

The Brazilian Citrus Industry

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Introduction

J. Henry Burke, marketing specialist, USDA Foreign Agricultural Service reported after a survey made in 1958 of the Brazilian citrus areas, "the potential of orange production is almost unlimited. Vast areas exist where oranges can be produced without irrigation and with little care." Total citrus production of the country at that time was estimated about 15 million boxes, since tristeza had destroyed most of the orchards. Production has increased since then continuously, surpassing in 1973 the record of 100 million boxes (40.8 Kg or 90 lbs.).

The total number of citrus trees existing in the country today is estimated between 80 and 100 million, of which nearly 50 percent are under 5 years of age. In the last few years, 10 to 12 million citrus trees have been planted annually and this rate of increase is assumed to continue at least for the near future. Prices of land and labor are growing steadily and, this picture may soon be changed. Production is expected to grow very rapidly reaching possibly 200 million boxes within the next 10 years. This almost unbelievable post-tristeza expansion of the Brazilian citrus industry was initiated soon after the December 1962 Florida freeze, with the installation of several processing citrus plants in the State of Sao Paulo. The major citrus area of the country, with an estimated 270,000 hectares is located there. The 1973 orange production of Sao Paulo is estimated between 65 to 70 million boxes, of which 40 to 45 million boxes will be used by the industries for the production of frozen concentrate juice (nearly all for export purposes), about 2.7 million boxes will be exported as fresh fruits and the remaining fruits will be consumed locally.

Sao Paulo accounts for more than 60 percent of the citrus production of the country. For this reason, the present report is concerned mainly with this area.

The Country

Brazil is the largest nation of South America and the third largest country in continuous area in the world. Its length from north to south is 4,320 km, its width is 4,328 km and its area corresponds to 8,511,965 km², of which over 700 million hectares are suitable for agriculture. It is presently the seventh most populated nation of the world, just exceeding 100 million inhabitants this year. Spreading like a giant from the latitude of 5°16'19" north of the equator to the latitude of 33°45'09" in the south, Brazil shows a great variation of climates and soil types with a nearly unlimited potential for agricultural enterprises.

The State of Sao Paulo is located in the center-south portion of the country, laying between 20 and 25° S and 43 and 55° W. The Tropic of Capricorn passes through the city of Sao Paulo, capital of the state. The area of the state is 247,898 km², 2.91 percent of the area of the country and its population is just a little over 18 million inhabitants. Most of the area of the state has a deep sandy soil, with an altitude varying from 300 to 700 except for a narrow littoral land belt. The topography of the plateau is of rolling hills and the climatic variables are average rainfall 1,200 to 1,500 mm a year, with a rainy, warm summer and a relatively dry winter; average mean temperature 21° C, average minimum temperature 8° C, average maximum temperature 35° C; and average relative humidity 75 percent.

History

Citrus trees are said to have been growing about 1540 in the littoral areas of Brazil where they were brought by the Portuguese and spread all over the country. Commercial plantings were started, however, only in the beginning of this century. The first phase of the citrus industry expansion was marked by the export of oranges to Argentina, initiated in 1916 and to Europe 10 years later. Since then, the export market expanded to reach peaks of 5.5 and 5.6 million boxes shipped in 1938 and 1939, respectively. Exports dropped drastically during the second World War and the record of 1939 has never been reached again. Tristeza made its appearance in Brazil by 1937 and caused the decline and death of over 12 million citrus trees budded on sour orange rootstock, mainly in the state of Sao Paulo, during the next 2 decades. After the discovery of the virus nature of the disease in 1946, the growers started replanting on tristeza-tolerant rootstocks, mainly sweet orange and 'Rangpur' lime. Use of these

rootstocks brought about new problems, particularly footrot and virus diseases, such as exocortis and xyloporosis. The extensive use of healthy nucellar lines has given new impulse to the industry. The exports grew to a peak of 4.7 million boxes of oranges in 1965 and then declined to stabilize at about 2 to 3 million boxes per year. The phase of industrialization began with 2.12 million boxes processed in 1963 for the production of frozen concentrated juice for export.

