on that basis. In this connection it is important to know that in addition to the relief from flood damage, there would be the saving of waters that now go to waste. Put this water to some good purpose and its value will be at least five times as great as the damage it causes. When one considers the plain facts upon the basis of dollars and cents, it is clear that the continuation of the present public policy with reference to the conservation and utilization of national resources is the climax of public stupidity. One thing is certain: the time is coming when we shall consider flood levees as improvident and wanton as the old method of burning timber for the purpose of clearing land for cultivation."

The following message was sent to President Roosevelt by the Irrigation Congress:

"Your splendid message read by Hon. Gifford Pinchot is deeply appreciated by the members of the Fifteenth Irrigation Congress, and I am directed by unanimous and enthusiastic vote to extend to you the thanks of this body. The congress meets under most favorable auspices with the largest and most representative attendance in the history of Irrigation Congresses, and promises to be of great value to the country as a factor in the wise development of our splendid resources of forest lands and waters."

At the evening session Morris Bien of the U. S. Reclamation Service spoke on the "Community Idea in the Reclamation Act." "The Work of the National Reclamation Service" was the subject discussed by F. H. Newell, director of the service. It was illustrated by stereopticon views.

The feature of the session of Wednesday was an address by E. H. Harriman, the railroad magnate who had stopped off at Sacramento to attend the congress. He gave a short address, telling the congress of his early belief in the possibilities of irrigation. When he suggested to his associates east of the Mississippi that they take hold of the Union Pacific Railroad, they regarded him as being almost out of his senses, and asked what he was going to do with the great desert to be traversed. "I told them of the possibility of irrigation, but they replied that it would come in another generation, not in ours.

"I had to go it alone and perhaps some of them now regret that I did not use more force and persuasion to have them go along with me.

Harriman then said that his organization controlled much timber land in Oregon, but that it was not being sold, or the

timber cut, but is being saved for future generations. He referred to the work done in improving the Union Pacific and said it was necessary to secure control of the Central Pacific and improve it likewise; otherwise traffic would be choked up at Ogden. He closed by saying he hoped the people of the West would not consider his organization selfish, and added that everything possible was being done to develop the West.

The addresses of Wednesday included one by Dr. Elwood Mead, who spoke on "Some Things Needed to Secure the Highest Development of the Arid Region." Professor E. J. Wickson of the Agricultural Department, University of California, read the paper of A. C. True, director of Experiment Stations Department of Agriculture, who could not be present. The subject was, "Irrigation and Drainage Investigations." W. A. Ward, director of the Rice Growers' Association of Beaumont, Texas, delivered an address on "Rice Irrigation." Robert D. Manson, a Chicago banker, spoke on "Financing Irrigation Enterprises."

Governor Kibbey of Arizona was heard at the afternoon session on "Water Users' Association." W. A. McAllister, general agent of the Southern Pacific Railway, spoke on the "Settlement of Irrigated Lands." L. L. Dennett of Modesto, California, spoke on "Municipal Irrigation Systems." Professor Samuel Fortier delivered an able address on "The Greatest Need of Arid America." His main contention was the settlement of irrigated lands. He said that the irrigation projects amounted to little without the strong arm, sound judgment and tireless energy of the farmers. He said that 5,000,000 acres of land were to be opened for homes after irrigation projects were completed, and every effort should be made to encourage settlement. F. L. Reeding of the Department of Agriculture spoke of the "Relation of Irrigation to Dry Farming."

Interest in Thursday's session centered around Luther Burbank, "The Wizard of California." Mr. Burbank chose as his subject the cactus.

