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**HAWAIIAN
SUGAR
MANUAL**



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1981



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**Hawaiian Sugar
Planters' Association**



HSPA SUGAR MANUAL 1981

A Hand Book of Statistical Information
PUBLISHED BY

Hawaiian Sugar Planters' Association

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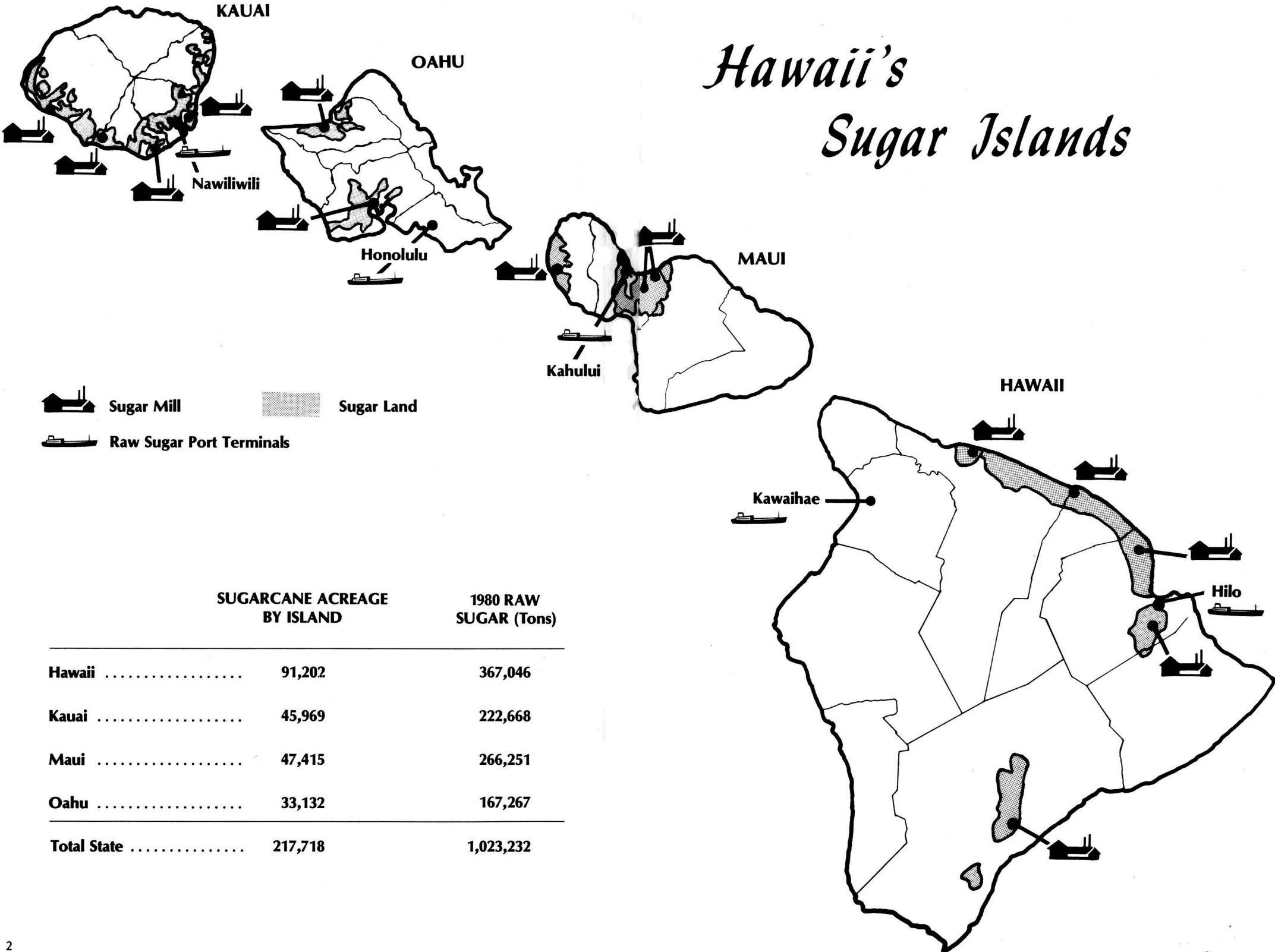
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Hawaii's Sugar Islands



 Sugar Mill
  Sugar Land
 Raw Sugar Port Terminals

	SUGARCANE ACREAGE BY ISLAND	1980 RAW SUGAR (Tons)
Hawaii	91,202	367,046
Kauai	45,969	222,668
Maui	47,415	266,251
Oahu	33,132	167,267
Total State	217,718	1,023,232

HAWAIIAN SUGAR COMPANIES

(Principal officers, mailing addresses and
telephone numbers)

ISLAND OF KAUAI

GAY & ROBINSON
Makaweli, Hawaii 96769
Phone: 338-8233

KEKAHA SUGAR COMPANY, LTD.
L. A. Faye, Jr., *Pres. & Mgr.*
Kekaha, Hawaii 96752
Phone: 337-1472

THE LIHUE PLANTATION COMPANY, LTD.
W. D. Balfour, Jr., *Pres. & Mgr.*
Lihue, Hawaii 96766
Phone: 245-2112

McBRYDE SUGAR COMPANY, LTD.
R. F. Cameron, *Vice Pres. & Mgr.*
Eleele, Hawaii 96747
Phone: 335-5337

OLOKELE SUGAR COMPANY, LTD.
R. B. Cushnie, *Vice Pres. & Mgr.*
Kaumakani, Hawaii 96747
Phone: 335-5337

ISLAND OF OAHU

OAHU SUGAR COMPANY, LTD.
D. W. Ballie, Jr., *Pres. & Mgr.*
Waipahu, Hawaii 96791
Phone: 677-3577

WAIALUA SUGAR COMPANY, INC.
W.W. Paty, Jr., *Pres. & Gen. Mgr.*
Waialua, Hawaii 96791
Phone: 637-4520

ISLAND OF MAUI

HAWAIIAN COMMERCIAL
& SUGAR COMPANY
P. F. Conrad, *Gen. Mgr.*
Puunene, Hawaii 96784
Phone: 877-0081

PIONEER MILL COMPANY, LTD.
R. T. Vorfeld, *Pres. & Mgr.*
Lahaina, Hawaii 96761
Phone: 661-0592

WAILUKU SUGAR COMPANY
D. B. Cataluna, *Vice Pres. & Mgr.*
Wailuku, Hawaii 96793
Phone: 244-7079

ISLAND OF HAWAII

HILO COAST PROCESSING COMPANY¹
T. H. Inglett, *Exec. V. P. & Chief Exec. Off.*
Pepeekeo, Hawaii 96783
Phone: 963-5516; 963-6669

DAVIES HAMAKUA SUGAR COMPANY
P. E. Bouvet, *Vice Pres. & Gen. Mgr.*
Paauiilo, Hawaii 96776
Phone: 775-7261

KA'U SUGAR COMPANY, INC.
I.W. Bowman, *Vice Pres. & Mgr.*
Pahala, Hawaii 96777
Phone: 928-8311

MAUNA KEA SUGAR COMPANY, INC.²
S.W. Knox, *Vice Pres. & Mgr.*
Papaikou, Hawaii 96781
Phone: 964-1025

PUNA SUGAR COMPANY, LTD.
J. C. Hance, *Pres. & Mgr.*
Keaau, Hawaii 96749
Phone: 966-9242

¹Sugarcane milling company cooperatively owned by United Cane Planters Cooperative and Mauna Kea Sugar Co.

²Mauna Kea Sugar Company is a grower which delivers its cane to Hilo Coast Processing Co.

Part I

HAWAII'S SUGAR INDUSTRY

Within the past few years, the visitor industry has become a major economic base for Hawaii. From a very small business following World War II, tourism grew rapidly following Hawaii's statehood and the introduction of the jet aircraft. Military expenditures continue to be the second most important source of outside income for the state; while agriculture, although still important, is not the predominant factor it once was.

In 1980 the Hawaiian economy realized an estimated \$3 billion from visitor spending and \$1.34 billion from federal defense expenditures. Revenues from agricultural products totaled \$1.013 billion in 1980. Sugar accounted for \$631 million of this, pineapple for \$213 million, and diversified agricultural products for \$169 million.

The State of Hawaii imports most of its essentials—food, building materials, fuel, and clothing—so income from “export” products is necessary in the State's balance of trade.

SUGARCANE IN HAWAII

1978 was the bicentennial of the discovery of the Hawaiian Islands by Capt. James Cook. Capt. Cook noted in his journal that he observed sugarcane growing in the Islands on his discovery visits. This important food plant had been brought to Hawaii by the Polynesians who had arrived some 800 years before Cook. The Hawaiians did not produce crystallized sugar from their sugarcane; they, as did other Pacific Island peoples, chewed it.

Don Francisco de Paula Marin was the first European horticulturist who recorded his experiences with native and introduced plants in Hawaii. In March 1819 he noted that he had extracted juice from the sugarcane. There were other abortive efforts to produce sugar from sugarcane but the first successful operation was a plantation started at Koloa on the Island of Kauai in 1835. Some of the fields at Koloa have grown sugarcane continuously since then and are still producing satisfactorily today. Koloa first milled sugarcane in 1837 and 5,039 pounds of sugar and 400 pounds of molasses were sent out by ship in that year.

Sugarcane growing expanded throughout the Kingdom of Hawaii, slowly at first, but rapidly after the negotiation of the Reciprocity Treaty with the United States in 1876. It expanded even more rapidly after Hawaii became a territory of the U.S. Production had reached 100,000 tons in 1886, had expanded to 250,000 tons by 1897, and had doubled again to 500,000 tons in 1908.

In 1980, a total of 1,023,232 tons of raw sugar and 315,088 tons of molasses were produced in Hawaii.

GROWING SUGARCANE IN HAWAII

Hawaii's sugarcane industry differs from that in other sugarcane growing areas of the world in

two important respects. First, the harvest season is virtually year-round. Each raw sugar mill suspends operations at a selected period for maintenance and overhauling, usually one to two months in each year. Harvesting and planting, therefore, are carried on throughout the year. Second, the age of the sugarcane crop at harvest averages two years. A few fields are harvested at 18 months, while some may be as old as four years.

These characteristics of the sugarcane crop result from the fact that Hawaii has a temperate rather than a truly tropical climate, with more rain falling in the cool part of the year than in the warm part. Rainfall in Hawaii varies tremendously from place to place over very short distances. Average annual rainfall on some sugarcane land exceeds 200 inches, while on others it is as low as 15 inches. Accordingly, 55% of Hawaii's sugarcane lands are irrigated. The irrigated fields produce about 63% of Hawaii's annual production. Demands for available water, especially on the Island of Oahu, have become so great that scientists and engineers have sought more efficient ways of irrigating the sugarcane crop. Drip irrigation has developed rapidly and is now being used on some 60,000 acres, or about 50% of the irrigated area. It provides more efficient use of water, more uniform application and can be automated.

The irrigation systems, including not only the in-field application, but the tunnels, dikes, ditches, wells and pumps have all been designed and built by the sugar companies without any government assistance or contributions.

Hawaii's sugar industry is one of the most highly mechanized in the world. Heavy capital investment in field machinery and in factory processing equipment and controls have made Hawaii's sugarcane workers the most productive in the world.

PLANTING AND HARVESTING

Sugarcane is propagated vegetatively. Pieces of cane stalks, commonly called “seed” in Hawaii and called “cuttings” in many other parts of the world, are cut from growing sugarcane and are planted to start a new crop.

Sugarcane is planted by machines which drop the sugarcane pieces in rows and then cover the pieces with soil.

About half of Hawaii's sugar lands are harvested each year. When sugarcane is harvested, it grows again from the old stubble left in the ground. From two to four ratoon crops are obtained from each original planting. Then the field is plowed again and replanted with new seed pieces.

The fields are burned before harvest to dispose of accumulated dead leaves and other trash. Small, discrete areas are burned immediately before harvest. The fire is intense and brief and although there are large visible clouds of steam and some particulate matter, there are no harmful pollutants in the smoke from cane fires. Field burning is done under permits

from the Hawaii State Department of Health under regulations of the Federal Environmental Protection Agency. Burning is economically essential because the extra costs of transporting unburned trash to the mill and removing it there has been shown to be very high.

After the fields are burned, mechanical harvesters are used. These push the cane into windrows where giant grab cranes load the cane into tractor-trailers which haul the cane to the mill for processing into raw sugar.

Some plantations use a V-cutter, which has a v-shaped blade with a vertical cutting wheel at the front. The cane cut by this machine is also loaded with grab cranes after it is picked up and taken to the edge of the field.

New developments include mechanical harvesters now being used by some non-irrigated plantations. These harvesters cut the cane,

chop it into short lengths and use forced air to blow much of the trash and soil from the cane. Engineers are seeking new ways in which cane can be harvested and cleaned more efficiently.

RAW SUGAR TO THE U.S. MAINLAND

Almost all Hawaiian raw sugar is shipped to the U.S. mainland for refining and marketing. In 1980 this amounted to 95% of the total production. About 5% was refined at the C and H Sugar Company refinery in Aiea, Hawaii, primarily for Hawaiian consumption.

All Hawaiian raw sugar is transported in bulk form. The bulk sugar is loaded on ships from terminals at Kahului, Maui; Hilo and Kawaihae, Hawaii; Honolulu, Oahu; and Nawiliwili on Kauai.

In 1980 there were 56 voyages of ships carrying raw sugar from Hawaii to the U.S. mainland.

**HAWAIIAN SUGAR COMPANIES BY ISLANDS, WITH ACREAGE
AND PRODUCTION FOR 1980
(Raw Value)**

	Total Caneland Acreage	Acreage Harvested	Production (short tons)	Tons Sugar Per Harvested Acre
HAWAII				
Hilo Coast Processing Co. (Processor only)			105,364 ¹	9.54
Mauna Kea Sugar Co. (Grower only)	16,793	7,690	1	
United Cane Planter Coop. (Grower only)	6,825	3,351	1	
(237 member-growers)				
Davies Hamakua Sugar Co.	35,507	14,431	141,892	9.83
Ka'u Sugar Co., Inc.	15,905	4,829	63,181	13.08
Puna Sugar Co., Ltd.	16,172	7,073	56,609	8.00
TOTAL HAWAII	91,202	37,374	367,046	9.82
KAUAI				
Gay and Robinson (Grower only)	2,628	1,299	16,811 ²	12.94
Kekaha Sugar Co., Ltd.	8,177	3,774	48,651	12.89
The Lihue Plantation Co.	17,308	8,718	74,009	8.49
McBryde Sugar Co., Ltd.	13,015	6,343	54,710	8.63
Olokele Sugar Co., Ltd.	4,841	2,327	28,487	12.24
TOTAL KAUAI	45,969	22,461	222,668	9.91
MAUI				
Hawaiian Commercial & Sugar Co.	34,727	15,356	188,004	12.24
Pioneer Mill Co., Ltd.	8,599	4,638	49,842	10.74
Wailuku Sugar Co.	4,089	2,505	28,405	11.34
TOTAL MAUI	47,415	22,499	266,251	11.83
OAHU				
Oahu Sugar Co., Ltd.	18,188	9,286	104,350	11.24
Waialua Sugar Co., Inc.	14,944	5,738	62,917	10.96
TOTAL OAHU	33,132	15,024	167,267	11.13
TOTAL—ALL ISLANDS	217,718	97,358	1,023,232	10.51

¹ 80,121 tons attributed to Mauna Kea Sugar Co. 25,243 tons attributed to United Cane Planters Coop.

² Gay & Robinson sugarcane milled by Olokele Sugar Co., Inc.