Producing Regions

Citrus trees are grown everywhere in Brazil, except perhaps the half south of the state of Rio Grande do Sul because of freeze damage. Official statistics for orange plantings, including areas of bearing orchards, amount, and value of the production for the 1969 crop, per unit of the federation are shown in Table 1. Presently, the total citrus area is estimated at 400,000 hectares, with concentration of orchards generally around the major cities of the country. Fruit production estimates for 1973, which give a general idea of the major producing areas, are as follow:

<i>State</i>	<i>Million boxes (40.8 Kg or 90 lbs.)</i>	<i>Percentage of total</i>
Sao Paulo	70	64.2
Rio de Janeiro	10	9.2
Minas Gerais	8	7.3
Rio Grande do Sul	2	1.9
Bahia and Sergipe	1.5	1.4
Others	<u>17.5</u>	<u>16.0</u>
TOTAL	109.0	100.0

Of this total production, oranges account for about 80 percent, tangerines 12 percent, lemons and limes 6 percent, and other citrus fruits including grapefruits, sweet limes, sour orange, citrons and kumquats, 2 percent. All fruits except those from Sao Paulo are consumed locally. Characteristics of all citrus areas, but that of Sao Paulo have not experienced great changes from what was reported by J. Henry Burke in the USDA Foreign Agricultural Report N. 109, dated June 1958, except for the generalized use of nucellar clones in the new plantings. Major expansions have occurred in Sao Paulo, Sergipe, Rio de Janeiro and Minas Gerais.

The Sao Paulo Citrus Industry.

Areas

The major commercial citrus-producing area in Sao Paulo is situated at present on the interior plateau within a wide belt about 300 km long and 100 km wide that extends from around Campinas to Barretos with the largest concentrations of orchards being located around Limeira, Araras, Araraquara, Matao and Bebedouro. It is estimated that over 50 million citrus trees exist within this belt. Other minor producing areas, outside this belt, are Sorocaba with an estimated 500 thousand orange and tangerine trees; the Sao Paulo and the Paraiba valley districts mainly dedicated to the production of lemons, limes and tangerines for local consumption and the Eldorado area situated in the low, warm, humid coastal Ribeira River valley where excellent quality mandarins are grown.

Citrus fruits are also found elsewhere throughout the state of Sao Paulo, except for a small area around Presidente Prudente where citrus plantings are prohibited because of the citrus canker eradication program.

Number of trees and production

Estimates of the total number of citrus trees in Sao Paulo in 1960 and 1971, and the number of nursery trees from state surveys made in 1961, 1966 and 1970 are shown in Table 2. Official statistics for total number of orange trees, production, destination and prices from 1960 to 1973 are summarized in Table 3. Estimates for 1973 made by the official Instituto de Economia Agricola, for the major citrus types, are as follows:

<i>Citrus type</i>	<i>Total number</i> (1,000 trees)	<i>Production</i> (1,000 boxes)
Oranges	56 500	68 500
Tangerines	6 000	9 400
Lemons and limes	4 100	7 200

The total number of trees in these estimates include about 16.5 million young orange trees, 1.5 million young tangerine trees and 1.1 million young lemon and lime trees.

Production per tree is low in Sao Paulo, averaging 1.5 boxes, but nearly 30 percent of the trees are very young, non-bearing trees and about 60 percent are less than 10 years of age. This average is expected to be improved during coming seasons as the trees mature with heavier use of fertilization and general adoption of healthy nucellar clones in the new orchards.

Climate

The climate of the state of Sao Paulo is extremely favorable for citrus production. Trees grow rapidly and thus come into commercial production very quickly. Frosts are rare, never damaging field trees. Very few orchards, (less than 1,000,000 trees) are known to receive irrigation. These are trees budded mainly on 'Caipira' sweet orange and trifoliolate rootstocks. In some years, however, part of the crop may be lost because of drought occurring after the August bloom has taken place. Frequently, in this case, a second bloom occurs between October and December.

Size of orchards

The size of farms varies considerably in the state of Sao Paulo as do the citrus orchards. Most plantations cover more than 30 hectares and at least 20 cover more than 500 hectares. Two large individual holdings have 400 and 500 thousand citrus trees and a few others are planned to expand to 1,000,000 citrus trees.

Spacing

Planting distances are variable but most orange orchards use 7 x 7 spacing. Small growers tend to increase the number of their trees by reducing distances to 6 x 6 and 6 x 7 meters. Tangerines are planted around 5 x 7 m or 6 x 7 m. Large new orchards are being planted using a double planting system such as 4 x 8 m and 4.5 x 9 m.