"I feel a good deal more at home in my grounds than I do in addressing an audience. In my work I have something over 5000 species of plants in training for improvement, but I can only speak of one of them now. I will take the cactus. You probably know that one-third of the land surface of this whole earth is practically desert. Nearly the whole of Australia except a narrow rim around the coast has been found to be almost useless for any purpose except sheep raising, and even that is not profitable because there is once in a while a year when one-half of the sheep die, and it is something the same wherever stock has been grown in semi-arid districts. The cactus, which was introduced into Australia and South Africa, was the worst thing that could have been done. It was introduced probably for ornament on

account of the thorns. It has taken possession of Australia and South Africa. It is very destructive to the sheep districts. Very often the thorns get into the eyes of the animals and destroy their sight. Fifteen years ago I was examining and studying foliage plants for dry regions, to see what improvement could be made upon them, and it struck me that the cactus, if the thorns can be taken off, would be one of the, if not the best, of all plants for desert culture. I gathered all the cactus of all kinds, those which would even grow in Alaska, because I wanted some of the hardy blood. I gathered them from the best that I could find from my collectors in South Africa and Mexico and I gathered them from North Africa, where the cactus has been somewhat cultivated for the use of camels. This is a particularly thornless variety. There are two or three others. I found that by raising them by seed that ninety-nine out of a thousand would be thorny. A few were partially thorny. They had not yet acquired the habit of leaving off the thorns, but once in a while one would be found among thousands that would have less thorns than even the parent. Taking that one and raising thousands and thousands of seedlings produced one that was entirely thornless. The cactus is just a little hardier than the bluegum. Some cactus will grow in Labrador. One species grows in North Dakota and Idaho and is able to stand the climate of Alaska. Now, as I wished to get a cactus that would produce a great amount of nourishment, of course my first object was to get it thornless. Then next was to get one which would produce a great weight of forage to the acre. That has been very well accomplished. I have a cactus set out three feet apart one way by six the other, that will produce 200 tons of food per acre. Twenty tons per acre is a good crop for beets, carrots, turnips, cabbage and almost anything cultivated in the soil. Some of the older cactus will produce about 100 tons. Cactus is not as nutritious as beets, but there is more water in it. By analysis some cactus produce 2.5 per cent. starch, while others produce 5-10 of one per cent., so you can see there is a great individuality in the nutritious quality of cactus as well as productiveness. Now my object is to combine this great productiveness with great nutrition, and then my opinion is that the cactus will be the most important plant that there is today for arid regions. I have taken the wild Colorado cactus, planted them in a small bed and given them no water, planted four or five of my improved cactus in the same bed, and the improved cactus starved them almost to death. In the same treatment they will grow three or four feet in height and be in perfect vigor and often weigh two to seven pounds each, while the wild Colorado cactus, which you would think was as hardy as anything possible, would be drying up for the want of moisture. That can be seen on my place today. The ability of the improved cactus to root deeper, from their greater individual growth, gives them the opportunity to strike deeper and take the moisture up, while the

common wild cactus cannot reach it, so it starves to death. Now, every animal that eats vegetation of any kind is very fond of cactus and for that reason it has thorns, otherwise it would be out of existence, or it would have taken some other means to protect itself. All the cactus, as far as I know, which do not already have thorns, have a very bitter juice and it is not suitable for food for any animal. Those which have the worst thorns are the most nutritious and the most useful. The cactus produces very good beef and very good milk and is used in the Hawaiian Islands and North Africa for that purpose extensively." A delegate asked Burbank if he had a secret of developing plant life and if the secret would die with him. Burbank replied that he has no secret and that he is always ready to assist others.

THURSDAY, SEPTEMBER THE 5TH—FORESTRY, AGRICULTURE AND IRRIGATION DAY.

The official program was carried out, the entire session being devoted to the able and interesting addresses as follows:

Forestry and Railroads.
The Relation of Range Products to the Water Supply.
Leasing of the Public Grazing Lands.
State Forestry and Forestry Administration.
Relation of Forestry and Irrigation.
The Bureau of Plant Industry.
Federal Aid and Control of Irrigation and Drainage.
Irrigation and Sugar Beet Culture.