**AVERAGE RAW SUGAR PRICE, AVERAGE DAILY EARNINGS
FOR NON-SUPERVISORY EMPLOYEES,
AVERAGE NUMBER OF ADULT
HOURLY-RATED EMPLOYEES, AND TOTAL MAN-DAYS
ALL HOURLY-RATED EMPLOYEES
ON HAWAIIAN SUGAR PLANTATIONS**

	Average New York Raw Sugar Price, cents per pound (Hawaiian Basis) ¹	Average Daily Earnings ²	Adult Hourly-Rated Employees ³	Total Man-Days Hourly-Rated Employees
1940	2.78	\$ 2.18	35,062	9,994,863
1941	3.39	2.48	30,646	8,870,704
1942	3.74	2.90	26,371	7,923,641
1943	3.74	3.59	23,847	7,562,690
1944	3.74	3.91	22,543	7,062,227
1945	3.75	5.10	20,806	6,350,489
1946	4.59	5.28	22,131 ⁴	5,247,294 ⁴
1947	6.22	7.63	22,743	6,443,424
1948	5.56	8.02	21,381	5,820,806
1949	5.81	8.04	20,258	5,437,839
1950	5.93	8.30	19,340	5,069,682
1951	6.06	9.00	18,654	4,894,004
1952	6.26	9.70	18,193	4,653,898
1953	6.29	10.20	17,589	4,386,554
1954	6.09	10.58	16,773	4,163,264
1955	5.95	10.62	15,935	3,896,761
1956	6.09	10.73	15,065	3,646,860
1957	6.25	11.20	14,085	3,457,428
1958	6.27	12.78	13,304 ⁵	2,333,527 ⁵
1959	6.24	12.84	12,755	3,082,207
1960	6.31	13.18	12,111	2,917,459
1961	6.30	14.11	11,660	2,787,714
1962	6.45	14.96	10,960	2,675,974
1963	8.20	16.68	10,722	2,582,706
1964	6.90	17.60	10,516	2,593,094
1965	6.75	18.40	10,346	2,505,839
1966	6.99	19.76	10,040	2,447,554
1967	7.28	21.35	9,756	2,346,197
1968	7.52	21.62	9,481	2,282,654
1969	7.75	23.26	9,213 ⁶	2,066,244 ⁶
1970	8.08	24.24	8,908	2,139,183
1971	8.52	26.08	8,610	2,077,011
1972	9.10	29.09	8,127	1,934,563
1973	10.30	30.86	7,900	1,897,369
1974	29.43	34.41	7,700 ⁷	1,744,346 ⁷
1975	22.49	37.34	7,800	1,937,973
1976	13.31	43.12	7,500	1,854,272
1977	11.11 ⁹	43.92	7,200	1,660,298 ⁸
1978	13.74	47.06	7,200	1,771,530
1979	15.20 ¹⁰	50.49	7,065	1,762,838
1980	30.18	56.72	7,076	1,793,237

¹Hawaiian basis is the average New York raw sugar price computed over all the days in the year. The New York price is computed for days the New York market is operating. Local sugar land leases are based on the Hawaiian basis rather than the New York basis.

²Cash wage only. Does not include "employee benefits."

⁷1974: industry-wide strike, 6 weeks.

³Prior to 1947 included only male adults.

⁸1977: industry-wide strike, 3 weeks.

⁴1946: industry-wide strike, 2½ months.

⁹New York spot price discontinued Nov. 2, 1977; after that date based on Clearing Association settlement prices.

⁵1958: industry-wide strike, 4 months.

¹⁰N.Y. spot price reinstated on Aug. 20, 1979.

⁶1969: industry-wide strike, 5 weeks.

WAGES, HOURS & WORKING CONDITIONS

Hawaii's sugar workers, both field and factory, are members of the International Longshoremen's and Warehousemen's Union (ILWU). A new contract was negotiated with the ILWU, running from February 1, 1981 through January 31, 1982. Under this contract, the minimum pay (Grade 1) is currently \$6.09 per hour and Grade 11 is \$8.625 per hour.

Unlike some farming areas where crops are seasonal, Hawaii's sugar industry provides year-round, long-term employment.

In 1980 the payroll for all Hawaii's sugar workers amounted to \$138,168,000.

DAILY AVERAGE EARNINGS IN 1980

Wages	\$56.72
Employee Benefits	24.68
Total	\$81.40

EMPLOYEE BENEFITS

Year-round employees receive up to four weeks vacation with pay, nine paid holidays a year; paid sick leave for up to 54 days plus a temporary disability supplement for extended illness, medical plan, a dental care plan for dependent children, retirement pensions, severance pay and many other benefits.

APPROXIMATE EMPLOYMENT BY OCCUPATION AT SUGAR COMPANIES

Factory	1000
Field	2000
Motive Equipment	2280
Construction & Surveying	170
Clerical	250
Trades	1250
Miscellaneous	400
Supervisors	1050
Total	8400

SUGAR LANDS

The Hawaiian Islands make up the union's fourth smallest state. The islands are actually the summits of a chain of volcanic mountains, some of which are still active. Only certain lowlands near the coasts are tillable because of the rugged terrain and the character of the soils. The balance is forest, pasture and wasteland.

Hawaii's sugar companies are located along the coastlines of the four sugar islands and push upwards into the foothills and mountains.

Approximately 220,000 acres are devoted to growing sugar in Hawaii, with about 35,000 acres in mill sites, roads, irrigation systems, etc., or un-

cultivated land. This is equal to about 5 percent of total land area and about 9 percent of total private land.

More than half of the sugar lands are owned by the sugar companies. The balance is leased from government or private owners.

ISLAND LAND AREAS WITH SUGAR

Island	Ex-treme Length Miles	Ex-treme Width Miles	Area		1980 Total Cane Acreage ²
			Square Miles ¹	Acres 000's	
Hawaii	93	76	4,038	2,584	91,202
Maui	48	26	729	466	47,415
Oahu	44	30	608	388	33,132
Kauai	33	25	553	354	45,969
Molokai ...	38	10	261	167	—
Lanai	18	13	139	89	—
Niihau	18	6	73	46	—
Kahoolawe .	11	6	45	28	—
Minor Islands ...	—	—	4	2	—
Total			6,450	4,128	217,718

¹Includes land and inland water.

²Does not include mill sites, roads, etc.

HAWAII LAND OWNERSHIP

Private	58.0%
Hawaii State	34.6%
Federal Government	7.3%
Counties	0.1%
	<u>100.0%</u>

Source: State of Hawaii Data Book, 1979.

LAND USED BY SUGAR COMPANIES*

Sugar Companies & Independent Grower Farms

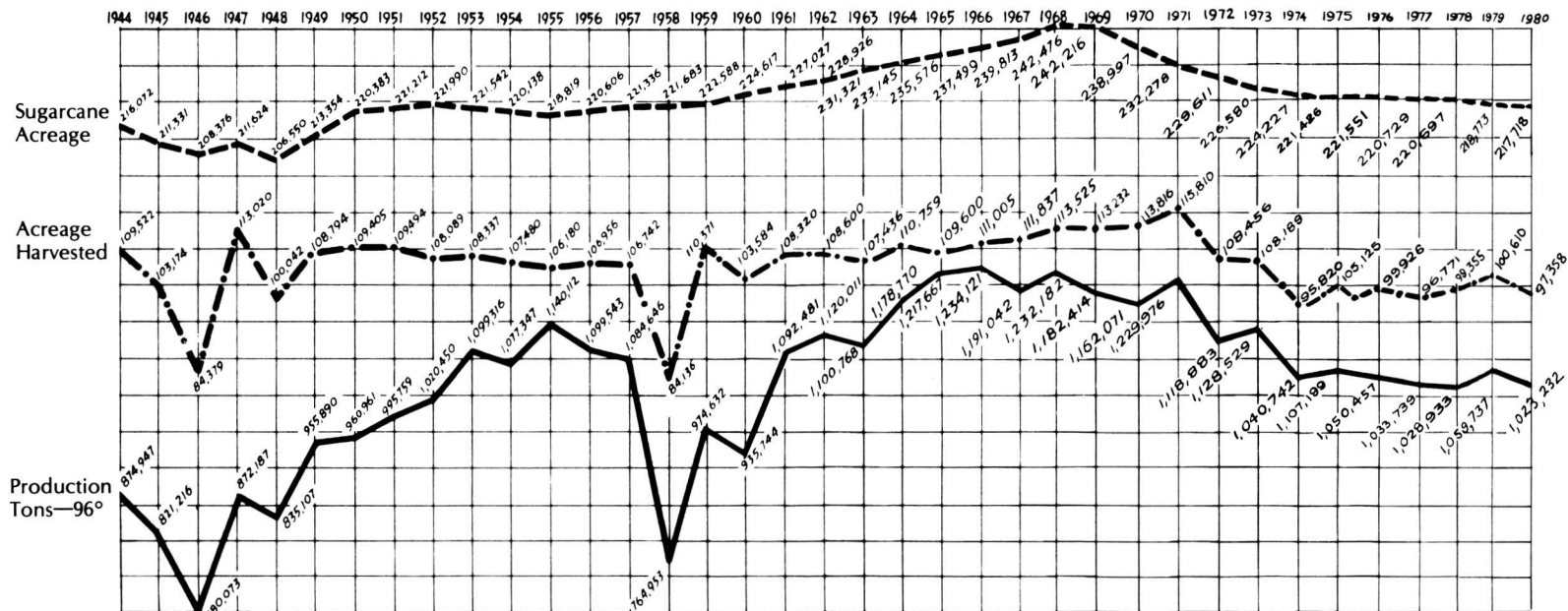
	Land Used by Sugar Companies	Acreeage	Total Acreeage
Owner in fee simple	141,389		
Leased from private owners or estates	75,013		
Leased from State of Hawaii	32,022		
Leased from U.S. Navy	1,440		
			249,864

Land Used By Independent Grower Farms	
Leased from sugar companies ..	3,069
Sub-leased from sugar companies	2,455
Direct Ownership, or Leased from Other Sources	5,000

Total	<u>10,524</u>
	<u>260,388</u>

*Includes attributable land (roads, resevoirs, mill sites and irrigation ditch systems) in addition to that used for cultivation.

HAWAIIAN SUGARCANE ACREAGE, ACREAGE HARVESTED, AND PRODUCTION



1946: Industry-wide strike, 2½ months.

1958: Industry-wide strike, 4 months.

1969: Industry-wide strike, 5 weeks.

1974: Industry-wide strike, 6 weeks.

1977: Industry-wide strike, 3 weeks.

HAWAIIAN SUGAR PLANTERS' ASSOCIATION

The Hawaiian Sugar Planters' Association is a voluntary, non-profit, incorporated association for the maintenance, advancement, improvement and protection of the sugar industry in Hawaii, the support of an Experiment Station, and the doing of all such matters and things as shall be incidental to such purposes and objects.

Plantation members of the Association are those companies in Hawaii engaged primarily in the business of raising sugarcane and manufacturing sugar from it. Active members are elected from among individuals who are directly connected with the direction, management, or operation of the sugar companies.

The Association carries out many of its activities through standing committees and these are: Accounting, Energy, Environmental Standards, Industrial Relations, Insurance, Land and Water, Legislative, Public Relations, Tax, and Experiment Station Advisory.

EXPERIMENT STATION

The Association's largest program is the Experiment Station which conducts research on basic physiology and biochemistry of the sugarcane plant; on cultural practices, including methods of planting, fertilizing and irrigating; on breeding and selection of new sugarcane varieties; on the control of pests, including insects, weeds, diseases and rats; on chemistry, including methods of analysis for plant and soil constituents, for pesticide residues and for other purposes as needed; on sugarcane factory processes and process control; on sugar recovery from milling sugarcane; on raw sugar quality; and on the design and engineering of equipment, both field and factory.

With recent national and state emphasis on alternate energy sources, the Experiment Station has cooperated with state and federal agencies in evaluating potential energy production from sugarcane and its products.

In addition to its research, the Experiment Station provides some services to its member companies such as routine analyses of raw sugar and molasses, including determinations of pol, moisture, color, filterability, grain size and ash; plant and soil analyses to determine fertilizer needs; the repair and calibration of sugar factory instruments; field, factory, and factory laboratory audits; and short courses for training employees of member companies.

The Experiment Station has a large library, consisting of reference volumes and periodicals on sugarcane growing and milling, as well as on general agriculture, chemistry and engineering.

The Experiment Station maintains and operates substations on Oahu, Kauai, Maui and Hawaii. There are two principal substations on Oahu, one at Kunia for general research and one at Maunawili for the maintenance of parent material and for the crossing of sugarcane varieties for the development of new varieties. Substations on

Kauai, Maui and Hawaii provide areas in which seedlings from the breeding program can be grown and evaluated and where some other agricultural research can be done.

The Experiment Station can now offer its services for sale in other sugarcane growing areas or for any agricultural problem to which its capabilities can be applied. These services include consulting on all agricultural problems, the conduct of experiments either in the Association's laboratories or in the area in question, and the Station can offer sugarcane hybridization to the order of the customer. Information on these services can be obtained from the Experiment Station Director.

WASHINGTON REPRESENTATIVE

The Association maintains an office in Washington, D.C. where a vice president represents the member companies' interests in federal legislative actions and in the actions of federal administrative and regulatory departments.

REFINING AND MARKETING HAWAII'S CANE SUGAR

California and Hawaiian Sugar Company, San Francisco markets all the raw cane sugar and molasses produced in the state of Hawaii. It is the nation's second largest marketer of refined sugar.

ORGANIZATION

Best known by its brand name, "C and H", the company is an agricultural marketing association as defined by the Capper-Volstead Act, which authorizes formation of cooperative marketing associations by producers of agricultural products. C and H stock is owned by 14-member sugar producing companies in Hawaii in substantially the same proportions as the tonnage each markets through the association.

The company also serves as refining and marketing agency for the 400-450 independent sugarcane farmers in Hawaii.

All proceeds of sugar and molasses sales, less only authorized costs of operation, are returned to member companies and sugarcane growers represented by C and H.

HISTORY

In 1906 Hawaiian producers, representing more than 80 per cent of the islands' production, acquired a refinery at Crockett, California and formed C and H to compete for sales in the U.S. refined sugar market. Their's was a successful effort to overcome price discrimination against Hawaiian raw sugar practiced by a "sugar trust" which existed among mainland sugar refiners at the time.

Originally a commercial corporation, C and H was reorganized along cooperative lines in 1921. Since 1948 it has marketed Hawaii's entire cane sugar and molasses output.

OPERATIONS

C and H takes title to the raw sugar at the factories, transports it to port terminals and ships it

to the refinery in California, or transports it to the refinery at Aiea, Oahu. It has capacity in its two refineries to refine about 1 million tons of raw sugar annually. Raw sugar not required for C and H refining operations is sold to other refiners. Molasses is sold by C and H to distributors primarily for use in animal feed.

The C and H refinery at Crockett, California near San Francisco, which began operations in 1906, has been developed until it is acknowledged as the largest in the world. It has capacity to melt some 960,000 tons of raw sugar annually.

A smaller C and H refinery at Aiea near Honolulu can process about 40,000 tons of raw sugar a year, primarily to supply Hawaii's refined sugar requirements.

Raw sugar is delivered from Hawaii to Crockett in bulk cargo ships carrying from 16,000 to 31,000 tons of raw sugar per voyage. Raw sugar is mechanically discharged into refinery storage bins which have capacity for more than 100,000 tons.

PRODUCTION

The Crockett refinery operates the year around, three shifts a day in 10-day production cycles, followed by four-day shut-downs.

Refined sugars are produced in more than 100 types, grades and package sizes. In addition to an unsurpassed variety of packaged sugars for the grocery trade, sugars are produced for industrial use in packaged, bulk granulated and liquid form. High speed packaging equipment can turn out more than a million consumer-size packages of refined sugar daily.

STORAGE AND DISTRIBUTION

The refinery has storage facilities for approximately 55,000 tons of packaged, dry bulk and liquid sugars. Most customers receive shipments directly from the refinery by rail or truck. However, to expedite service to many customers, C and H maintains inventories of packaged sugars in some 30 public warehouses strategically located throughout the company's marketing territory. In addition, liquid and bulk sugar distri-

bution depots are maintained in Portland, Oregon, Seattle, Washington, Los Angeles, California; and liquid sugar facilities in Phoenix, Arizona.

MARKETING

C and H brand sugar is sold primarily in the west from the Pacific Coast to the Mississippi River Valley plus Hawaii and Alaska. C and H brand sugar is distributed more widely in this region than any other brand.

Competition for sugar sales throughout the region, with beet sugar producers and southern cane and eastern cane refiners, is intense.

C and H marketing is carried out through sales offices in San Francisco, Oakland and Los Angeles, California and through food brokers' offices in major cities from the Northwest into the Midwest.

Intensifying competition in recent years has been the advent of private labels in packaged consumer items, generally sold at a discount below advertised labels. Some of this form of marketing developed as a response to the "brand franchise," or superior consumer acceptance of the C and H brand in a number of major markets. C and H has, however, been able through strong sales and promotion efforts to maintain its share of the market. The greatest impact of private labels has been, however, a depressant on prevailing market price levels, since the private labels generally are sold at a discount below established brands.