Varieties

Oranges are the most important in Sao Paulo, comprising about 70 to 80 percent of total area (see Table 2). Major orange varieties include the late ripening 'Pera', 'Natal' and 'Valencia'. Together, they account for about 70 percent of the orange production. They supply fruits from June to December and in smaller amounts up to March of the following year. 'Bahia' and 'Baianinha' navels are early varieties with a ripening season from March through June. Navels are rapidly losing their importance and now supply only about 10 or 11 percent of the total orange crop. 'Hamlin' oranges are next in importance, they are early ripening and represent around 7 percent of the oranges. They are used mainly for processing. Other important orange varieties are the acidless 'Lima' and 'Piralima' (early ripening) and 'Lima Verde' (late ripening). They enjoy good acceptance locally and account for nearly 6 percent of the total. Many other orange varieties are grown in a very limited scale like 'Barao', 'Westin', 'Rubi', 'Cadenera', 'Pineapple', 'Seleta' and so on.

Tangerines now comprise about 18 percent of total number of trees compared with 11.5 percent in 1960. Major varieties and their ripening season are: 'Ponkan' (50 percent) April-July; 'Cravo' (28.5 percent) February-May; 'Mexirica do Rio' (Willow leaf) (6 percent) - April-July and 'Murcott' (15 percent) June-October. Other tangerine varieties like 'Dancy' and the satsumas have very limited interest. 'Murcott' is gaining importance very rapidly because of its high quality and late ripening season.

Lemons and acid limes are all locally called "limao" and they comprise about 6 percent of the total citrus area. Plantings of 'Tahiti' lime are rapidly expanding and probably account now for more than 50 percent of all acid fruits. 'Mexican' lime comes next (about 22 percent) but most plantings are growing poorly, affected by tristeza stem pitting. 'Eureka' lemon types locally named 'Siciliano' comprise another 20 percent. The main harvest season for lemons and limes extends from December through May.

Miscellaneous citrus varieties include grapefruit, citrons, sour orange, some tangors, sweet limes and also kumquats. There is presently a great interest in grapefruit production but tristeza stem pitting limits the vigor and productivity of this citrus species in Sao Paulo.

Blooming of all citrus occurs in August and the major harvest season extends from March through December. An off-season bloom in April is common for 'Pera' orange resulting in an annual second crop for the period of December through March. 'Tahiti' lime also shows this tendency for an April bloom. Ripening of fruits in Bebedouro area is earlier than in Limeira by 2 to 4 weeks.

Nucellar clones

Nucellar clones of most commercial citrus varieties were produced in Sao Paulo around 1938. They were first used in commercial plantings in 1955 and resulted in very vigorous trees, producing large yields. They soon gained popularity among nurserymen and growers. Data from nursery surveys show the extensive use of nucellar clones in recent years:

<i>Year</i>	<i>Total number</i>	<i>Nucellars</i>	<i>Percentage</i>
1961	2,348,716	232,481	9.9
1966	3,957,404	1,352,088	34.17
1970	9,508,390	9,024,480	94.91

Most old clones from commercial varieties have been found infected with exocortis and xyloporosis, hence the great interest and value of nucellars.

Rootstocks

'Rangpur' lime is used for about 90 percent of the present citrus plantings in Sao Paulo and recent surveys indicated that 99 percent of nursery trees are now budded on this rootstock. Reasons for the extensive use of this citrus type as rootstock are good tolerance to tristeza, great vigor in the nursery and in the field, early blooming, heavy crops, good resistance to drought, great availability of seeds, good compatibility with all scion varieties and fairly good fruit quality. It has also ample adaptability to different soil types. Major disadvantages are fairly low resistance to footrot and intolerance to exocortis and xyloporosis viruses.

Other rootstocks used in a limited scale are 'Caipira' sweet orange, 'Cleopatra' mandarin, trifoliolate orange, Florida and Brazilian rough lemons and 'Troyer' citrange. Sour orange is also used for true lemons.