The evening session was a very interesting lecture on California and its resources, illustrated by splendid stereopticon views of California scenes and attractions by the California Promotion Committee.

On Friday, September the 6th, Land and Irrigation laws held sway. The addresses continued full of interest and were as follows:

"The Public Land Laws," by J. M. Carey of Wyoming, author of the Carey Act.

J. M. Carey was the president of the Fifth and Sixth National Irrigation Congress, held in Lincoln, Nebraska, in July, 1897, and in Cheyenne in Sept., 1898, and has accomplished much for the cause of irrigation in the arid West.

"California Irrigation Laws," by Frank H. Short of California, one of the ablest attorneys on the subject of water and water rights.

Dr. Elwood Mead read a report of the Committee on Interstate Water Rights. Some friendly discussion followed the last two addresses.

The afternoon and evening sessions were given over to other

attractions and many took advantage to attend the State and Irrigation Fairs.

Saturday, the closing day of the congress, was full of interest and the reports of the various committees were received and adopted. A spirited debate on the Resolution Committee's report on the subject of "Free Sugar and Lumber from Foreign Countries," lasted for some time. Finally the two resolutions relating to these subjects were withdrawn and the report of the Resolution Committee adopted unanimously, with the thanks of the congress for their good work.

The delegates of the National Irrigation Congress are to be congratulated on their selection of both president and secretary. Judge Goudy, the newly-elected president, whose home is in Denver, and who is one of the best known men in the State, has large irrigation interests. Judge Goudy personally is a delightful man to meet and his work prior to and during the congress will result in great good to the West generally.

Mr. B. A. Fowler, who was elected secretary, is a man of fine attainments and a good executor, who also has had large experience in irrigation lines, having filled the position of president of the leading water users association in the Salt River Valley in Arizona.

Perhaps two of the most interesting features of the congress, without any attempt to criticize the quality of the many splendid papers delivered there, were the visit of Mr. E. H. Harriman and his talk to the congress and the visit also of "The Wizard of California," Mr. Burbank.

Governor Chamberlain of Oregon, who acted as president of the Fifteenth National Irrigation Congress, filled the position very creditably indeed; in fact, many expressed the opinion that he was the best presiding officer that the Irrigation Congress ever had.

Article VI of the Constitution of the National Irrigation Congress is as follows:

"The membership of the congress may be as follows: Fifteen delegates from each State and Territory, to be appointed by their respective governors; five delegates from each town and city of the United States having a population less than 25,000, to be appointed by its Mayor or chief executive; ten delegates from each city having a population of over 25,000, to be appointed by the Mayor; five delegates for each county, to be appointed by the chairman of the governing board; two delegates each from regularly organized immigration, agricultural and horticultural societies, societies of engineers, agricultural colleges and commercial bodies; each member of any State or Territorial Irrigation commission; also the State Commissioners of Agriculture or Horticulture; the chairman of each section and a permanent officer of the congress; also the Governor of each State and Terri-

tory and all members of the United States Senate and House of Representatives.

Each member shall be entitled to one vote; provided, no State shall have more than twenty votes; and provided, when a State is represented by less than ten delegates, said delegates if all present may cast ten votes for said State.

It is clear from the above that the Territory of Hawaii is entitled to a large delegation to the National Irrigation Congresses and it is to be hoped that at the future annual meetings, Hawaii will be ably represented, and the needs of the Territory clearly stated so that the citizens of this Territory may reap some of the benefits to be derived from the Reclamation Act and the preservation and conservation of the natural resources of these Islands, by placing the same under National supervision and control.

BRAZIL'S SUGAR CRISIS.

In furnishing the following report, Consul-General George E. Anderson of Rio de Janeiro, says that the sugar industry has reached the most critical period in its history, and is now the center of a great conflict in the Brazilian business world.