GENERAL

Over the past decade, annual C and H sales have averaged about \$442 million, and have returned an average of about \$327 million annually to Hawaii's producers. The company employs approximately 1,500 persons in mainland operations and has about 75 employees at the Aiea refinery. Payroll totals almost \$40 million annually.

Robert O. Nagle is president and chief executive officer of C and H. Company headquarters are at One California Street, San Francisco, 94106.

IMPORTANT HISTORICAL DATES

- 1825 First sugarcane plantation attempted in Manoa Valley, Oahu.
- 1835 Ladd & Company founded first successful plantation, Koloa on Kauai.
- 1837 First Koloa sugar, 2.1 tons.
- 1838 Twenty sugar mills in operation, 18 animal powered, 2 water.
- 1852 Arrival of first Chinese laborers. First sugar centrifugal introduced, Makawao Plantation.
- 1853 First steam engine, Koloa.
- 1857 Irrigation introduced, Lihue.
- 1859 First steam mill, Lihue.
- 1860 Judd and Wilder established first mill on Oahu, Kualoa Plantation.

- 1863 Pepeekeo introduced vacuum pan.
- 1868 First Japanese laborers arrived.
- 1876 Reciprocal trade treaty, Kingdom of Hawaii and United States, admitted sugar duty free. Alexander & Baldwin built Hamakua Ditch at cost of \$80,000, first large-scale irrigation on islands, 17 miles long and producing 40,000,000 gallons a day.
- 1878 Portuguese immigrants arrived.
- 1879 Ewa drilled first artesian well; Onomea pioneered with commercial fertilizer.
- 1881 German immigrants arrived at Lihue; Hamakua brought first steam plow.
- 1882 Planters' Labor & Supply Co. organized.
- 1886 First 100,000-ton crop.
- 1895 Planters' Labor and Supply Co. dissolved and members immediately organized as Hawaiian Sugar Planters' Association.

- HSPA Experiment Station started and first chemist hired. Makee inaugurated night grinding. Ewa installed 9-roller mill.
- 1897 First 250,000-ton crop.
- 1898 Hawaii annexed to United States.
- 1904 Leaf hopper parasites introduced from Australia.
- 1905 H-109 variety of cane germinated from seedling.
- 1906 California & Hawaiian Sugar Refining Corp. founded; Filipino immigration.
- 1907 Oahu Sugar Co. installed first 12-roller mill.
- 1910 Kilauea introduced gasoline tractor. Cane borer parasite introduced from New Guinea.
- 1916 Anomala beetle parasite introduced from the Philippines.
- 1920 Leaf hopper completely controlled by egg-sucking parasite introduced from Australia and Fiji.
- 1922 First commercial-scale mechanical loading of cane by self-propelled vehicle.
- 1923 First Dorr Clarifiers (2 factories).
- 1924 First of series of ten consecutive record crops.
- 1926 First Oliver Filter, Oahu Sugar Company.
- 1928 Establishment of sugarcane quarantine station on Island of Molokai.
- 1932 First million-ton crop; *Bufo marinus*, insectivorous frog, brought to Territory to control pests.
- 1934 First high-speed sugar centrifugals — Waialua.
- 1935 Long-line irrigation widely adopted by plantations.
- 1936 First major use of trucks for cane hauling. HSPA insect and plant disease quarantine started on Midway Island.
- 1937 Expedition to New Guinea to collect wild sugarcanes for breeding. Mechanical harvesting begun at Ewa Plantation. Development of "prebaiting" technique of rat control. Research on food yeast from molasses. Mechanical harvesting by "grabs" started — Ewa Plantation.
- 1940 Kaiwiki Sugar Co. was first plantation in Hawaii to transport 100 percent of its cane to mill by trucks.
- 1941 32-8560 displaces H-109 as leading variety. First precision refractometer for factory control.
- 1942 New armyworm parasite brought from Texas. Plantation operations subordinated to defense requirements. War brings acute shortage of labor and equipment, resulting in forced use of all known types of mechanization. First bulk sugar plant began operating at Kahului, Maui.
- 1945 Development of activated diesel oil emulsion for weed control. Organization of the Agricultural Engineering Research Department to consolidate and expand research development. HSPA furnished \$100,000 to finance university of Hawaii Agricultural Engineering Institute buildings and equipment. Ion exchange research started.
- 1946 Production reduced severely by two-and-a-half month strike.
- 1947 Plantation railroads rapidly being replaced with trucks. Field testing started on several types of cane cutters. Ion exchange pilot plant in operation.
- 1948 V-cutter and side-mounted cutter for un-irrigated cane and 2-line cutter for irrigated cane developed. Chemical weed control with rpe-emergence and contact herbicides used on all plantations.
- 1949 Second bulk sugar plant began operating at Hilo, Hawaii.
- 1950 First commercial models of HSPA-developed harvesting machines for both irrigated and unirrigated plantations put into operation at three plantations; third bulk sugar plant began operating at Nawiliwili, Kauai; aluminum flumes used on a field scale for irrigation and cane transport.
- 1951 By-products pilot plant installed at Oahu Sugar Co., Ltd; direct-mounted cane cutter and infield transport machine for unirrigated plantations developed; 37-1933 replaced 32-8560 as leading cane variety; radioactive materials used in irrigation and fertilization experiments; 40-hour week for half the year established on plantations; first bulk raw sugar shipments made to east coast. Aerial fertilization began.
- 1952 Cane buggy adopted by Hilo Coast plantations.
- 1953 First commercial application of liquid nitrogen fertilizer (aqua ammonia) made at Ewa Plantation Co.; plantations hit hardest by one of the Territory's worst droughts.
- 1954 First industry-wide pension plan established; HSPA corrosion inhibitor developed; 124-acre arboretum deeded to the University of Hawaii; HSPA meteorologists participate in Project Shower, "warm" rainfall study.
- 1955 Bulk sugar storage-loading plant completed at Honolulu.
- 1956 California & Hawaiian Sugar Company celebrated its fiftieth anniversary. Total half-century production came to nearly 25 million tons of raw sugar refined.
- 1958 Four-month-long, industry-wide strike drastically reduced production.
- 1959 Tenth Congress of International Society of Sugar Cane Technologists held in Honolulu.
- 1960 Variety 44-3098 replaced 37-1933 as leading cane variety.
- 1961 Production, reduced for three years by the 1958 strike, returned to normal levels.
- 1962 Hakalau Sugar Company was merged into Pepeekeo Sugar Company, reducing the number of sugar companies to 25. Variety 50-7209 replaced 44-3098 as leading cane variety.
- 1964 First sugarcane diffuser began commercial operation at Pioneer Mill.
- 1965 Hilo Sugar co. and Onomea Sugar Co. merge to form Mauna Kea Sugar Co.

- 1966 Record raw sugar crop of 1,234,121 tons was produced.
- 1967 First commercial sugarcane drycleaner installed at Paauhau Sugar Co. on Hawaii Island.
- 1971 Months-long West Coast Longshoremen's strike stops shipments C and H, disrupts C and H marketing program, and creates raw sugar and molasses storage problems in Hawaii. Smut disease discovered on Oahu.
- 1972 Subsurface and drip irrigation research intensified. Smut infection found on more than 5,000 acres on Oahu, Molokai quarantine station closed. USDA agrees to undertake 2-year quarantine for Hawaii canes at Beltsville, Maryland. Hutchinson Sugar Co. and Hawaiian Agricultural Co. merged to form Ka'u Sugar Company, reducing number of sugar companies to 18. Hilo Coast Processing Company organized as a sugar processing cooperative to mill cane produced by Mauna Kea Sugar Co. and members of United Cane Planters' Cooperative.
- 1973 Smut testing of 8,000 varieties completed. Top two varieties, 50-7209 and 59-3775 remain uninfected. First temporary registration for chemical ripener for sugarcane obtained. Nearly 3,000 acres of furrow-irrigated lands converted to flat culture by installing drip irrigation. Harvesting methods fields trials stepped up. Success obtained with HSPA rock-removal cane drycleaner tested at Pioneer Mill Company, Ltd. First voyage of new ship, Sugar Islander, leased by California and Hawaiian Sugar Co. to take Hawaii sugar to the Mainland. Grove Farm announced it was going out of sugarcane operations. Grove Farm sugarcane lands and leases were taken over by McBryde Sugar Co. and The Lihue Plantation Co. Paauhau Sugar Co. purchased by Honokaa Sugar Co.
- 1974 Variety 59-3775, developed by HSPA geneticists, became the most widely planted sugarcane within the State. Industry-wide strike closed all but Kohala Sugar Co. from March 9 through April 23. Plans were prepared for new HSPA facility in Aiea on same site as the C and H refinery. Sugar Act expired midnight, December 31. Hamakua Mill Co. merged into Laupahoehoe Sugar Co.
- 1975 HSPA offices and Experiment Station moved from Makiki to new \$5 million facility in Aiea. An additional \$600,000 was spent for modernizing and equipping the HSPA breeding station at Maunawili. Kohala Sugar Company was closed at the end of the 1975 grinding season. A total of 46,822 tons Hawaiian raw sugar was sold by California and Hawaiian Sugar Company to Japanese buyers.
- 1976 Hilo Coast Processing Co. closes Wainaku Mill as improvements to conform with EPA regulations completed at company's two other factories—Pepeekeo and Papaikou. Drought continued through 1976 and caused lower raw sugar production. Raw sugar prices in the United States reduced returns to Hawaiian producers. Companies announced reductions in force and measures to economize. On September 26, 1976 the President increased tariff on imported raw sugar from .625 cents per lb. to 1.875 cents per lb. Senate and President request investigation by United States International Trade Commission on effect of imports of raw sugar on domestic producers.
- 1977 President Carter puts into effect "Interim Program" of direct support payments to sugar producers. Congress adopts de la Garza amendment making sugar eligible for loan or purchase under Commodity Credit Corporation program. When bill to which this amendment attached signed by the President, interim payment program terminated. Record quantities of raw and refined sugar imported into the United States. Three-week industry-wide strike in November, 1977. Extended drought conditions; reservoirs and ditch flows below normal.
- 1978 HSPA incorporated. Kona storms returned with substantial rains in November. Sugar Stabilization Act of 1978 fails to pass U.S. Congress. Wailuku factory closes.
- 1979 Laupahoehoe and Honokaa Sugar Companies were merged to form a single company called Davies Hamakua Sugar Company. Record-breaking rainfall in Honokaa-Hamakua area, Island of Hawaii, during January-March, several stations recording 2½ times the normal amount for the three months. One station received 93 inches of rain in January alone.
- 1980 U.S. Congress passed enabling legislation making the U.S. a full-fledged participant of the International Sugar Agreement.
- 1981 Dr. Hugo Kortschak shared with two Australian scientists an award from the Rank Prize Fund for his discovery of the C₄ pathway of photosynthesis. The award carries a value of 60,000 pounds, or about \$126,000. Dr. Kortschak is a plant physiologist who worked at the HSPA from 1937 until his retirement in 1976.

Part II

U.S. SUGAR INDUSTRY

The U.S. sugar needs are met from several sources, both domestic and foreign. Nineteen states, including Hawaii, produce sugarcane or sugar beets. Raw sugar, produced from sugarcane, is imported from some 38 countries.

In 1980 the U.S. produced about 56% of its sugar requirements, the balance being made up by imports of foreign produced raw sugar. Of the approximately 5.6 million tons of sugar produced in the U.S. during 1980, approximately 2.9 million tons were from beets and 2.7 million tons from sugarcane. A new factor in the supply of nutritive sweeteners is High Fructose Corn Syrup (HFCS), produced from corn. This product is in addition to corn syrup and dextrose which have been important sweeteners for a long time. Total sweetener production from corn in 1980 was approximately 4.6 million tons.

Sugar beets are grown in 16 states and there are beet processing factories in 14 states (see map below).

Sugarcane is grown and milled in the states of Florida, Hawaii, Louisiana and Texas and also in the Commonwealth of Puerto Rico (see map, page 18).

Corn is grown in significant amounts in 26 states although only a small proportion of the crop is used for processing. HFCS is produced in factories located in 9 states (see map, page 18).

Foreign raw sugar is received at refineries located

in principal port cities on the East Coast and the Gulf of Mexico, plus one large factory which handles Hawaiian raws located near San Francisco.

During 1980 a total of 4.5 million tons of sugar was imported into the U.S. This is less than the amounts imported in 1979 and in 1978.

Total refined sugar deliveries in the United States in 1980 were 9,477,000 tons. Of this, approximately 6.0 million tons were used in industrially-produced products such as soft drinks, baked goods and dairy products. Most of the balance was used at home and in meals served in restaurants and institutions.

BET SUGAR INDUSTRY

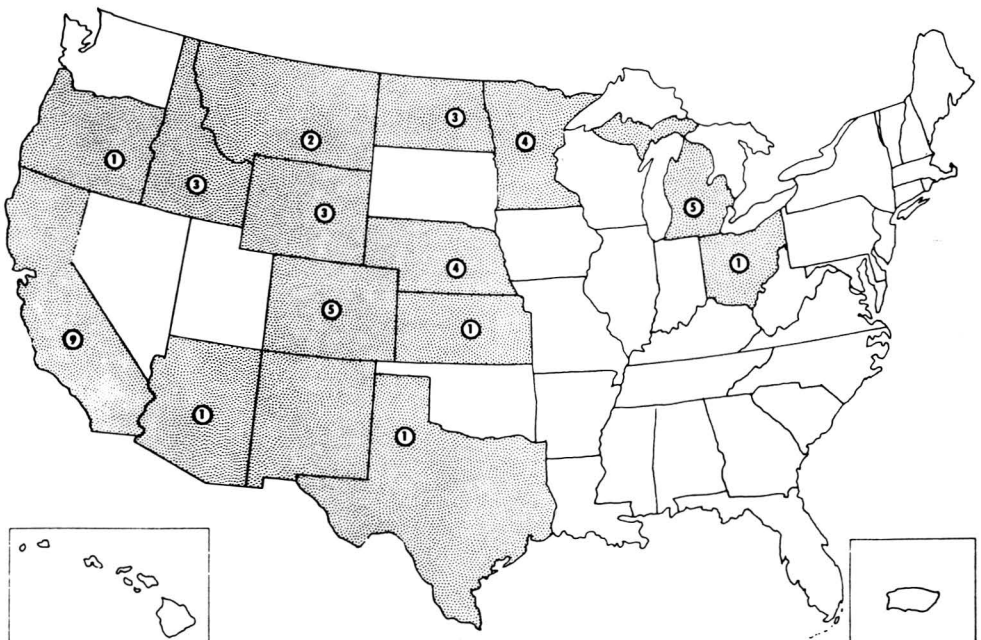
About 46% of the sugar produced in the U.S. comes from beets. Sugar beets are grown by farmers who contract to deliver their crops to the sugar beet processing companies which operate a total of 43 factories in 14 states.

A majority of the nation's beet sugar factories are located in 8 western states. There are others, however, in the Red River Valley of North Dakota, Minnesota and in the Upper Midwest.

CANE SUGAR INDUSTRY

Of all the refined sugar consumed in the U.S., about 70% comes from sugarcane. Most of this cane sugar is refined in the 22 refineries which are located principally on the East and Gulf Coasts.