The total number of unbudded seedlings and percentage of the various rootstocks found in different nursery surveys are:

	<i>1961</i>	<i>1966</i>	<i>1970</i>
Total seedlings	3,251,600	2,612,170	9,675,930
Rootstocks (percent)			
'Rangpur' lime	76.53	95.92	99.13
'Caipira' sweet orange	12.95	0.85	0.21
'Cleopatra' mandarin	8.59	2.84	0.30
Trifoliolate orange	0.03	0.38	0.24
Sweet lime	0.03	-----	-----
Rough lemon	1.80		0.01
'Troyer' citrange	0.04		-----
Sour orange			0.11

Pest and diseases

Fruit flies cause the greatest losses to the citrus industry. The largest populations of *Anastrepha* spp. occur in the beginning of the ripening season and of *Ceratitis capitata* later on after drying of the coffee berries. Other pests of importance are rust mite, scales and the black citrus aphid *Toxoptera citricidus*. Sprays are generally used for fruit fly control but much less frequently for other pests.

Important fungus diseases include footrot, pink disease and sweet orange scab. Citrus canker, a bacterial disease, is present in Brazil in a limited area, outside the commercial citrus regions and subjected to an intensive eradication program since 1957.

Virus diseases, except for tristeza, are no longer problems of great importance in the Sao Paulo citrus industry as a result of the extensive use of healthy nucellar clones. Tristeza stem pitting affects the growth and reduces yields of several varieties like 'Pera' orange, 'Mexican' lime, grapefruit and citron. To overcome the problem, certain clones of 'Pera' orange and 'Mexican' lime that are now being planted, are preinoculated with mild tristeza strains for protection against severe strains in the field.

Costs

Costs of production of citrus fruit in Sao Paulo are presently relatively low. Most growers consider that they could sell oranges for 80 cents to 1 dollar a box with a good profit. On-tree sales prices per box of oranges from 1960 through 1973 are shown in Table 3. A large citrus grower producing 1.5 million orange boxes per year with an average of 3 boxes per tree considers that the price paid now for 1 box covers all the expenses with the tree for 1 year. Prices or costs of some items in 1973 are given for a general illustration of the cost picture:

The cost of production of a nursery tree is around 35 cents. The sales price runs between 50 to 70 cents per unit, depending upon whether it is a bare-root or potted plant. Prices vary greatly among the nearly 1,000 existing nurseries.

The cost of establishing a new plantation now amounts to \$300 - 400 per hectare, with nursery trees being the largest single expense. Price of land has increased greatly in the last 5 years within the major citrus areas, a bare hectare nowadays costing about \$300 - 1,000.

Estimated cost for the cultivation of 1 hectare of an orchard is about \$100 - 200 per year, including all operations and materials.

The minimum wage for labor is presently equivalent to \$50 per month. Picking a box of oranges costs 8 - 10 cents. A laborer picks 25 to 40 boxes per day of 8 hours of work.

A ton of ammonium sulfate costs around \$70 and a ton of dolomitic lime about \$8.

Prices paid by the processing industry for 1 box of oranges this year ranged between \$1 - 2, with an estimated average of about \$1.40. The cost of processing a ton of oranges, packing and transportation of the concentrated juice to the port of Santos amounted to about \$135.

Fresh orange exports

Orange exports from Brazil have gone through various expansion and contraction phases during the years. Exports have increased since 1916 steadily to a peak of over 5 million boxes in 1938 and 1939 then declined to less than 1.5 million boxes in 1945. Most shipments were made to Argentina at this time because of the war. Since 1954, exports slowly recuperated as larger quantities of fruit became available in Sao Paulo and a new high of 4.7 million boxes was shipped in 1965. Exports have since declined to a new low level of 1 million boxes in 1970, - followed by a new increase in the volume shipped. In 1973 fresh orange exports are estimated to reach 2.7 million boxes, but, great increases are not expected in the near future.

Export varieties are mainly 'Hamlin', navels and late 'Pera' oranges. Tangerines and grapefruit are exported in very limited quantities. The export season runs from about March to October. Since 1962, all export fruit have been produced in Sao Paulo, as shown in Table 4. Customers for Brazilian oranges are now mainly European countries. Table 5 summarizes Brazilian exports of fresh citrus through Santos, the large port of the state of Sao Paulo, by country of destination for the last 5 years (1968-1972).

Processing

Brazilian citrus processing industries consisted for many years of small plants dedicated to the production of essential oil, citric acid, pectin and orange marmalade and jellies.