The present phase of the contest involves the duty on sugar, and among the elements of the situation are: A contest between the planter-factory, as the producing interests, and the refiners; a very high import duty and largely decreased consumption and a coming bumper crop; the crop prospects being modified by the fact that there is in Brazil a sugar trust, which exists not for the importation and domestic sale of sugar, but for the control of the domestic market by controlling the country's sugar exports, imports being entirely shut out.

The conflict is of interest to the people of the United States not only in its effect upon American exports to Brazil generally and exports for sugar factories particularly, which are coming to be large, but also in the fact that the amount of sugar exported directly affects American markets, because in certain cases certain amounts of Brazilian sugar are forced, or are likely to be forced, upon the American markets at any price. At the same time, while the United States does not penalize sugars from countries which pay bounties upon sugar, unless such bounties are direct, the United States, as a protection of its own sugar industries, is none the less interested in countries which pay indirect bounties in the way of prohibitive import duty as in Brazil at the present time.

INDIRECT BOUNTY AND BRAZILIAN SUGAR COMBINATION.

In 1905 the Permanent Commission of the Brussels Sugar Convention raised the question of whether or not Brazilian sugars should not be penalized by reason of the indirect bounty paid by Brazil to Brazilian sugar planters and manufacturers in the shape of the charge of an import duty of 1 milreis, then about 25 cents gold, per kilo, or about 11 cents per pound. Brazil sent a commission to Brussels to oppose the proposition to penalize its product. The question was finally settled temporarily, in the negative, chiefly, it would seem, because the duty had in the meanwhile been reduced to 200 reis (then about 6 cents) per kilo or about 2.7 cents per pound.

This import duty, comparatively low for Brazil though still high as such duties run the world over, did not appeal to a good many sugar manufacturers in Brazil and there was at that time the beginning of agitation and organization which has continued ever since. Starting with the necessity of opposing the proposed action of the Brussels Convention, there has been a constantly developing organization now known as the Colligacao Assucaria Brazileira (Brazilian Sugar Combination), which now dominates the situation. This organization has forced upon Brazil, one of the great sugar producing countries of the world, prices for sugar to the consumer which probably are the highest paid in any country in the world to-day. The opportunity and scope of this organization has rested in exceptional circumstances. By reason largely of conditions, hereinafter described, in general due to the prevalence of old-time methods in sugar making and in an indisposition or lack of capital to adopt modern methods and machinery to enable them to meet competition of other countries in their own and in foreign markets, the combination has claimed reason for its existence and has been able to influence producers in the direction of organization.

PRICES IN THE HOME MARKET CONTROLLED BY EXPORTS.

The fear of losing all of Brazil's foreign market for its sugar as a result of the penalties proposed by the Brussels Convention led to particular attention being given to the home market. The control of sugar prices within Brazil for Brazilian consumption by the organization was obtained by an agreement whereby the amount of sugar to be sold in Brazil was limited. In spite of the great lowering of the duty to 200 reis per kilo, as noted, the duty was still great enough to shut out foreign sugar under ordinary conditions. The organization thereupon agreed to allot to Brazil about three-fourths of their crop and to hold the crop long enough to force prices up to consumers; the rest of the crop was to be exported. The estimated amount of sugar to be exported was,

in a general way, divided among the importing countries, and, in a general way, sales to such countries were made upon the basis of this allotment. The price to be obtained for the sugar exported was to be as high as possible, as a matter of course, but whatever the prices were the proportion of the crop allotted for export was to be sold abroad rather than in Brazil, regardless, also, of the prices in Brazil. The price of sugar in Brazil was by this method gradually raised to a point where, even by paying the high import duty, French and German beet sugars could be exported to Brazil and undersell Brazilian sugars. To prevent this competition from abroad, the Brazilian sugar interests demanded action from the Government, and, on March 27, 1908, the President of Brazil, using authority granted him by the Brazilian Congress, issued a decree doubling the duty on imported sugars, thus shutting out all foreign sugars.