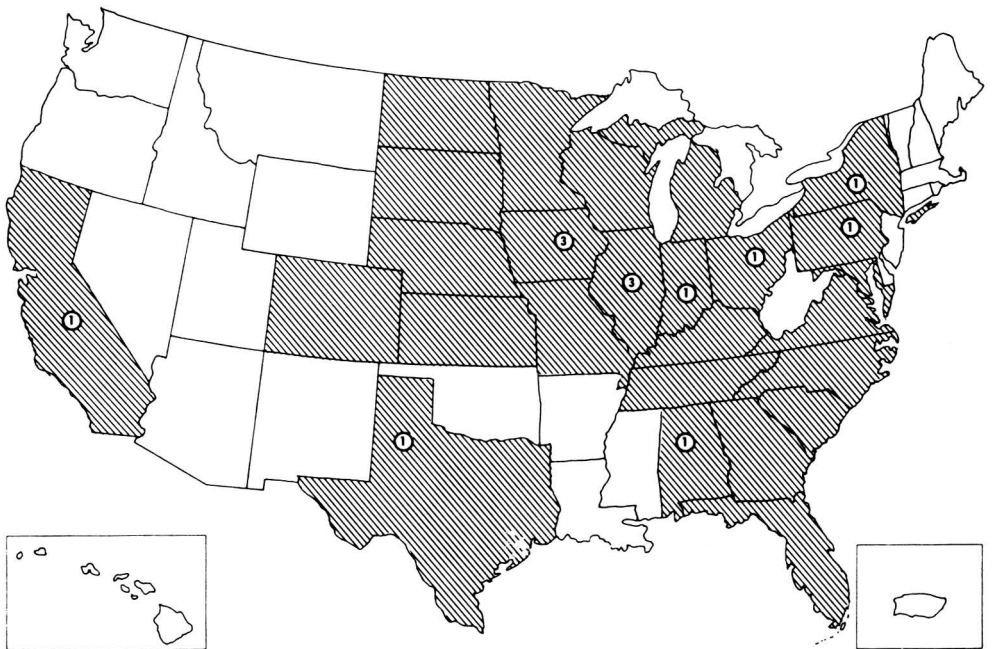
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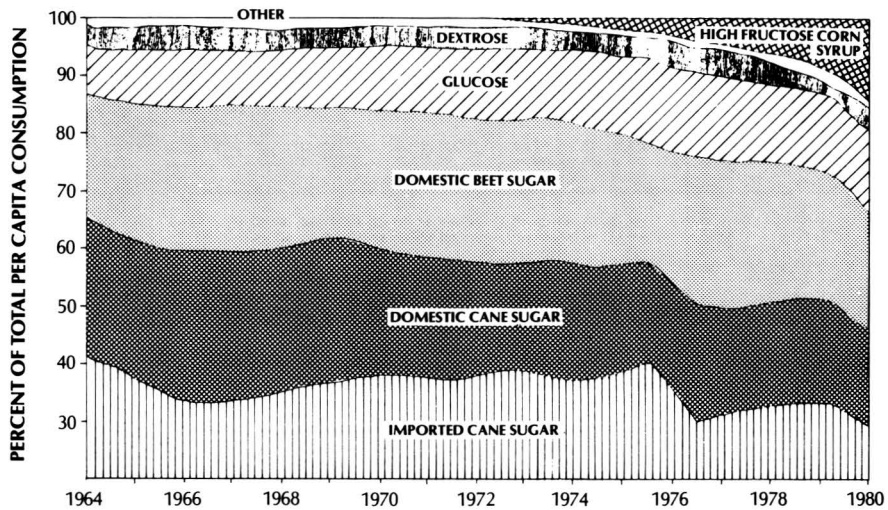
States that are shaded grow sugar beets. Figure in circle indicates number of beet processing factories in state.



States designated by crosshatch grow sugarcane. Figure in circle indicates number of raw sugar mills in state.



States designated by diagonal lines grow a substantial (more than 400,000) acreage of corn. Figure in circle indicates number of factories that produce high fructose corn syrup (HFCS).



UNITED STATES PER CAPITA CALORIC SWEETENERS CONSUMPTION

(Sources as per cent of total, 1964-79.)

Based on data from USDA Sugar and Sweetener Report, 6 (1), February 1981.

Continued from page 17

The 15 companies that operate sugar refineries and the location of their refineries are as follows:

Revere Sugar Corporation	.....	Brooklyn, N.Y. Chicago, ILL Charlestown, Mass.
Amstar Corp.	.....	Boston, Mass. Brooklyn, N.Y. Philadelphia, Pa. Baltimore, Md. Chalmette, La.
Supreme Sugar Co. Inc.	..	Supreme, La.
California and Hawaiian Sugar Co.	.....	Crockett, Calif. Aiea, Hawaii
Colonial Sugars Co.	....	Gramercy, La.
Everglades Sugar Refinery, Inc.	.....	Clewiston, Fla.
Florida Sugar Refinery, Inc.	.....	Belle Glade, Fla.
Godchaux-Henderson Sugar Co., Inc.	.....	Reserve, La.
Imperial Sugar Co.	.....	Sugar Land, Texas
Industrial Sugars, Inc.	..	St. Louis, Mo.
The National Sugar Refining Co.	.....	Philadplehia, Pa.
Refined Syrups & Sugars, Inc.	.....	Yonkers, N.Y.

Savannah Foods & Industries, Inc.	.....	Port Wentworth, Ga.
Holly Sugar Corp.	.....	Santa Ana, Calif.
Louisiana Sugarcane Products, Inc.	.....	Mathews, La.

Source: USDA Economics, Statistics Service.

CORN SWEETENERS

The principal corn sweeteners—corn syrup or glucose and dextrose—have contributed substantially to total caloric sweetener use in the U.S. for many years. During the past 17 years, however, consumption of corn sweeteners has increased from about 13 lbs per capita to 38 lbs per capita. Per capita consumption of other caloric sweeteners—sugar, honey and other syrups—has declined slightly during the same period.

The comparatively recent development of High Fructose Corn Syrup (HFCS) added a new corn product that is directly competitive with sugar for many industrial uses. This product was first produced in commercial amounts in 1967 and its use increased slowly until the past few years, during which it has become an important product. Per capita consumption in 1980 is estimated to be 19 lbs which is 15% of all nutritive sweetener consumption. The table on the following page reports per capita consumption of sweeteners in the U.S. for the period 1964-80.

CALORIC AND NON CALORIC SWEETENERS: PER CAPITA U.S. CONSUMPTION, 1964-80

Calendar	Refined cane and beet sugar						Corn sweeteners ¹				Minor caloric ¹			Total caloric	Noncaloric sweeteners ²		
	U.S. grown sugar			Cane sugar			Corn syrup				Honey	Edible syrups	Total		Saccharin	Cyclamate	non-caloric
	Beet sugar	Cane sugar	Total	Im-ported	Total	Total	High-fructose	Glucose	Dex-trose	Total							
	<i>Pounds</i>																
1964	28.6	30.3	58.9	37.9	68.2	96.8	—	10.9	4.1	15.0	1.0	.7	1.7	113.5	3.5	1.3	4.8
1965	29.1	30.1	59.2	37.8	67.9	97.0	—	11.0	4.1	15.1	1.1	.7	1.8	113.9	4.0	1.7	5.7
1966	28.3	28.7	57.0	40.3	69.0	97.3	—	11.2	4.2	15.4	1.0	.7	1.7	114.4	4.5	1.9	6.4
1967	26.6	29.6	56.2	42.3	71.9	98.5	.1	11.9	4.2	16.2	.9	.5	1.4	116.1	4.8	2.1	6.9
1968	27.8	26.8	54.6	44.6	71.4	99.2	.3	12.6	4.3	17.2	.9	.7	1.6	118.0	5.0	2.2	7.2
1969	30.3	25.3	55.6	45.4	70.7	101.0	.5	13.2	4.5	18.2	1.0	.6	1.6	120.8	5.3	1.6	6.9
1970	31.3	25.0	56.3	45.5	70.5	101.8	.7	14.0	4.6	19.3	1.0	.5	1.5	122.6	5.8	(³)	5.8
1971	31.1	22.8	53.9	48.5	71.3	102.4	.9	15.0	5.0	20.9	.9	.5	1.4	124.7	5.1	(³)	5.1
1972	30.4	25.4	55.8	47.0	72.4	102.8	1.3	15.6	4.4	21.3	1.0	.5	1.5	125.6	5.1	(³)	5.1
1973	30.4	24.9	55.3	46.2	71.1	101.5	2.1	16.7	4.8	23.6	.9	.5	1.4	126.5	5.1	(³)	5.1
1974	26.1	21.0	47.1	49.5	70.5	96.6	3.0	17.4	4.9	25.3	.8	.4	1.2	123.1	5.9	(³)	5.9
1975	30.5	24.9	55.4	34.8	59.7	90.2	5.0	17.7	5.1	27.8	.9	.4	1.3	119.3	6.2	(³)	6.2
1976	32.5	22.7	55.2	39.5	62.2	94.7	7.2	17.7	5.1	30.0	1.0	.4	1.4	126.1	6.1	(³)	6.1
1977	30.3	23.3	53.6	42.1	65.4	95.7	9.4	17.9	4.7	32.0	.9	.4	1.3	129.0	6.6	(³)	6.6
1978 ...	27.9	23.3	51.2	41.9	65.2	93.1	11.5	18.1	4.5	34.1	1.1	.4	1.5	128.7	6.9	(³)	6.9
1979 ⁴ ...	27.0	21.5	48.5	42.6	64.1	91.1	15.4	18.2	3.6	37.2	1.1	.4	1.5	129.8	7.0	(³)	7.0
1980 ⁵ ...	25.7	21.6	47.3	37.6	59.2	84.9	18.9	18.4	3.8	41.1	.9	.4	1.3	127.3	7.1	(³)	7.1

¹Dry basis. Recent corn sweetener consumption may be understated due to incomplete data.

²Sugar sweetness equivalent—assumes saccharin is 300 times as sweet as sugar, and cyclamate is 30 times as sweet as sugar.

³Cyclamate food use was banned by the Food and Drug Administration, effective in 1970.

⁴Preliminary.

⁵Estimated.

Source: 1962-1978—U.S. Dept. of Agriculture Sugar and Sweetener Report, Vol. 4 (5), May 1979.

1979-1980—U.S. Dept. of Agriculture Sugar and Sweetener Report, Vol. 6(1), February 1981.

**PRIMARY DISTRIBUTION OF SUGAR, CONTINENTAL
UNITED STATES, BY REGION, JANUARY-DECEMBER 1980**

Region	Cane Sugar ¹	Beet Sugar Processors	Commodity Credit Corproation	Total
				Short Tons ²
New England . . .	317,850	4,000		321,850
Mid-Atlantic	1,492,150	29,550	10,100	1,531,800
North Central . .	1,488,100	1,734,150	112,400	3,334,650
Southern	2,642,950	111,600	69,850	2,824,400
Western	578,650	881,900	4,150	1,464,700
Unspecified	0	0	0	0
Grand Total . .	6,519,700	2,761,200	196,500	9,477,400

¹ Includes deliveries by mainland sugarcane processors, previously reported separately.

² Reported as produced or imported and delivered except liquid sugar which is on a sugar solids content basis.

Source: U.S. Department of Agriculture, Crop Reporting Board, Sugar Market Statistics, April 24, 1981.

**SUGAR DELIVERIES, BY TYPE OF PRODUCT OR BUSINESS OF
BUYER AND BY TYPE OF SUGAR, CALENDAR YEAR 1980
UNITED STATES**

Product or Business of Buyer	Beet (Total)	Cane (Total)	Total All Sugar	Liquid Sugar Included in Totals	
				Beet	Cane
Short Tons¹					
INDUSTRIAL					
Bakery, cereal and allied products	495,996	801,824	1,297,819	4,996	79,537
Confectionery and related products	324,484	581,601	906,084	4,729	82,309
Ice cream and dairy products	160,571	276,345	436,916	65,824	177,048
Beverages	509,235	1,612,227	2,121,462	222,313	913,454
Canned, bottled, frozen foods, jams, jellies and preserves	225,038	291,487	516,525	57,053	125,017
Multiple and all other food uses . . .	240,375	329,446	569,821	10,334	52,503
Non-food products	43,596	73,492	117,088	528	23,381
SUB-TOTAL	1,999,295	3,966,422	5,965,715	365,777	1,453,249
NON-INDUSTRIAL					
Hotels, restaurants, institutions	5,307	90,358	95,665	73	5,438
Wholesale grocers, jobbers, sugar dealers	494,220	1,348,123	1,842,343	8,466	41,355
Retail grocers, chain stores, super markets	231,847	918,609	1,150,456	7,137	4,115
All other deliveries, including deliveries to Government agencies	31,391	173,701	205,092	1,405	16,460
SUB-TOTAL	762,765	2,530,791	3,293,556	17,081	67,368
Unspecified	195,649	22,475	218,124	—	—
TOTAL DELIVERIES	2,957,709	6,519,688	9,477,395	382,858	1,520,617
Deliveries in consumer-size packages (less than 50 lbs.)	424,903	1,922,150	2,347,053	—	—
Deliveries in bulk (unpackaged) . .	1,344,660	1,927,287	3,271,947	—	—

¹ Reported as produced or imported and delivered except liquid sugar which is on a sugar solids content basis.

Source: U. S. Department of Agriculture, Crop Reporting Board, Sugar Market Statistics, April 24, 1981.

**SUGARBEETS: ACREAGE, PRODUCTION, SEASON AVERAGE
PRICE PER TON RECEIVED BY FARMS AND VALUE:
AND PRODUCTION OF BEET SUGAR IN THE UNITED STATES**

Year	Acreage Planted 1,000 acres	Acreage Harvested 1,000 acres	Average Yield Per Acre short tons	Production 1,000 short tons	Price ¹ Dollars per ton	Farm Value ¹ 1,000 Dollars	Sugar Produced (In thousands of short tons)		Tons Sugar Raw Value per Harvested Acre
							Raw Value Basis	Equiv. Refined	
1940 ..	971	912	13.4	12,194	5.11	62,287	1,881	1,758	2.06
1941 ..	796	755	13.7	10,342	6.43	66,522	1,592	1,488	2.11
1942 ..	1,048	954	12.2	11,685	6.84	79,905	1,730	1,617	1.81
1943 ..	619	550	11.9	6,547	8.81	57,674	1,000	935	1.82
1944 ..	633	555	12.1	6,718	10.60	71,156	1,048	979	1.89
1945 ..	775	713	12.1	8,616	10.20	87,539	1,274	1,191	1.79
1946 ..	905	802	13.2	10,582	11.10	117,840	1,522	1,422	1.90
1947 ..	968	879	14.2	12,503	11.80	148,080	1,839	1,719	2.09
1948 ..	800	694	13.6	9,424	10.60	99,639	1,370	1,280	1.97
1949 ..	768	687	14.8	10,196	10.80	110,369	1,563	1,461	2.28
1950 ..	1,014	925	14.6	13,535	11.20	151,293	2,009	1,878	2.17
1951 ..	758	691	15.2	10,482	11.70	122,483	1,549	1,448	2.24
1952 ..	719	665	15.3	10,169	12.00	121,970	1,505	1,407	2.26
1953 ..	794	745	16.2	12,084	11.60	140,364	1,816	1,697	2.44
1954 ..	964	876	16.1	14,082	10.80	152,151	2,043	1,909	2.33
1955 ..	798	740	16.5	12,228	11.20	136,477	1,739	1,625	2.35
1956 ..	831	785	16.6	12,993	11.90	155,087	1,966	1,837	2.50
1957 ..	918	880	17.7	15,530	11.20	174,261	2,194	2,050	2.49
1958 ..	935	891	17.0	15,150	11.70	177,807	2,200	2,056	2.47
1959 ..	955	905	18.8	17,015	11.20	191,186	2,340	2,187	2.59
1960 ..	977	957	17.2	16,421	11.60	190,109	2,451	2,291	2.56
1961 ..	1,129	1,077	16.4	17,704	11.20	197,547	2,404	2,247	2.23
1962 ..	1,182	1,103	16.5	18,254	12.80	233,243	2,586	2,417	2.34
1963 ..	1,285	1,235	18.9	23,328	12.20	285,011	3,096	2,893	2.34
1964 ..	1,460	1,395	16.8	23,389	11.80	275,660	3,288	3,073	2.36
1965 ..	1,314	1,249	16.8	20,915	11.95	249,836	2,894	2,705	2.32
1966 ..	1,240	1,161	17.5	20,342	12.80	260,355	2,828	2,643	2.44
1967 ..	1,197	1,122	17.1	19,197	13.55	260,114	2,636	2,464	2.35
1968 ..	1,476	1,410	18.0	25,363	13.81	350,207	3,483	3,255	2.47
1969 ..	1,647	1,541	18.0	27,736	12.72	352,863	3,330	3,112	2.16
1970 ..	1,483	1,419	18.6	26,427	14.84	390,813	3,421	3,179	2.41
1971 ..	1,406	1,342	20.2	27,096	15.40	416,279	3,552	3,320	2.65
1972 ..	1,420	1,329	21.4	28,410	16.00	455,830	3,624	3,387	2.73
1973 ..	1,280	1,218	20.1	24,499	29.60	725,661	3,199	2,990	2.63
1974 ..	1,252	1,213	18.2	22,123	46.80	1,035,567	2,916	2,725	2.40
1975 ..	1,595	1,517	19.6	29,704	27.60	820,743	4,019	3,756	2.65
1976 ..	1,525	1,479	19.9	29,386	21.00	616,813	3,895	3,640	2.63
1977 ..	1,273	1,216	20.6	25,007	24.20	604,399	3,368	3,148	2.77
1978 ..	1,305	1,269	20.3	25,788	25.20	649,846	3,289	3,074	2.56
1979 ..	1,161	1,120	19.6	21,996	NA	NA	2,879	2,691	2.58
1980 ² ..	1,232	1,187	19.6	23,275	NA	NA	2,913	2,722	2.50

¹Includes production incentive payments which were payments made to producers of sugar beets and sugarcane by the Commodity Credit Corporation during the period of government price control in World War II, to stimulate production, but excludes Sugar Act payments.