Processing for the production of frozen concentrated orange juice is a very recent achievement which began with the installation of a modern juice plant at Araraquara in 1963. Soon 2 more large plants were built, one at Bebedouro and another at Matao. Today, there are 10 citrus processing plants in Sao Paulo. Another large plant is scheduled to start operation in 1975 and several new plants are being planned in Sao Paulo and other states. Total processing capacity in 1973 is estimated at 60 million boxes or about 2.4 million tons. However, processing is expected to remain, this year, somewhere between 40 and 45 million boxes.

The processing plants, area of location and total processing capacity are listed in Table 6. Nearly all of the juice processed is exported since the local market is very limited. Brazilian exports of concentrated juice by country of destination from 1963 through 1972; exports by month from 1968 to 1972; and exports by exporter in the crop year of 1972 are presented in Tables 7, 8, and 9, respectively.

Various plants also produce dehydrated peel for export and others are planning to install the necessary equipment.

The processing season starts normally in May and extends to January. The main varieties of oranges used for processing are 'Hamlin', 'Pera', 'Natal' and 'Valencia'. 'Cravo' tangerine is used, in small quantities, in the beginning of the season. Grapefruit and 'Tahiti' lime are also processed in very limited amounts. 'Pera' orange accounts for about 75 percent of all citrus used for processing. Fruit and juice quality is very similar to that of Florida.

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Table 1.

Brazilian citrus industry: areas of bearing orchards, amount and value of the production of the 1969 crop per unit of the federation*.

State	Areas of bearing orchards (ha)	Estimated Production	
		Quantity (1 000 fruits)	Value ⁽¹⁾ (Cr\$ 1 000)
Rondonia	42	1 122	160
Acre	129	7 300	279
Amazonas	261	22 007	729
Roraima	25	2 500	250
Para	827	86 334	3 415
Amapa	36	4 736	217
Maranhao	1 227	219 844	5 517
Piaui	761	85 850	2 547
Ceara	1 898	171 728	9 393
Rio G. do Norte	480	16 282	662
Paraiba	1 136	137 292	5 088
Pernambuco	3 677	250 522	7 680
Alagoas	944	86 507	3 149
Sergipe	4 965	378 127	14 570
Bahia	5 066	372 345	15 000
Minas Gerais	19 834	1 687 818	31 401
Espirito Santo	4 129	189 774	3 994
Rio de Janeiro	17 488	1 195 632	38 701
Guanabara	7 344	734 400	14 688
Sao Paulo	82 996	6 305 544	139 517
Parana	6 731	756 961	11 683
Santa Catarina	2 694	354 442	5 217
Rio G. do Sul	16 585	1 099 000	23 270
Mato Grosso	1 157	86 005	1 624
Goiias	2 562	229 482	5 959
Distrito Federal	63	2 500	70
Brasil	183 057	14 484 057	344 780

*Source IBGE - Anuario Estatistico do Brasil, 1972.

(1) US\$ 1.00 correspond to Cr\$ 6.10

Table 2.

Commercial Citrus Varieties in the State of S. Paulo, Brazil

	<i>Field Trees</i>		<i>Nursery Trees</i>		
	<i>1960</i>	<i>1971</i>	<i>1961</i>	<i>1966</i>	<i>1970</i>
Citrus (total)	18 million	55 million	2.35 million	3.96 million	9.51 million
Oranges (total)	14.49 million 80.5 %	40.00 million 72.7%	1.87 million 80.31%	2.51 million 63.29%	6.69 million 70.03%
Pera	42.0%	28.0%	25.0%	13.5%	13.0%
Valencia	10.0	20.0	4.0	8.5	44.5
Natal	7.5	28.0	29.5	53.0	36.0
Hamlin	12.5	7.0	14.0	1.0	0.5
Baianinha	15.0	8.0	6.5	4.0	1.0
Bahia Navel	3.5	2.8	4.0	8.0	0.5
Barao	2.0	1.0	2.0	2.0	0.5
Piralima	7.5	5.0	2.0	6.5	3.0
Lima Verde	0.0	0.2	0	0	0.5
Others	----	----	3.0	3.5	0.5
Tangerines (total)	2.07 million 11.5%	10.00 million 18.2%	0.42 million 17.65%	1.06 million 26.55%	1.97 million 20.71%
Ponkan	17.0%	50.0%	62.5%	65.0%	43.0%
Cravo	78.0	28.5	17.0	19.0	10.5
Tankan	----	----	9.5	----	----
Willow leaf	5.0	6.0	7.0	7.5	6.5
Dancy	----	0.5	1.0	1.0	3.0
Murcott	0	15.0	0	6.5	37.0
Others	----	----	3.0	1.0	----
Limes and Lemons (total)	0.99 million 5.5%	4.00 million 7.3%	0.04 million 1.65%	0.40 million 10.02%	0.81 million 8.5%
Mexican	27.0%	22.0%	57.0%	28.5%	15.5%
Tahiti	27.0	55.0	15.0	47.5	75.0
Eureka	46.0	20.0	13.0	20.0	7.5
Others	----	3.0	15.0	4.0	2.0
Miscellaneous (total)	0.45 million 2.5%	1.00 million 1.8%	0.01 million 0.41%	0.006 million 0.14%	0.07 million 0.75%