This increase in duties brought the price of sugar in Brazil to the following rates: Cubes, cube sugar, and the grade known in the United States as granulated, are selling in Rio de Janeiro for 1,200 reis per kilo (1 kilo=2.2 pounds); whites, corresponding to C sugar in the United States, for 900 reis per kilo, mascovinho or coarse brown sugar, 600 reis per kilo, substantially 16.3 cents, 12.3 cents, and 8.2 cents per pound, respectively. In the face of these prices is the fact that last year about 13,000 metric tons of sugar were exported from Brazil to countries where they competed with sugars selling at very much less than sugars are selling in Brazil.

PRESENT OUTLOOK—PROSPECTIVE EXPORTS TO THE UNITED STATES.

The course of such prices in Brazil continues and the plan of the Colligacao is to be continued. For the present crop, according to the arrangement made at the beginning of the crop year, 20 per cent. of the product is to be kept by the producers in the shape of demararas and melados, or low grade sugars of the specifications for export. If the agreement is adhered to, this 20 per cent. will not be sold in Brazil, no matter what the price of the product here may be.

There is no doubt that the sugar industry of Brazil has come to the parting of the way. The present artificial conditions of the business can not continue long. Even if the present high duty here is maintained, the market will dwindle until it will not suffice to support the present volume of the industry. Without some such artificial support it is also certain that many of the sugar concerns will have to stop business, unless they can reestablish it upon a modern basis, with modern machinery and modern methods generally. The planters and factory people who have bought modern machinery—mostly from the United States—are making money now and could, in all probability, even make

good profits without the support of any duty, owing to the possibility of reducing many elements of the cost of production to a minimum.

In the meanwhile, whether the sugar organization in Brazil continues to withdraw sugar from the Brazilian market to ship it abroad for the sake of keeping up Brazilian prices, or whether by the collapse of the present wall made by the high duty the business takes upon itself a more natural and more lasting aspect, it is probable that shipments of Brazilian sugar to the United States will largely increase in the near future. The satisfactory expansion of the business, other than a temporary aid in the increased consumption in Brazilian markets which would follow at once upon the fall of prices, can only come in the development of exports in which by reason of full supplies elsewhere, the United States must have a part.

Present indications are that the current year's crop in Brazil will amount to 5,200,000 bags of 75 kilos each, a total of 390,000 metric tons.

PHILIPPINE FOREIGN COMMERCE.

The "Report on Philippine foreign commerce in the calendar year 1907," is, in part, a summary of agricultural conditions in the Islands for this period. This report shows improved commercial conditions in both import and export trade. Imports exceed by $4,050,042 those of 1906, and increased export values amount to $454,985.

In considering the import trade of the Islands, the fact of especial interest to the Philippine farmer is that one-third of the total imports come under the general head of foods, drinks, and food-animals. A large part of these imports are products that could be produced wholly, or in part, in the Islands.

The largest single item of value under this group is rice, the imports of which amounted to $4,166,744. The imports of rice show an increase in value of $174,831, this increase being due to exceptionally high prices as shown by the fact that the quantity of rice imported in 1907 was less than in 1906. The cattle trade amounts to $1,119,638, of which China furnished, in 1907, 90 per cent. The total meat trade amounts to $886,924, one-half of which comes from Australasia. Vegetables are imported to the amount of $561,116; dairy products, $478,585; coffee and cacao, $343,288; and eggs, $243,810.

Of the export trade the four great Insular staples—abaca, sugar, copra, and tobacco, which constitute 95 per cent. of the total exports show a gain of only $13,314. Of these four staple

products copra shows a considerable increase, abaca a small gain, and sugar and tobacco considerably reduced values.

The most encouraging feature of the export trade of the Islands is the increased trade in various minor products, such as maguey, ylang-ylang, coconut oil, etc. Of these minor products maguey is of the first importance. The exports of maguey show a steady growth from year to year both in quantity and value and it seems probable that this fiber is destined to become one of the important export products of the Islands.—Philippine Agr. Review.