²Preliminary.

Source: 1940-1959—Agricultural Statistics, 1972, Table 114, USDA, Washington; 1960-1974—Agricultural Statistics, 1976, Table 98, USDA, Washington; 1975—Agricultural Statistics, 1977, Table 104, USDA, Washington; 1976-1977—Crop Production and Crop Values, USDA Economic Statistics and Cooperatives Services; 1978-1979—USDA Economic Statistics and Cooperatives Service, Crop Production, June 1980.

1980—U.S. Dept. of Agriculture, Sugar and Sweetener Report, Vol. 6 (2), May 1981.

LOUISIANA—SUGAR PRODUCTION—ACREAGE—YIELD

Crop Year	Sugarcane Used for Sugar			Sugar Produced		Raw Sugar 96° made per ton of sugarcane (Pounds) ¹	Tons 96° sugar per harvested acre
	Acreage harvested (1000 acres)	Average yield of cane per acre (Tons)	Production (1,000 tons)	(In thousands of short tons) Raw Value Basis ¹	Equivalent refined ²		
1939-40 ..	234	21.7	5,084	436	408	172	1.86
1940-41 ..	211	13.8	2,923	234	219	160	1.11
1941-42 ..	224	17.6	3,947	322	301	163	1.44
1942-43 ..	269	17.6	4,734	397	371	168	1.48
1943-44 ..	257	20.9	5,388	432	404	160	1.68
1944-45 ..	246	20.0	4,929	369	345	150	1.50
1945-46 ..	234	21.9	5,128	370	346	144	1.58
1946-47 ..	255	17.6	4,484	331	309	148	1.30
1947-48 ..	259	15.1	3,917	297	277	152	1.15
1948-49 ..	274	19.2	5,257	393	367	150	1.43
1949-50 ..	279	17.9	4,984	414	387	166	1.48
1950-51 ..	273	19.5	5,312	451	421	170	1.65
1951-52 ..	258	17.3	4,463	295	276	132	1.14
1952-53 ..	274	20.7	5,667	451	422	159	1.65
1953-54 ..	280	20.6	5,759	479	448	166	1.71
1954-55 ..	247	22.8	5,625	478	447	170	1.94
1955-56 ..	232	24.4	5,664	454	425	161	1.96
1956-57 ..	203	23.7	4,817	429	401	178	2.11
1957-58 ..	226	22.0	4,976	396	370	159	1.75
1958-59 ..	219	22.0	4,869	443	414	182	2.02
1959-60 ..	250	20.3	5,073	440	411	174	1.76
1960-61 ..	255	21.9	5,583	470	439	169	1.84
1961-62 ..	277	25.7	7,118	650	607	183	2.35
1962-63 ..	254	20.9	5,315	472	441	178	1.86
1963-64 ..	296	28.9	8,554	759	710	177	2.56
1964-65 ..	325	22.7	7,383	573	536	155	1.76
1965-66 ..	288	22.7	6,542	550	514	168	1.91
1966-67 ..	288	22.7	6,563	562	526	171	1.95
1967-68 ..	294	27.6	8,110	740	692	182	2.52
1968-69 ..	282	26.1	7,377	669	625	181	2.37
1969-70 ..	235	24.1	5,676	537	502	189	2.29
1970-71 ..	266	26.1	6,927	602	563	174	2.26
1971-72 ..	301	21.4	6,438	571	534	177	1.90
1972-73 ..	311	25.8	8,022	660	617	165	2.12
1973-74 ..	319	20.6	6,570	558	522	170	1.75
1974-75 ..	308	21.3	6,558	594	555	181	1.93
1975-76 ..	308	21.0	6,468	640	598	198	2.08
1976-77 ..	291	25.6	7,451	650	607	174	2.23
1977-78 ..	304	23.9	7,265	668	624	183	2.20
1978-79 ..	268	20.3	5,449	550	514	202	2.05
1979-80 ³ ..	240	20.6	4,950	500	467	202	2.08
1980-81 ³ ..	232	23.0	5,336	470	439	176	2.03

¹Production reported on raw value basis.

²Raw value multiplied by 0.9346.

³Estimate.

Source: 1939-40 to 1973-74—U.S. Department of Agriculture, Sugar Statistics and Related Data, Vol 2, Statistical Bulletin No. 244.

1974-75 to 1975-76—U.S. Department of Agriculture, Sugar and Sweetener Report, Vol. 3 (5), May 1978.

1976-77 to 1977-78—U.S. Department of Agriculture, Sugar and Sweetener Report, Vol. 4 (5), May 1979.

1978-79 to 1980-81—U.S. Department of Agriculture, Sugar and Sweetener Report, Vol. 6 (1), Feb. 1981.

FLORIDA—SUGAR PRODUCTION—ACREAGE—YIELD

Crop Year	Sugarcane Used for Sugar			Sugar Produced		Raw Sugar 96° made per ton of sugarcane (Pounds) ¹	Tons 96° sugar per harvested acre
	Acreage harvested (1000 acres)	Average yield of cane per acre (Tons)	Production (1,000 tons)	(In thousands of short tons)			
				Raw Value Basis ¹	Equivalent refined ²		
1939-40 ..	20	35.5	714	70	65	197	3.50
1940-41 ..	29	32.1	933	98	91	209	3.38
1941-42 ..	31	30.7	944	94	88	198	3.03
1942-43 ..	21	30.6	648	61	57	187	2.90
1943-44 ..	27	25.7	699	65	60	185	2.41
1944-45 ..	27	28.8	780	69	64	176	2.56
1945-46 ..	31	33.2	1,041	100	93	192	3.23
1946-47 ..	32	32.6	1,037	94	88	181	2.94
1947-48 ..	35	26.7	921	80	75	173	2.29
1948-49 ..	35	28.7	1,010	80	75	158	2.29
1949-50 ..	37	30.8	1,126	105	98	186	2.84
1950-51 ..	37	31.3	1,169	109	102	186	2.95
1951-52 ..	39	32.4	1,260	122	114	195	3.13
1952-53 ..	43	34.9	1,495	154	144	207	3.58
1953-54 ..	45	32.6	1,453	151	141	207	3.36
1954-55 ..	39	32.6	1,258	132	123	210	3.38
1955-56 ..	35	33.4	1,160	118	110	204	3.37
1956-57 ..	30	39.7	1,197	128	120	214	4.27
1957-58 ..	33	41.7	1,358	135	126	201	4.09
1958-59 ..	34	37.8	1,303	135	126	208	3.97
1959-60 ..	46.4	38.2	1,771	175	164	198	3.77
1960-61 ..	48.9	31.8	1,554	160	150	205	3.27
1961-62 ..	56.2	36.2	2,036	208	194	204	3.70
1962-63 ..	114.3	35.4	4,050	380	355	188	3.32
1963-64 ..	142.5	31.2	4,446	424	396	191	2.98
1964-65 ..	219.8	29.3	6,439	574	536	178	2.61
1965-66 ..	185.4	29.1	5,505	554	518	201	2.99
1966-67 ..	190.7	31.8	6,057	652	609	215	3.42
1967-68 ..	190.6	34.3	6,542	717	670	219	3.76
1968-69 ..	182.1	29.5	5,368	546	510	203	3.00
1969-70 ..	153.4	33.8	5,197	535	500	205	3.49
1970-71 ..	170.0	33.4	5,670	652	609	230	3.84
1971-72 ..	189.9	31.7	6,022	635	593	211	3.34
1972-73 ..	243.8	38.1	9,289	961	898	207	3.94
1973-74 ..	257.6	31.5	8,119	824	770	203	3.20
1974-75 ..	258.4	29.0	7,184	803	758	224	3.11
1975-76 ..	286.6	35.3	10,264	1,061	992	207	3.70
1976-77 ..	286.0	32.6	9,324	930	869	198	3.25
1977-78 ..	285.0	29.8	8,493	894	836	210	3.13
1978-79 ..	300.0	30.5	9,160	972	908	212	3.24
1979-80 ³ ..	318.2	31.3	9,975	1,047	978	210	3.29
1980-81 ³ ..	321.5	32.9	10,577	1,050	981	198	3.27

¹Production reported on raw value basis.

²Raw value multiplied by 0.9346.

³Estimate.

Source: 1939-40 to 1973-74—U.S. Department of Agriculture, Sugar Statistics and Related Data, Vol. 2, Statistical Bulletin No. 244.

1974-75 to 1975-76—U.S. Department of Agriculture, Sugar and Sweetener Report, Vol. 3 (5), May 1978.

1976-77 to 1977-78—U.S. Department of Agriculture, Sugar and Sweetener Report, Vol. 4 (5), May 1979.

1978-79 to 1980-81—U.S. Department of Agriculture, Sugar and Sweetener Report, Vol. 6 (1), Feb. 1981.

TEXAS—SUGAR PRODUCTION—ACREAGE—YIELD

Crop Year	Sugarcane Used for Sugar			Sugar Produced		Raw Sugar 96° made per ton of sugarcane (Pounds) ¹	Tons 96° sugar per harvested acre
	Acreage harvested (1000 acres)	Average yield of cane per acre (Tons)	Production (1,000 tons)	(In thousands of short tons)			
				Raw Value Basis ¹	Equivalent refined ²		
1974-75 ..	28.0	32.4	898	74	69	165	2.64
1975-76 ..	35.0	35.3	1,236	126	118	204	3.60
1976-77 ..	27.1	35.8	971	94	88	194	3.47
1977-78 ..	33.5	29.2	978	88	80	180	2.63
1978-79 ..	32.4	29.3	949	61	57	128	1.88
1979-80 ..	30.9	27.6	853	93	87	218	3.01
1980-81 ³ ..	34.7	28.0	972	75	70	154	2.16

¹Production reported on raw value basis.

²Raw value multiplied by 0.9346.

³Estimate.

Source: 1974-77—U.S. Department of Agriculture Sugar and Sweetener Report, Vol. 4 (5), May 1979.

1978-79 to 1980-81—U.S. Department of Agriculture, Sugar and Sweetener Report, Vol. 6(1), February 1981.

PUERTO RICO—SUGAR PRODUCTION—ACREAGE—YIELD

Crop Year	Sugarcane Used for Sugar			Sugar Produced		Raw Sugar 96° made per ton of sugarcane (Pounds) ¹	Tons 96° sugar per harvested acre
	Acreage harvested (1000 acres)	Average yield of cane per acre (Tons)	Production (1,000 tons)	(In thousands of short tons)			
				Raw Value Basis ¹	Equivalent refined ²		
1945	288.6	27.7	7,994	971	908	242.9	3.36
1950	367.1	28.9	10,615	1,299	1,214	244.7	3.54
1955	361.1	27.3	9,873	1,166	1,090	236.2	3.23
1960	327.9	30.5	9,997	1,019	952	203.9	3.11
1962	308.6	31.3	9,663	1,008	942	208.8	3.27
1963	303.4	33.4	10,123	989	924	195.5	3.26
1964	303.1	32.3	9,802	989	924	201.9	3.26
1965	287.6	30.6	8,807	897	838	203.7	3.12
1966	272.8	34.7	9,465	883	825	186.7	3.24
1967	263.3	31.0	8,160	818	764	200.6	3.11
1968	237.1	27.8	6,590	645	603	195.9	2.72
1969	180.1	32.8	5,902	484	452	163.9	2.69
1970	188.8	31.2	5,891	460	430	156.2	2.44
1971	153.4	29.9	4,581	324	303	141.5	2.11
1972	152.4	28.7	4,382	298	278	135.7	1.96
1973	132.1	27.4	3,621	255	238	140.9	1.93
1974	121.6	29.5	3,585	291	272	162.4	2.39
1975	137.5	25.6	3,520	302	282	171.7	2.20
1976	123.9	29.3	3,630	312	291	172.0	2.52
1977	116.2	27.3	3,177	268	250	168.7	2.31
1978	101.1	28.0	2,835	204	191	143.9	2.02
1979	85.6	26.7	2,288	193	180	168.7	2.25
1980	83.9	26.7	2,236	177	165	158.3	2.11

¹Production reported on raw value basis.

²Raw value multiplied by 0.9346.

Source: 1945-76: U.S. Department of Agriculture, Sugar and Sweetener Report, Vol. 2 (5), May 1977.

1977: USITC Publication 881, April 1978.

1978: U.S. Department of Agriculture, Economics, Statistics & Cooperative Service

1979: U.S. Department of Agriculture, Economics, Statistics & Cooperative Service

1980: U.S. Department of Agriculture, Economics, Statistics Service.

**EDIBLE SYRUPS: UNITED STATES PRODUCTION, FOREIGN TRADE,
AND INDICATED DOMESTIC CONSUMPTION, 1950-80**
(000 GALLONS)

Year	PRODUCTION ¹ SYRUPS								IMPORTS				
	Corn	Cane	Sorghum	Maple ²	Refiners	Edible Molasses	Honey	Total	Maple Syrup	Edible Molasses and Cane Syrup ³	Honey	Shipments from Territories Honey	Total
1950	130,448	9,745	3,539	2,006	4,005	3,314	19,780	172,837	479	2,214	1,020	30	3,743
1951	131,831	8,775	3,671	1,742	4,971	4,339	21,923	177,252	323	2,050	692	—	3,065
1952	127,405	5,510	2,856	1,603	3,405	3,284	23,091	167,154	522	5,710	720	—	6,952
1953	131,767	5,540	2,418	1,208	3,907	4,077	18,996	167,913	442	1,793	831	—	3,066
1954	133,071	4,805	2,552	1,672	3,814	2,958	18,372	167,244	371	2,015	777	—	3,163
1955	138,226	4,730	2,405	1,578	3,853	2,820	21,666	175,278	457	2,305	837	—	3,599
1956	141,504	4,990	3,594	1,529	3,882	3,193	18,169	176,861	643	2,046	406	—	3,095
1957	142,089	3,965	2,516	1,697	3,620	2,384	20,447	176,748	757	573	404	—	1,734
1958	153,481	3,135	2,282	1,392	4,892	2,553	22,116	189,851	656	1,286	335	—	2,277
1959	162,197	3,617	2,286	1,137	3,999	3,084	20,083	196,403	691	2,138	383	—	3,212
1960	169,776	3,676	1,943	1,143	4,134	2,714	20,611	203,997	908	1,884	1,049	—	3,841
1961	180,397	3,519	—	1,524	3,846	3,379	21,721	214,386	904	911	768	—	2,583
1962	201,259	3,303	—	1,460	2,691	3,075	21,189	232,977	929	3,827	604	—	5,360
1963	215,573	2,702	—	1,143	2,769	2,772	22,647	247,606	1,068	1,706	221	—	2,995
1964	238,832	2,814	—	1,546	2,862	2,685	21,323	270,062	666	2,119	417	—	3,202
1965	243,682	2,989	—	1,266	2,994	2,648	20,427	274,006	879	3,349	1,127	—	5,355
1966	252,337	2,923	—	1,476	2,493	2,563	20,403	282,195	938	3,061	806	—	4,805
1967	255,860	2,121	—	979	2,402	2,477	18,225	282,064	1,147	1,065	1,416	—	3,628
1968	274,000 ⁴	2,346	—	983	2,561	2,466	16,165	298,521	988	3,732	1,427	—	6,147
1969	282,000 ⁴	2,661	—	1,032	2,235	2,532	22,591	313,051	1,185	2,266	1,244	—	4,695
1970	292,000 ⁴	—	—	1,110	1,695	2,121	18,726	315,652	956	2,165	749	—	3,870
1971	304,000 ⁴	—	—	962	1,883	2,517	16,708	326,070	577	2,470	967	—	4,014
1972	387,880 ⁴	—	—	1,099	2,077	2,290	18,210	411,556	710	1,694	3,291	—	5,695
1973	451,264	—	—	857	2,309	1,926	20,193	476,549	803	2,935	900	—	4,638
1974	498,313	—	—	1,087	2,564	1,559	15,866	519,389	801	2,508	2,196	—	5,505
1975	561,215	—	—	1,207	2,482	2,114	16,823	583,841	607	2,483	3,917	—	7,007
1976	615,498	—	—	927	2,403	2,574	16,756	638,158	886	3,188	5,608	—	9,682
1977	695,196	—	—	1,221	2,197	2,538	15,076	716,228	867	1,773	5,396	—	8,036
1978	751,809	—	—	1,154	2,571	2,750	19,466	777,750	811	2,077	4,727	—	7,615
1979	845,741	—	—	1,219	2,524	2,900	20,081	872,465	857	2,944	4,947	—	8,748
1980 ⁵	941,056	—	—	973	1,983	1,900	16,857	962,769	855	3,737	4,142	—	8,734