Table 3.

Sao Paulo: orange trees, production, destination and prices, 1960 - 1973.

Year	Total number of trees (1000)	Nonbearing trees	Production (1000 boxes)	Exports fresh fruit (1000 boxes)	Processed (1000 boxes)	Sold to other States (1000 boxes)	Local consumption	Urban population State S. Paulo	Average consumption box/inhabitant	Selling price cruzeiro/box	Selling price dollar/box
1960	13 594		14 400	3 227	---	1 400	8 330	8 895	0.9	0.10	0.55
1961	16 026		18 726	3 256	---	1 900	11 690	9 326	1.2	0.12	0.46
1962	17 012		19 200	3 109	---	1 900	12 270	9 859	1.2	0.25	0.67
1963	17 912		21 600	4 143	2 120	2 100	11 080	10 429	1.1	0.41	0.74
1964	19 050		16 160	2 882	1 610	1 700	8 350	11 013	0.8	1.38	1.06
1965	19 815		23 936	4 738	2 530	2 300	11 980	11 633	1.0	1.30	0.69
1966	21 550		29 856	2 329	4 240	2 700	17 600	12 269	1.4	1.50	0.68
1967	23 433		34 400	2 657	4 290	2 600	21 410	12 945	1.6	1.70	0.64
1968	25 435		35 560	2 160	10 100	3 000	16 740	13 634	1.2	2.91	0.86
1969	32 830	6 700	34 830	1 691	8 200	2 900	18 560	14 337	1.3	6.00	1.48
1970	39 000	10 500	44 350	1 505	15 000	4 300	19 100	14 669	1.3	4.00	0.88
1971	44 000	13 200	46 000	1 962	25 000	4 000	10 440	14 982	0.7	5.30	1.01
1972	50 200	15 500	60 700	2 300	35 000	4 000	14 000	---	---	6.50	1.10
1973+	56 500	16 500	69 000	2 700	45 000	2 000	---	---	---	8.50	1.40

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+Estimated data.

Source: IEA - Secretaria da Agricultura, S. Paulo.

Table 4.

Brazilian fresh orange exports, by port of Shipment, 1955 - 1973.

Year	Sao Paulo (Port of Santos)	Rio de Janeiro
	1 000 boxes	1 000 boxes
1955	520	797
1956	918	315
1957	1 246	76
1958	2 000	144
1959	3 184	58
1960	3 227	40
1961	3 256	41
1962	3 109	
1963	4 143	
1964	2 882	
1965	4 738	
1966	2 329	
1967	2 657	
1968	2 160	
1969	1 691	
1970	1 055	
1971	1 962	
1972	2 300	
1973 ⁽¹⁾	2 700	

(1) Estimated

Source: IEA - Secretaria da Agricultura, Sao Paulo

Table 5.

Brazilian exports of fresh citrus, through the Port of Santos, by country of destination.