Year	EXPORTS				INDICATED DOMESTIC CONSUMPTION SYRUPS					
	Corn Syrup	Edible Molasses and Syrup including Maple ⁶	Honey	Total	Corn	Maple	Sorghum	Cane Syrup, Refiners Syrup, and Edible Molasses	Honey	Total
1950	3,761	242	801	4,804	126,687	2,485	3,539	19,036	20,029	171,776
1951	4,287	231	1,075	5,593	127,544	2,065	3,671	19,904	21,540	174,724
1952	3,101	153	1,968	5,222	124,304	2,125	2,856	17,756	21,843	168,884
1953	3,241	267	2,789	6,297	128,526	1,650	2,418	15,050	17,038	164,682
1954	3,233	272	2,061	5,566	129,838	2,043	2,552	13,320	17,088	164,841
1955	3,386	248	1,739	5,373	134,840	2,035	2,405	13,460	20,764	173,504
1956	3,189	249	1,548	4,986	138,315	2,172	3,594	13,862	17,027	174,970
1957	2,745	250	1,681	4,676	139,344	2,454	2,516	10,292	19,200	173,806
1958	2,396	165	1,902	4,463	151,085	2,048	2,282	11,701	20,549	187,665
1959	2,245	155	1,062	3,462	159,952	1,828	2,286	12,683	19,404	196,153
1960	1,836	182	797	2,815	167,940	2,051	1,943	12,226	20,863	205,023
1961	1,370	173	607	2,150	179,027	2,428	—	11,482	21,882	214,819
1962	1,514	140	1,158	2,812	199,745	2,389	—	12,756	20,635	235,525
1963	2,055	192	2,125	4,372	213,518	2,211	—	9,757	20,743	246,229
1964	1,632	205	760	2,597	237,200	2,212	—	10,275	20,980	270,667
1965	1,003	—	1,166	2,169	242,679	2,145	—	11,980	20,388	277,192
1966	1,038	—	1,219	2,257	251,299	2,414	—	11,040	19,990	284,743
1967	1,113	—	986	2,099	254,747	2,126	—	8,065	18,655	283,593
1968	1,541	—	684	2,225	272,459	1,971	—	11,105	16,908	302,443
1969	2,169	—	833	3,002	279,831	2,217	—	9,694	23,002	314,744
1970	1,324	—	688	2,012	290,676	2,066	—	5,981	18,787	317,510
1971	1,324	—	640	1,964	302,676	1,539	—	6,870	17,035	328,120
1972	1,205	—	346	1,551	386,675	1,809	—	6,061	21,155	415,700
1973	1,377	—	1,484	2,861	449,887	1,660	—	7,170	19,609	478,326
1974	1,736	—	386	2,122	496,577	1,888	—	6,631	17,676	522,772
1975	1,070	—	337	1,407	560,145	1,814	—	7,079	20,403	588,441
1976	1,674	—	396	2,070	613,824	1,813	—	8,165	21,968	645,770
1977	1,543	—	466	2,009	693,653	2,088	—	6,508	20,006	722,255
1978	1,694	—	679	2,373	750,115	1,965	—	7,398	23,514	782,992
1979	1,207	—	747	1,954	844,534	2,076	—	8,368	24,281	879,259
1980 ⁵	3,498	—	722	4,220	937,558	1,829	—	7,620	20,277	967,283

¹Production of cane syrup, sorghum syrup, and edible molasses is of the fall of the preceding year. Estimates of sorghum discontinued beginning 1961; cane syrup discontinued beginning 1970. ²Does not include varying quantities produced on nonfarm lands in Somerset County, Maine. ³U.S. Department of Commerce molasses and sugar syrups series, less liquid sugar imports reported to Sugar Division, Agricultural Stabilization and Conservation Service. ⁴Unofficial estimates 1968-71, estimates for 1972-77 from USITC Pub. 881, April 1978. ⁵Preliminary. ⁶Assumed to be largely refiners' syrup. Beginning 1965, data not available because of change in export classification.

Source: U.S. Department of Agriculture and Economics, Statistics Service.

CONTINENTAL U.S. SUGAR CONSUMPTION

Five Year Intervals—1873-1943

Year	Total Sugar Consumption* (Short tons, raw value)	Per Capita Consumption (Pounds, refined value)
1873	897,072	40.2
1878	926,929	36.4
1883	1,402,577	48.8
1888	1,746,385	54.4
1893	2,283,985	63.8
1898	2,400,278	61.1
1903	3,055,492	70.5
1908	3,817,849	80.1
1913	4,485,778	86.9
1918	4,189,134	75.6
1923	5,729,172	96.0
1928	6,658,400	103.8
1933	6,613,200	99.7
1938	6,597,200	96.3
1943	6,725,720	94.2

Yearly Intervals—1944-1980

1944	6,170,000	89.5
1945	5,046,000	73.9
1946	5,552,000	75.1
1947	7,357,000	95.5
1948	7,263,000	94.0
1949	7,451,000	95.8
1950	8,217,000	100.8
1951	7,552,000	93.8
1952	8,008,000	98.2
1953	8,354,000	97.9
1954	8,106,000	96.3
1955	8,350,000	97.5
1956	8,962,000	98.4
1957	8,708,000	95.0
1958	9,017,000	96.8
1959	9,135,000	96.4
1960	9,434,000	97.6

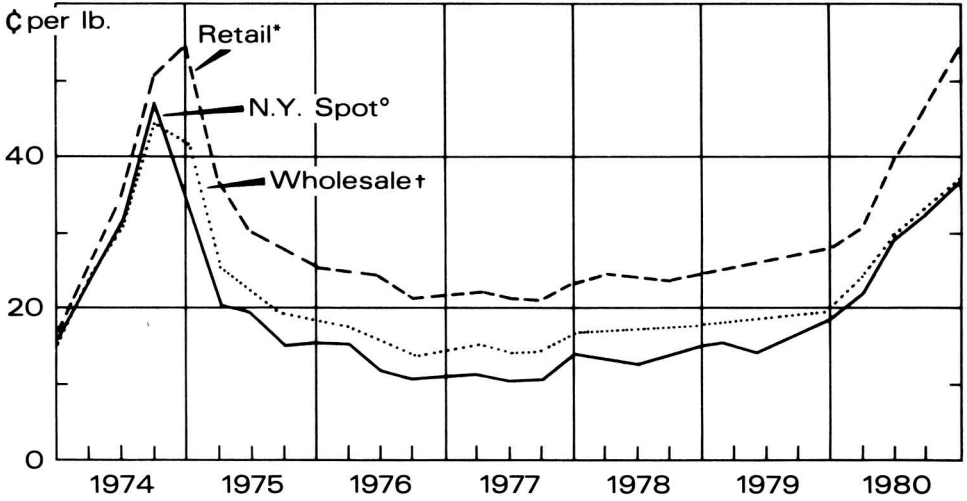
Year	Total Sugar Consumption* (Short tons, raw value)	Per Capita Consumption (Pounds, refined value)
1961	9,612,000	97.7
1962	9,709,000	97.2
1963	9,856,000	97.3
1964	9,938,000	96.8
1965	10,080,000	97.0
1966	10,235,000	97.3
1967	10,474,000	98.5
1968	10,656,000	99.2
1969	10,950,000	101.0
1970	11,163,000	101.8
1971	11,345,000	102.4
1972	11,487,000	102.8
1973	11,429,000	101.5
1974	10,946,000	96.6
1975	9,304,000	90.2
1976	10,895,000	94.7
1977	11,100,000	95.7
1978	10,889,000	93.1
1979	10,761,000	91.1
1980 ¹	10,100,000	84.9

*Theoretical consumption. (Actually deliveries for consumption, and includes deliveries for U.S. military forces at home and abroad.)

¹Estimated.

Source: 1873-1943—Lamborn Sugar Market Reports.
1944-1977—U.S. Dept. of Agriculture Agricultural Statistics, 1958, 1968, 1978.
1978-1980—U.S. Dept. of Agriculture Sugar and Sweetener Report, Vol. 6 (1), February, 1981.

U.S. Sugar Prices



* Granulated.

° Bulk raw sugar. For 4th quarter 1977 through 3rd quarter 1979, derived from London daily price, Caribbean basis, plus applicable fees and freight.

† Bulk, dry beet sugar, F.O.B. plant in Colorado.

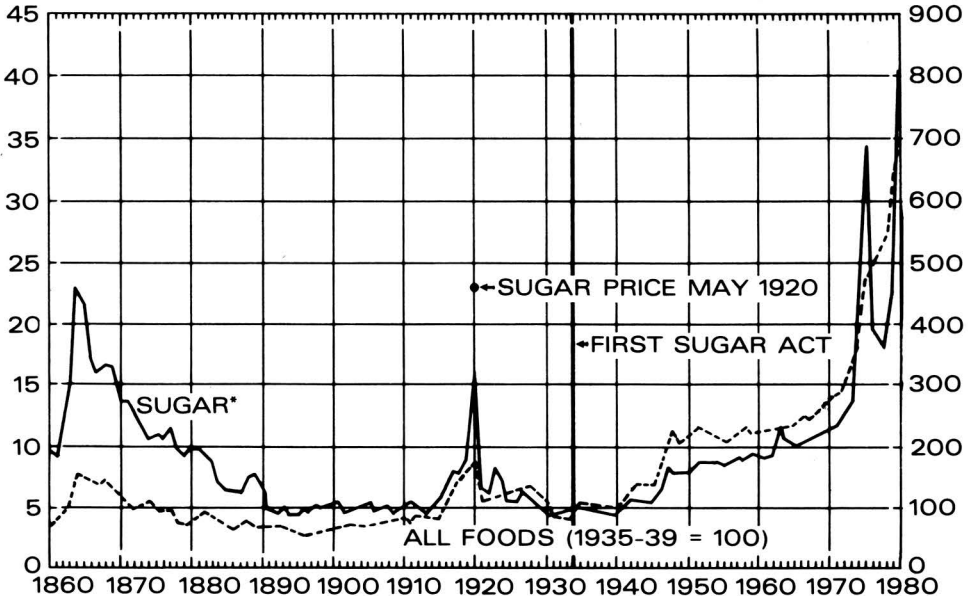
Source: 1972-77: Adapted from Fig. S-6, USDA Sugar and Sweetener Report, Vol. 3, pg. 17, February 1978.

1978: Adapted from Fig S-5, USDA Sugar and Sweetener Report, Vol. 4 pg. 20, May 1979.

1980: Adapted from "U.S. Sugar Prices" figure, USDA Sugar and Sweetener Report, Vol. 6 (2), pg. 10, May 1981.

REFINED SUGAR PRICES, AND INDEX OF ALL FOOD PRICES AT WHOLESALE, 1860-1980

SUGAR (CENTS PER POUND) ALL FOODS (PERCENT OF 1935-39)



*Refined sugar prices, net cash, Northeast.

Source: All food prices—U.S. Dept. of Labor

All sugar prices—U.S. Dept. of Agriculture.

**TOTAL FOREIGN IMPORTS INTO U.S.A. (Mainland) BY COUNTRIES
OF ORIGIN: 1977 THROUGH 1980**

Country	Calendar year			
	1977	1978	1979	1980
	1,000 short tons, raw value			
WESTERN HEMISPHERE:				
Caribbean Islands				
Dominican Republic	975	734	817	615
Haiti	—	6	11	10
West Indies	160	184	212	214
Other	—	—	—	—
Total ¹	1,135	924	1,040	839
CENTRAL AMERICA:				
Belize (British Honduras)	36	87	58	72
Costa Rica	95	78	80	68
El Salvador	166	130	161	41
Guatemala	301	156	171	219
Honduras	21	18	65	89
Nicaragua	120	108	122	63
Panama	131	123	157	156
Other	—	—	—	11
Total ¹	870	700	814	719
NORTH AMERICA:				
Canada	138	98	90	1
Mexico	(²)	53	60	(²)
Total ¹	138	151	150	1
SOUTH AMERICA:				
Argentina	267	271	235	197
Bolivia	49	62	89	73
Brazil	661	601	1,262	846
Colombia	14	113	26	214
Ecuador	55	37	82	73
Peru	314	225	189	52
Other	1	8	—	7
Total ¹	1,361	1,318	1,883	1,462
Total Western Hemisphere ¹	3,504	3,093	3,887	3,021
EASTERN HEMISPHERE:				
Australia	494	165	108	351
China, Republic of	86	57	28	—
Fiji Islands	18	51	130	50
France	27	43	—	—
Germany, West	20	17	(²)	(²)
India	(²)	(²)	(²)	(²)
Malagasy, Republic of	12	14	10	20
Malawi	38	37	36	60
Mauritius	57	112	116	55
Mozambique	97	13	98	88
South Africa	274	60	89	164
Swaziland	62	82	102	142
Thailand	—	65	9	66
Other	5	39	—	57
Total Eastern Hemisphere excluding Philippines ¹	1,190	755	726	1,053
Philippines	1,443	833	413	409
Total Eastern Hemisphere ¹	2,633	1,588	1,139	1,462
Total U.S. Imports ¹	6,138	4,683	5,027	4,484

¹ May not add due to rounding.

² Less than 5.

Source: U.S. Dept. of Agriculture Sugar and Sweetener Report, Vol. 6 (2) May 1981.

Part III

WORLD SUGAR

Sugar, a basic food obtained mainly from sugarcane and sugar beets, is produced in some 125 nations throughout the world.

Total centrifugal sugar production for the 1980-81 crop year is estimated to be 86.1 million metric tons. Of this, approximately 40% was from sugar beets and 60% was from sugarcane. An additional 11 million short tons of non-centrifugal sugar was produced. Non-centrifugal sugar ordinarily is not traded because it is consumed in areas near where it is produced.

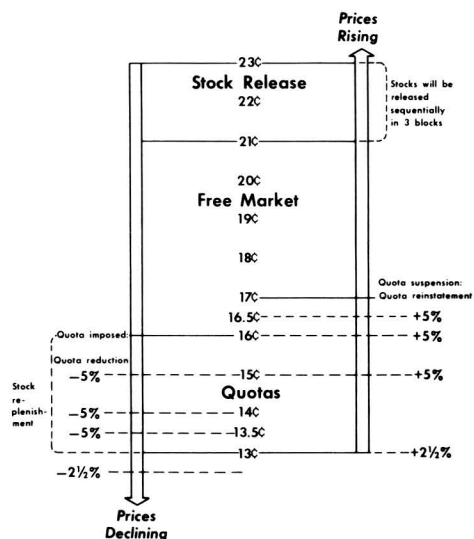
It is estimated that total world centrifugal sugar consumption for 1980 will be 89.0 million metric tons. About 75% of this will be used in the countries where the sugarcane or sugar beets were grown and the sugar produced. The other 25% is traded to countries that either produce no sugar or require more than they produce. Some of this sugar trade is under bilateral agreements, some of them of relatively long duration.

INTERNATIONAL SUGAR AGREEMENT

A series of meetings in 1976 and 1977 by representatives to the International Sugar Organization (ISO) culminated in an International Sugar Agreement on October 7, 1977. The Agreement became provisionally effective on January 1, 1978 and is now in full effect. The current Agreement runs through 1982 and can be extended for two years under its present terms, although basic export tonnages would have to be renegotiated.

The objective of the Agreement is to maintain world market prices within a specified corridor. Initially the corridor was from 11 to 19 cents per pound of raw sugar. These figures have been increased twice by the International Sugar Council (of the ISO) and now are 13 and 21 cents per pound.

INTERNATIONAL SUGAR AGREEMENT PRICE MECHANISM



The mechanism for maintaining world raw sugar prices within the corridor is illustrated in the figure below. Under the agreement, each member-producing country is assigned a basic export quota. The International Sugar Council is charged with review of the market situation and is authorized to act when specified "trigger points" are reached. The "trigger points" are 15-day average prices, computed from the New York and London raw sugar prices, that prevail for five consecutive market days.

When prices are declining (see *left* side of the figure below), the first trigger is reached when the average price is below 21 cents for five consecutive days. At that point, importing countries that are members of the ISO and are parties to the Agreement must limit imports from non-member countries to 75% of the average of such imports. This action was triggered and became effective April 21, 1981. If the price goes below 17 cents the Council may establish or reestablish export quotas or other limitations. At 16 cents export quotas are mandatory and the Council may also reduce the global quota, thereby also reducing individual country export quotas.

As the average price drops below 15 cents there is an automatic 5% reduction in export quotas. There are additional automatic 5% reductions in export quotas at 14 cents and at 13½ cents per pound average prices.

When prices are increasing (see *right* side of the figure), export quotas are increased at specified trigger points. There are automatic 5% increases in export quotas when the average price goes above 15, 16, and 16½ cents per pound. Above 17 cents quotas are automatically suspended. If the price goes higher than 21 cents, special stocks accumulated as a consequence of quota reductions are released.

Until the early part of 1981, average sugar prices have been higher than the trigger points and the effectiveness of the International Sugar Agreement has not really been tested. World prices are now at or are nearing the point at which export quotas would be reduced. Sugar not exported would build stocks which would be released as prices went above the upper level of the corridor. No stocks are now being held.

WORLD CENTRIFUGAL SUGAR PRODUCTION IN SPECIFIED COUNTRIES

Raw value, 1976 to 1980

Region and Country	1976	1977	1978	1979	1980 ²
	(to convert to short tons, multiply by 1.1023) (1,000 metric tons)				
<u>NORTH AMERICA:</u>					
United States:					
Mainland cane	1,519	1,497	1,436	1,488	1,501
Hawaii	953	938	962	948	965
Puerto Rico	243	184	175	159	160
Total U.S. cane	2,715	2,619	2,573	2,595	1,626
Sugar beets	3,534	2,820	2,984	2,612	2,722
Total U.S.	6,249	5,439	5,557	5,207	5,348
Caribbean:					
Cuba	6,100	7,000	7,500	6,400	6,000
Dominican Republic ..	1,222	1,179	1,166	1,090	1,200
Other countries	774	785	780	709	689
Total Caribbean	8,096	8,964	9,446	8,199	7,889
Other Mainland:					
Mexico	2,697	3,030	3,058	2,763	2,900
Canada	165	149	125	105	115
Central America	1,599	1,527	1,555	1,421	1,682
Total Other Mainland	4,461	4,706	4,738	4,289	4,697
Total North America ³	18,806	19,109	19,741	17,709	17,921
<u>SOUTH AMERICA:</u>					
Argentina	1,592	1,661	1,387	1,395	1,650
Brazil	7,500	8,600	7,740	6,968	8,200
Colombia	882	916	1,019	1,193	1,223
Peru	941	850	715	550	500
Venezuela	443	389	325	350	380
Other countries	1,403	1,125	1,258	1,151	1,314
Total South America ³	12,761	13,541	12,444	11,607	13,267
<u>EUROPE:</u>					
Western Europe:					
E.C.-9 ⁴					
Belgium-Luxemburg ..	714	729	834	965	905
Denmark	416	566	435	485	447
France	2,974	4,293	4,000	4,237	4,280
Germany, Fed. Rep. of	2,734	3,075	2,997	3,088	2,850
Ireland	186	179	201	187	180
Italy	1,748	1,364	1,605	1,672	1,660
Netherlands	931	890	1,019	913	885
United Kingdom	755	1,003	1,111	1,255	1,230
Total E.C.-9 ³	10,458	12,099	12,202	12,802	12,437
Non E.C.					
Austria	391	475	375	429	457
Greece	385	295	348	313	198
Spain	1,472	1,267	1,106	701	923
Sweden	302	343	322	333	317
Other countries	183	189	219	226	212
Total Non E.C. ³	2,733	2,569	2,370	1,997	2,107
Total Western Europe ³	13,191	14,668	14,572	14,798	14,544

**WORLD CENTRIFUGAL SUGAR PRODUCTION (cont.)
IN SPECIFIED COUNTRIES**

Raw value, 1976 to 1980

Region and country	1976	1977	1978	1979	1980 ²
	(to convert to short tons, multiply by 1.1023) (1,000 metric tons)				
Eastern Europe:					
Czechoslovakia	685	900	875	950	900
German Demo. Rep. . .	600	782	820	861	750
Poland	1,801	1,851	1,736	1,557	1,190
Romania	800	609	555	525	500
Yugoslavia	707	784	765	801	722
Other countries	707	734	791	876	770
Total Eastern Europe ³	5,300	5,660	5,542	5,570	4,832
Total Europe ³	18,491	20,328	20,114	20,368	19,376
U.S.S.R.	7,350	8,825	9,300	7,800	7,000
AFRICA:					
Egypt	662	634	668	662	695
Mauritius	731	705	705	730	500
Mozambique	200	260	175	175	175
South Africa	2,166	2,211	2,209	2,206	1,721
Other countries	2,366	2,377	2,562	2,745	3,201
Total Africa ³	6,125	6,187	6,319	6,518	6,292
ASIA:					
China-Peoples Republic	2,600	2,970	2,675	2,765	2,800
China-Rep. of Taiwan .	1,123	768	891	890	890
India	6,043	7,720	7,071	5,213	6,917
Indonesia	1,105	1,000	1,160	1,307	1,403
Iran	745	686	650	613	600
Japan	565	640	693	744	765
Pakistan	742	856	653	571	725
Philippines	2,750	2,397	2,347	2,325	2,420
Thailand	2,212	1,584	1,851	1,087	1,350
Turkey	1,285	1,082	1,079	1,052	1,000
Other countries	513	607	656	532	577
Total Asia ³	19,683	20,310	19,726	17,099	19,447
OCEANIA:					
Australia	3,405	3,322	2,978	3,027	3,300
Fiji Islands	307	369	347	473	500
Total Oceania ³	3,712	3,691	3,325	3,500	3,800
Northern Hemisphere . .	66,871	71,003	70,851	64,899	65,929
Southern Hemisphere . .	20,057	20,988	20,118	19,688	21,187
TOTAL WORLD ³	86,928	91,991	90,969	84,587	87,116

¹Crop years are on a September/August basis, but include the output of sugar from harvests of several Southern Hemisphere countries which begin prior to September.

²Preliminary.

³May not add due to rounding.

⁴E.C. Economic Community.

Source: U.S. Dept. of Agriculture, Sugar and Sweetener Report, Vol. 6 (1), Feb. 1981.

NON-CENTRIFUGAL SUGAR:¹
Production in Specified Countries, Annual 1976-77 to 1980-81²

Region and Country	1976-77	1977-78	1978-79	1979-80 ³	1980-81 ³
	(to convert to short tons, multiply by 1.1023) (1,000 metric tons)				
<u>NORTH AMERICA:</u>					
Costa Rica	45	45	48	45	45
El Salvador	16	10	12	14	15
Guatemala	37	36	35	36	38
Mexico	65	50	55	70	80
Nicaragua	10	10	10	10	10
Panama	2	3	3	3	3
TOTAL	<u>175</u>	<u>154</u>	<u>163</u>	<u>178</u>	<u>191</u>
<u>SOUTH AMERICA:</u>					
Brazil	200	200	200	200	200
Colombia	735	818	910	900	750
Ecuador	42	45	50	55	55
Peru	14	13	15	14	15
Venezuela	39	40	42	44	45
TOTAL	<u>1,030</u>	<u>1,116</u>	<u>1,217</u>	<u>1,213</u>	<u>1,065</u>
<u>ASIA:</u>					
Burma	138	140	140	140	138
China, Mainland	825	830	860	800	800
China, Taiwan	30	42	40	39	40
India	6,200	6,800	6,500	5,700	5,500
Indonesia	200	225	225	200	250
Japan	11	12	11	12	12
Pakistan	1,450	1,450	1,550	1,350	1,400
Philippines	51	60	68	75	40
Thailand	700	700	650	750	800
Vietnam	10	11	10	10	10
TOTAL	<u>9,615</u>	<u>10,270</u>	<u>10,054</u>	<u>9,076</u>	<u>8,990</u>
WORLD TOTAL	10,820	11,540	11,434	10,467	10,246

NOTE: Due to rounding, may not add to area total.

¹Noncentrifugal sugar includes all types of sugar produced by other than centrifugal process which is largely for consumption in the relatively few areas where produced. The estimates include such kinds known as piloncillo, panela, papelón, chancaca, radura, jaggery, gur, muscovado, panocha, etc.

²Years shown are last year's crop-harvesting season. For chronological arrangements here all campaigns which begin not earlier than September of one year nor later than August of the following year, are placed in the same crop-harvesting year. The entire season's production of each country is credited to the September/August year in which harvesting and sugar production began.

³Preliminary.

Source: USDA Foreign Agricultural Service, Circular FS1-81 May 1981. Prepared or estimated on the basis of official statistics of foreign governments, other foreign source materials, reports of U.S. Agricultural attaches and Foreign Service Officers, results of office research and related information.

PRICES OF WHITE REFINED SUGAR IN SELECTED COUNTRIES
Representative Prices for Years 1977-1979 (U.S. Cents per Pound)

Note: Data for 1980 not available at time of printing.

Countries	Locality	Representative Prices					
		1977		1978		1979	
		Wholesale	Retail	Wholesale	Retail	Wholesale	Retail
<u>NORTH AMERICA</u>							
Canada	Montreal	16.5	20.2	14.9	21.0	18.4	24.4
U.S.A.	whole country	17.3	21.6	20.9	24.1	23.2	24.9
<u>CENTRAL AMERICA</u>							
Barbados	whole country	17.0	18.5	17.0	18.5	18.6	20.5
Belize	Belize	7.0	7.9	7.0	7.9	7.0	7.9
Dominican Republic	whole country	14.2	17.0	14.2	17.0	14.0	17.0
El Salvador	whole country	14.5	16.0	N.A.	N.A.	17.6	20.0
Guatemala	whole country	9.5	11.0	N.A.	N.A.	13.3	15.0
Honduras	whole country	N.A.	N.A.	12.5	14.0	N.A.	N.A.
Jamaica	whole country	14.2	15.0	18.2	20.5	42.1	47.8
Leeward islands:							
St. Kitts	whole country	8.6	9.3	8.6	9.3	11.4	12.9
Mexico	whole country	11.1	11.9	11.2	12.0	N.A.	N.A.
Nicaragua	whole country	16.0	18.0	16.0	18.0	N.A.	N.A.
Panama	whole country	18.3	20.0	18.3	20.0	18.3	20.0
Trinidad & Tobago	whole country	8.2	8.8	8.2	8.8	8.5	8.8
<u>SOUTH AMERICA</u>							
Argentina	whole country	20.6	23.6	23.4	27.6	31.1	39.4
Bolivia	whole country	14.6	15.2	14.9	17.8	12.1	12.8
Brazil	Rio de Janeiro	13.5	15.2	15.0	15.6	N.A.	N.A.
Chile	whole country	N.A.	N.A.	19.5	21.3	N.A.	N.A.
Colombia	Cauca Valley	10.0	11.0	9.6	9.8	12.4	14.3
Ecuador	—	9.5	10.4	12.0	13.6	12.0	13.6
Guyana	Georgetown	2.3	2.6	4.6	4.9	4.6	4.9
Peru	—	6.5	7.0	8.6	9.4	11.7	12.3
Venezuela	whole country	16.6	18.5	17.1	18.5	17.1	18.5
<u>ASIA</u>							
Afghanistan	whole country	N.A.	N.A.	N.A.	29.0	N.A.	31.8
Hong Kong	whole country	N.A.	30.0	N.A.	27.4	N.A.	N.A.
India	Kanpur	11.0	11.1	11.6	12.2	24.4	16.2*
Iraq	whole country	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Israel	whole country	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Japan	Tokyo	31.4	40.7	40.8	50.3	39.0	48.0
Jordan	—	N.A.	N.A.	15.1	16.7	19.3	20.4
Korea, Rep. of	Seoul	39.3	41.5	N.A.	N.A.	40.0	42.0
Philippines	Manila	12.2	13.0	12.3	14.2	15.9	16.8
Saudi Arabia	—	16.0	20.0	N.A.	N.A.	N.A.	N.A.
Singapore	whole country	22.3	22.9	23.1	23.7	24.0	25.0
Sri Lanka	—	N.A.	54.6	N.A.	N.A.	18.0	19.3
Syrian Arab Rep.	whole country	33.8	34.5	20.9	21.9	20.9	21.8
Thailand	Bangkok	12.3	13.4	12.8	14.0	12.5	13.6
<u>EUROPE</u>							
Austria	whole country	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Cyprus	whole country	15.0	16.0	14.0	15.0	16.0	17.0
Finland	whole country	35.2	47.5	36.0	48.7	43.0	50.0
Greece	Athens	25.0	28.5	24.4	26.7	N.A.	N.A.
Hungary	whole country	28.6	31.7	N.A.	N.A.	N.A.	N.A.
Malta	whole country	12.0	13.0	12.7	14.1	13.8	15.5
Norway	whole country	N.A.	N.A.	17.8	26.5	N.A.	N.A.

PRICES OF WHITE REFINED SUGAR IN SELECTED COUNTRIES
Representative Prices for Years 1977-1979 (U.S. Cents per Pound) (cont.)

Note: Data for 1980 not available at time of printing

Countries	Locality	Representative Prices					
		1977		1978		1979	
		Wholesale	Retail	Wholesale	Retail	Wholesale	Retail
EUROPE (continued)							
Portugal	whole country	19.0	22.0	19.7	22.3	19.4	21.9
Spain	whole country	N.A.	N.A.	23.0	24.0	N.A.	N.A.
Sweden	whole country	23.5	37.1	25.6	38.5	27.4	43.4
Switzerland	whole country	18.1	26.4	21.9	31.2	25.2	31.6
Turkey	Ankara	20.1	N.A.	19.1	N.A.	8.3	10.0
Yugoslavia	whole country	29.1	31.2	N.A.	N.A.	12.3	13.5
AFRICA							
Burundi	whole country	23.0	26.0	55.0	76.0	27.0	41.0
Egypt, Arab Rep. of	whole country	10.4	11.3	N.A.	N.A.	N.A.	N.A.
Ethiopia	whole country	15.0	16.0	21.5	23.1	21.5	23.1
Ivory Coast	whole country	39.6	46.1	43.2	50.3	48.8	56.7
Kenya	whole country					26.0	27.0
Madagascar	major cities	N.A.	N.A.	21.4	24.7	21.4	24.7
Malawi	whole country	14.0	18.4	12.7	21.8	13.2	24.8
Mauritius	whole country	3.0	4.0	3.0	4.0	5.0	6.0
Somalia	whole country	3.0	4.0	N.A.	N.A.	N.A.	N.A.
South Africa	Durban	14.3	15.4	15.0	16.3	22.0	23.0
Sudan	major cities	89.2	92.2	N.A.	N.A.	31.0	32.0
Swaziland	whole country	6.4	9.8	9.4	14.6	14.8	20.7
Tanzania, Un. Rep. of	whole country	24.3	27.4	25.0	27.0	24.2	28.2
Upper Volta	—	N.A.	N.A.	34.1	40.2	N.A.	N.A.
Zambia	whole country	12.2	12.9	23.0	25.0	23.0	25.0
OCEANIA							
Australia	major cities	12.5	15.5	17.0	19.0	20.0	22.0
Fiji	main centers	10.7	12.4	10.7	12.4	11.1	12.8
New Zealand	4 main cities	19.1	21.1	21.4	24.4	23.5	26.5
Western Samoa	Apia	14.0	20.0	22.0	27.0	N.A.	N.A.

*Refers to the 65% of sugar made available through the Public Distribution Service. Retail prices for the balance sold freely are much higher.

Source: International Sugar Organization, Sugar Year Book, 1979.

SUGAR SUPPLY AND DISTRIBUTION BY COUNTRIES, 1979

Note: Data for 1980 not available at time of printing.