Destination	1968 boxes ⁽¹⁾	1969 boxes ⁽¹⁾	1970 boxes ⁽¹⁾	1971 boxes ⁽²⁾	% of total	1972 boxes ⁽²⁾	% of total
Netherlands	725 370	506 444	465 395	1 306 034	35	1 739 282	44
United Kingdom	449 250	436 653	390 345	885 998	24	988 052	25
West Germany	412 650	359 898	287 512	931 265	25	709 329	18
France	200 000	158 200	150 000	217 100	6	198 700	5
Finland	28 100	56 110	60 200	142 369	4	117 500	3
Canada	63 100	21 728	41 300	137 000	4	76 000	2
Sweden	61 569	46 825	25 875	3 750	0	34 566	1
Taiwan	102 250	24 331	21 950	14 307	0	20 000	1
Others	118 150	77 547	62 400	111 750	2	56 325	1
Total	2 160 439	1 690 936	1 504 977	3 749 573	100	3 939 754	100

(1) Standard boxes - Decree 56.659 of 6 August 1965.

(2) Standard boxes according Res. 45 - Concex

Table 6.

Processing citrus industries in the State of S. Paulo, Brazil - 1973.

Area	Industry	Total Processing Capacity (Number of boxes 40.8 kg)
Araraquara	Sucocitrico Cutrale S.A.	14,000,000
Matao	Citrosuco Paulista S.A.	14,000,000
Bebedouri	Citrobrasil S.A.	5,000,000
	Sanderson Brasil S.A.	9,000,000
	Multisuco	1,000,000
Barretos	Anglo-Universal	1,000,000
Limeira	Avante S.A. Produtos Alimenticios	5,000,000
	Citral S.A. Exp. Imp.	4,000,000
Araras	Sucorrico	4,000,000
Santo Antonio da Possee	Tropisuco	3,000,000

Table 7.

Brazilian exports of concentrated citrus juice by country of destination, 1963 - 1972

(metric ton - gross weight)

Destination	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
West Germany	1 862	611	3 725	4 792	3 801	5 004	10 957	20 103	29 629	36 290
Canada	3 023	606	864	3 452	585	5 108	4 613	4 374	9 151	12 509
Netherlands	--	--	63	874	1 963	2 584	4 385	4 209	9 607	13 914
United States	1 058	1 567	1 423	2 529	803	12 864	3 527	1 109	22 425	20 943
Sweden	--	--	57	246	160	572	850	1 129	2 544	6 746
Israel	--	--	--	589	398	--	684	2 115	491	1 303
England	--	2	51	362	525	223	514	623	1 330	887
Argentina	--	--	--	--	48	--	--	--	--	--
Den mark	--	--	100	256	139	496	302	256	677	777
Belgium	--	--	4	168	240	50	55	284	767	1 717
Norway	--	--	3	--	--	--	94	163	917	458
Finland	--	--	--	--	--	--	16	--	83	388
Spain	--	--	--	--	72	221	104	163	451	502
France	--	--	--	--	790	23	--	34	652	223
Austria	--	--	--	76	--	--	--	--	--	--
Italy	--	--	--	10	--	--	--	--	--	--
Gales	--	--	--	--	--	20	--	--	--	--
Peru	--	--	--	--	--	1	--	--	--	--
Portuguese Africa	--	--	--	--	--	--	--	668	214	--
Hong Kong	--	--	--	--	--	--	--	150	--	--
Japan	--	--	--	--	--	--	--	11	3	144
Scotland	--	--	--	--	--	--	--	4	--	--
South Africa	--	--	--	--	--	--	--	--	278	--
Total	5 943	2 786	6 290	13 354	9 524	27 166	26 101	35 395	79 219	96 801

Source: IEA - Secretaria da Agricultura, S. Paulo.

Table 8.

Brazilian exports of concentrated orange juice by month, 1968 - 1972.
(metric ton. - net weight)

Month	1968	1969	1970	1971	1972
January	1 347.1	2 047.9	422.1	3 563.4	6 485.9
February	705.6	393.7	2 606.5	2 940.4	3 584.8
March	889.1	1 124.8	492.3	5 190.6	4 240.3
April	289.7	412.3	108.2	2 156.4	4 032.8
May	164.0	553.1	613.1	2 981.4	3 200.4
June	1 806.9	1 214.4	1 618.4	1 854.7	4 399.3
July	2 822.9	2 921.1	2 769.3	10 460.4	7 949.9
August	2 796.3	2 034.7	2 758.2	5 465.6	9 134.1
September	1 819.1	2 305.0	2 443.8	9 783.6	9 855.7
October	4 229.1	5 039.3	5 346.9	10 439.3	12 102.0
November	7 434.1	3 463.3	8 014.9	5 545.4	16 855.5
December	1 575.8	2 581.7	4 096.3	13 047.1	9 280.5
Total	25 880.7	24 091.3	31 290.0	73 428.3	91 121.2

Source: IEA - Secretaria da Agricultura, S. Paulo

Table 9.