(Tonnes—Raw Value)†

(To convert to short tons, multiply by 1.1023)

Countries	SUPPLY		DISTRIBUTION	
	Production	Imports	Consumption	Exports
NORTH AMERICA:				
Canada	133,110	1,063,130	1,125,195	120,449
U.S.A. (Includes Mainland, Hawaii, Puerto Rico and Virgin Islands)	5,434,681	4,436,406*	9,876,365	14,310
TOTAL	5,567,791	5,499,536	11,001,560	134,759
EUROPE:				
Albania	20,000 ¹	24,649	42,000 ¹	0
Austria	407,861	75	374,753	55,995
Bulgaria	180,000 ¹	232,688 ³	420,000 ¹	0
Cyprus	0	19,600	18,000 ¹	219
Czechoslovakia	908,347	93,609	728,267	242,477
E.E.C.	13,303,739	1,474,999	10,475,416	3,576,842
Finland	100,213	97,784	206,296	32,249
French Overseas Terr. ⁵	0	7,939 ³	7,800 ¹	0
German Dem. Republic	680,000 ¹	223,339	825,000 ¹	76,902
Gibraltar	0	763 ³	900 ¹	0
Greece	309,383	0	337,582	45,056
Hungary	540,782	79,599	524,586	32,610
Iceland	0	11,874 ³	12,000 ¹	0
Malta	0	17,547	19,000 ¹	0
Norway	0	189,677	184,955	0
Poland	1,724,027	61,652	1,675,549	103,619
Portugal	12,000 ¹	355,926 ³	335,000 ¹	9,929
Romania	600,000 ¹	123,310 ³	700,000 ¹	6,843 ⁴
Spain & Spanish Dependent Territories	935,667	106,682 ³	1,139,520	0
Sweden	351,042	50,244	363,819	41,802
Switzerland	117,849	161,925	270,762	1,551
Turkey	1,060,216	0	1,247,734	3,858
U.S.S.R.	7,745,000 ¹	4,080,305	12,150,000 ¹	244,161
Yugoslavia	885,000 ¹	0	770,000 ¹	76,836
TOTAL	29,881,136	7,414,186	32,828,939	4,550,949
CENTRAL AMERICA:				
Bahamas	0	6,923 ³	7,000 ¹	0
Barbados	117,110	0	15,420	101,357
Belize	105,330	0	7,517	97,035
Bermuda	0	2,391 ³	2,000 ¹	0
Costa Rica	203,500	0	140,000 ¹	72,879
Cuba	7,799,968	0	518,986	7,269,429
Dominican Republic	1,200,195	0	190,844	1,034,960
El Salvador	273,779	0	143,760	164,312
Guatemala	414,802	0	223,049	195,486
Haiti	60,000 ¹	10,697 ³	60,000 ¹	10,053 ⁴
Honduras	164,386	0	108,816	53,890
Jamaica	291,025	0	101,190	193,911
Mexico	3,095,408	0	3,059,538	29,605
Netherlands Antilles	0	8,965 ³	12,000 ¹	3 ⁴
Nicaragua	201,726	0	107,470	104,667
Panama	225,509	0	64,685	151,829
Panama Canal Zone	0	2,500 ¹	2,500 ¹	0
St. Kitts-Nevis-Anquilla	40,745	0	2,252	38,583
Trinidad & Tobago	143,521	5,923	45,138	93,877
Other Caribbeans ⁷	0	8,710 ³	9,000 ¹	0
TOTAL	14,337,004	46,109	4,821,165	9,611,876

*Note: This is not consistent with U.S. imports for 1979 reported in tabled on page 30.

SUGAR SUPPLY AND DISTRIBUTION BY COUNTRIES, 1979 (cont.)

Note: Data for 1980 not available at time of printing.

(Tonnes—Raw Value)†

Countries	SUPPLY		DISTRIBUTION	
	Production	Imports	Consumption	Exports
SOUTH AMERICA:				
Argentina	1,410,783	0	1,090,590	351,379
Bolivia	288,439	0	198,075	126,524
Brazil	7,361,651	0	6,008,792	1,941,589
Chile	92,000 ¹	293,253 ³	390,000 ¹	0
Colombia	1,107,268	0	837,722	278,034
Ecuador	352,400	0	294,300	68,652
Guyana	316,414	0	33,422	280,235
Paraguay	76,000 ²	0	65,000 ¹	0
Peru	695,283	0	547,590	180,790
Surinam	12,000 ¹	3,585 ³	12,000 ¹	2,838 ⁴
Uruguay	84,000 ¹	20,569 ³	100,000 ¹	0
Venezuela	347,007	293,091	695,258	0
TOTAL	12,143,245	610,498	10,272,749	3,230,041
ASIA:				
Afghanistan	10,235	86,738	71,466 ¹	0
Bangladesh	120,000 ¹	30,466 ³	162,000 ¹	0
Brunei	0	6,000 ¹	6,000 ¹	0
Burma	60,000 ¹	104 ³	60,000 ¹	0
China	2,750,000 ¹	985,412	3,700,000	115,000 ¹
(Taiwan Province)				
Hong Kong	0	109,158	105,000 ¹	4,042
India	6,080,339	0	6,677,232	708,827
Indonesia ⁶	1,200,000 ¹	457,550	1,650,000 ¹	0
Iran	450,000	745,875 ³	1,200,000 ¹	0
Iraq	19,000	513,748 ³	486,893	0
Israel	16,300 ¹	137,806 ³	150,000 ¹	0
Japan	725,185	2,686,126	3,199,797	2,204
Jordan	0	99,250	95,000 ¹	0
Kampuchea	0	6,000 ¹	6,000 ¹	0
Korea, Dem. People's Rep.	0	100,000 ¹	120,000 ¹	0
Korea, Republic of	0	668,854	547,066	121,650
Kuwait	0	82,146 ³	60,000 ¹	0
Lao, People's Dem. Rep.	0	5,000 ¹	5,000 ¹	0
Lebanon	10,000 ¹	102,571 ³	120,000 ¹	0
Macao	0	3,000 ¹	3,000 ¹	0
Malaysia	40,000 ¹	426,596	480,000 ¹	16,226
Maldives	0	5,591 ³	4,500 ¹	0
Mongolia	0	38,287 ³	37,000 ¹	0
Nepal	20,000 ¹	0	17,000 ¹	0
Pakistan	609,000	35,704 ³	782,000	0
Persian Gulf	0	89,007 ³	80,000 ¹	0
Philippines	2,390,080	0	1,158,601	1,157,457
Saudi Arabia	0	226,746 ³	270,000 ¹	0
Singapore	0	121,477	100,233	15,370
Socialist Rep. of Vietnam	80,000 ¹	123,912 ³	200,000 ¹	5,470 ⁴
Sri Lanka	18,400	245,312	235,399	0
Syrian Arab Republic	25,286	285,433	281,791	0
Thailand	1,981,403	0	619,882	1,210,304
Yemen Arab Republic	0	75,168 ³	90,000 ¹	0
Yemen Democratic Republic	0	45,308 ³	65,000 ¹	0
TOTAL	17,405,228	8,544,325	23,265,860	3,741,260

SUGAR SUPPLY AND DISTRIBUTION BY COUNTRIES, 1979 (cont.)

Note: Data for 1980 not available at time of printing.

(Tonnes—Raw Value)†

Countries	SUPPLY		DISTRIBUTION	
	Production	Imports	Consumption	Exports
OCEANIA:				
Australia	2,960,835	0	797,872	2,002,853
British Oceania	0	4,800 ¹	4,800 ¹	0
Fiji	455,701	118	35,853	435,028
New Zealand	0	156,680	168,126	8
Papua New Guinea	0	29,754 ³	29,000 ¹	0
U.S. Oceania	0	2,922 ³	3,000 ¹	0
Western Samoa	2,166	593 ³	3,000 ¹	0
TOTAL	3,418,702	194,867	1,041,651	2,437,889
AFRICA:				
Algeria	15,000 ¹	443,990 ³	460,000 ¹	0
Angola	50,000 ¹	67,154 ³	110,000 ¹	0
Benin	0	7,000 ¹	6,000 ¹	0
Botswana	0	14,000 ¹	14,000 ¹	0
Burundi	0	8,318	6,000 ¹	0
Cameroon, United Republic of	45,000 ¹	18,757	60,000 ¹	2,165
Cape Verde Islands	0	7,000 ¹	8,000 ¹	0
Central African Republic	0	3,053 ³	3,000 ¹	0
Chad	24,000 ¹	7,569 ³	32,000 ¹	0
Comoros	0	3,660 ³	3,000 ¹	0
Congo	15,000 ¹	12,400 ³	22,000 ¹	5,426 ⁴
Djibouti ⁷	0	530 ³	7,500 ¹	0
Egypt, Arab Republic of	600,000 ¹	332,118 ³	900,000 ¹	0
Equatorial Guinea	0	850 ¹	850 ¹	0
Ethiopia	166,928	0	150,092	0
Gabon	10,000 ¹	8,160 ³	15,500 ¹	0
Gambia	0	28,816 ³	25,000 ¹	0
Ghana	15,000 ¹	55,715 ³	70,000 ¹	0
Guinea	20,000 ¹	6,031 ³	25,000 ¹	0
Guinea Bissau	0	2,555 ³	2,500 ¹	0
Ivory Coast	63,450	12,486 ³	57,000 ¹	0
Kenya	316,718	11,862	271,417	2,122
Liberia	0	8,000 ¹	8,000 ¹	0
Libyan Arab Jamahiriya	0	120,789 ³	130,000 ¹	0
Madagascar	116,775	0	92,807	21,337
Malawi	113,659	0	40,930	72,923
Mali	18,000 ¹	15,557 ³	35,000 ¹	0
Mauritania	0	36,308 ³	35,000 ¹	0
Mauritius	728,908	24	41,090	640,946
Morocco	360,000 ¹	327,253 ³	635,000 ¹	0
Mozambique	211,576	0	140,000	80,000
Niger	0	10,000 ¹	13,000 ¹	0
Nigeria	35,000 ¹	529,749 ³	575,000 ¹	93 ⁴
Rwanda	2,000 ¹	5,667 ¹	7,000 ¹	0
St. Helena	0	150 ¹	150 ¹	0
St. Thome and Principe	0	1,149 ³	1,500 ¹	0
Senegal	45,000 ¹	48,336 ³	85,000 ¹	0
Seychelles	0	1,184 ³	1,500 ¹	0
Sierra Leone	0	25,203 ³	25,000 ¹	0
Somalia	20,000 ¹	24,415 ³	65,000 ¹	0
South Africa	2,142,542	0	1,126,605	883,939
Sudan	115,889	201,108	371,942	0
Swaziland	257,954	0	21,762	235,782
Tanzania, United Rep. of	123,105	11,340	138,724	19,344
Togo	5,000 ¹	25,012 ³	18,000 ¹	6,000 ¹

SUGAR SUPPLY AND DISTRIBUTION BY COUNTRIES, 1979 (cont.)

Note: Data for 1980 not available at time of printing.

(Tonnes—Raw Value)†

Countries	SUPPLY		DISTRIBUTION	
	Production	Imports	Consumption	Exports
<i>AFRICA: Continued</i>				
Tunisia	6,100	194,133 ³	200,000 ¹	0
Uganda	10,000 ¹	5,334 ³	15,000 ¹	0
Upper Volta	31,017	0	26,695	4,000
Zaire	52,000 ¹	11,861 ³	65,000	0
Zambia	102,148	9,775	90,415	0
Zimbabwe	313,500	0	117,300	256,000
TOTAL	6,151,269	2,575,001	6,371,279	2,230,077
WORLD TOTAL	88,904,375	24,884,522	89,603,203	25,936,851

† Except for Indonesia, Macao, Angola, Cape Verde Islands, Guinea Bissau, Mozambique, Sao Thome and Tanzania, which are tons Tel Quel.

¹ Estimated.

² Calculated.

³ As reported by countries of origin.

⁴ As reported by countries of destination.

⁵ French Oceania, New Caledonia, New Hebrides and St. Pierre & Miquelon.

⁶ Including Timor.

⁷ Antigua, Montserrat, St. Lucia, St. Vincent and Virgin Islands (U.K.)

Source: ISO (London) Statistical Bulletin, Vol. 39, Nos. 9/10, Sept./Oct. 1980.

Part IV

MISCELLANEOUS

GLOSSARY

BAGASSE: Fibrous residue remaining after sugarcane has been milled to extract the sugar-containing juices.

BLACKSTRAP MOLASSES: The final product remaining after all the commercially recoverable sucrose has been removed from the juices expressed from cane. It is a dark colored, heavy, viscous liquid.

BRIX: The measure of density of a solution containing sucrose as determined by a hydrometer.

CALORIE: Unit expressing the energy-producing value of food. A pound of sugar contains 1,790 calories. A standard teaspoon contains 18.

DEXTROSE: A widely occurring crystallizable, simple sugar which contains 6 carbon atoms in contrast to the 12 found in sucrose. It is obtained in commercial quantities by the action of acid on cornstarch. It is less sweet than sucrose.

FRUCTOSE: An alternate chemical name for levulose.

GLUCOSE: (1) An alternate chemical name for dextrose. (2) A name given to corn syrups which are obtained by the action of acids and/or enzymes on cornstarch. Commercial corn syrups are nearly colorless and very viscous. They consist principally of dextrose and another sugar, maltose, combined with gummy organic materials known as dextrans, in water solution.

GUR: Cane juice, concentrated nearly to dryness by boiling over an open fire, without centrifuging and with no purification than by skimming. This ancient process is still used for producing a large share of the sugar consumed in India and some other countries. The crude product is high in glucose and correspondingly low in sucrose.

HIGH FRUCTOSE CORN SYRUP: High fructose corn syrups (HFCS) are produced by the enzymatic conversion of a portion of the glucose in corn syrup to fructose.

Composition of presently available products ranges from 7 to 55% glucose and 42 to 90% fructose on dry solids, the balance being other saccharides. Dry solids average about 71% on total weight. The product is roughly comparable to invert syrup made from sucrose in terms of sweetness and physical properties.

HIGH TEST MOLASSES: A concentrated, clarified cane juice which has been inverted (usually about 2/3) to prevent sucrose from crystallizing at the high concentrations normally employed.

INVERT OR INVERT SUGAR: The mixture of equal parts of dextrose and levulose produced by the action of acid or enzymes on solutions of sucrose.

LEVULOSE: A highly soluble, simple sugar, also containing 6 carbon atoms, it is crystallized with great difficulty, is generally considered sweeter than sucrose, and is used in considerable quantities in combination with dextrose and sucrose in invert sugars.

LIQUID SUGAR: A concentrated solution of refined sucrose or of a mixture of sucrose and invert sugar.

MASSECUITE: A dense mass of sugar crystals mixed with mother liquor, obtained by evaporation.

MOLASS: The mother liquor separated from sugar crystals in massecuite.

NON-CENTRIFUGAL SUGARS: Crude sugars made from the sugarcane juice by evaporation and draining off the molasses. Among local names are "muscovado," "panocha," and "papelon."

PLANT CROP: The sugarcane crop started with seed pieces (setts).

POLARIZATION: The value (designated as "pol") determined by direct or single polarization of a normal weight solution in a saccharimeter or polariscope. (Based on Spencer and Meade.)

RATOON: Second and subsequent crops grown from the root systems of previous plantings of sugarcane. Usually one or more ratoon crops are harvested before the fields are plowed and replanted.

RAW SUGAR: The impure centrifugal sugar of commerce, a light brown crystalline material, generally containing between 96 and 99% sucrose, plus various impurities and moisture. Other names are "panocha" and "demarra."

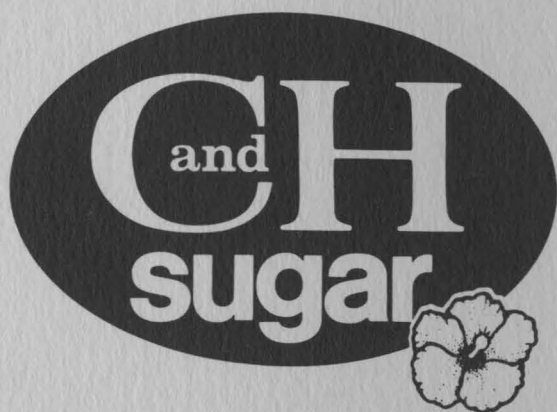
SOFT SUGARS: Highly refined, dark-colored, molasses-flavored sugars which are frequently called brown sugars. They contain significant amounts of non-sucrose.

SUCROSE: A sweet crystallizable, colorless sugar which constitutes the principal sugar of commerce. Refined cane and beet sugars are essentially 100% sucrose. Under certain conditions sucrose breaks down to dextrose and levulose.

SYRUP: Concentrated clarified cane juice before crystallization.

TEL QUEL: Literally, such as (it is). When used describing sugar it means "as made," hence of a polarization usually varying among mills and producing areas.

TURBINADO: Direct consumption raw sugar of high polarization which must be dried in a granulator to a very low moisture content.



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