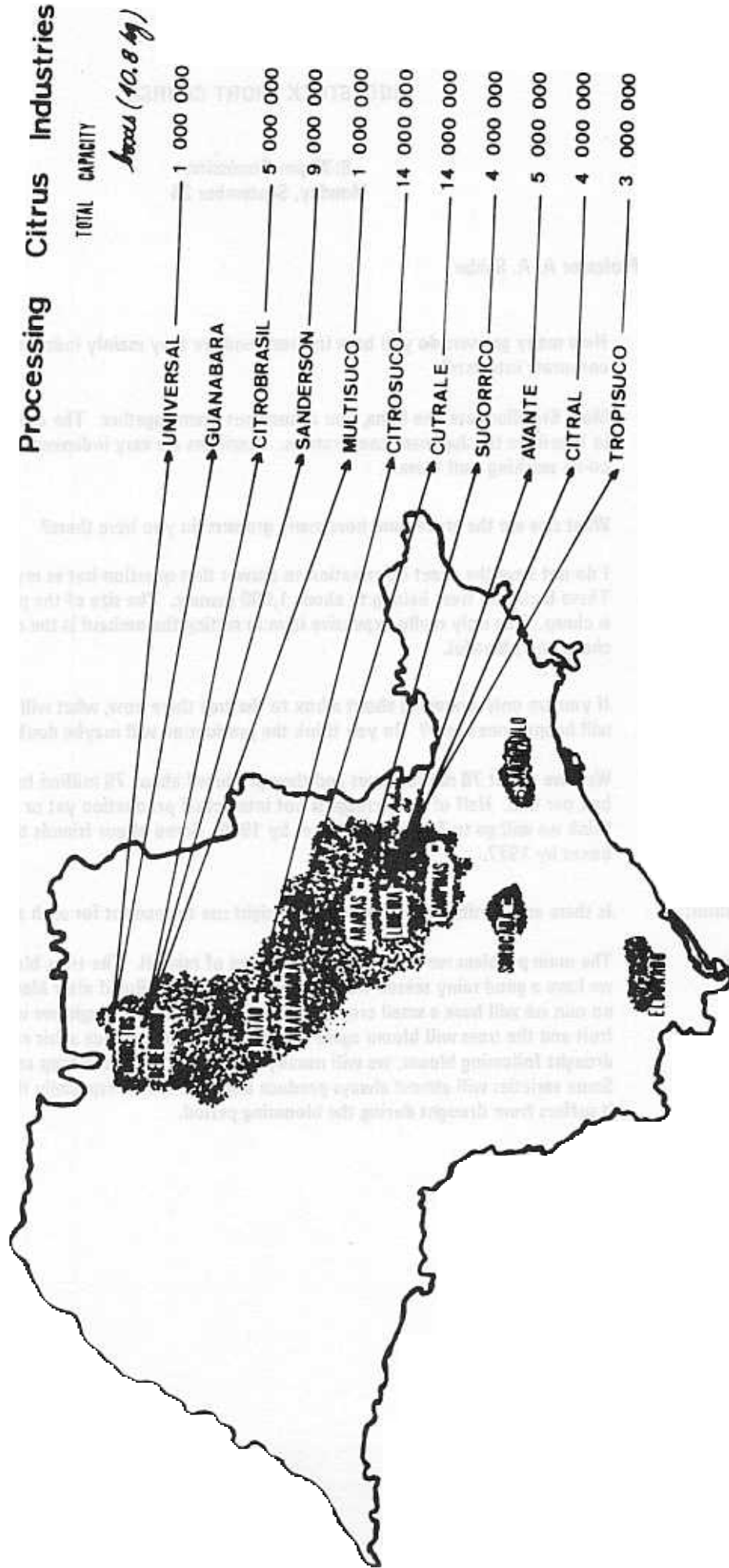
Brazilian exports of concentrated orange juice by exporter, the crop year 1972.

Exporter	Metric ton. (gross weight)
Sucocitrico Cutrale S/A.	44 517.4
Citrosuco Paulista S/A.	20 268.5
Avante S/A - Produtos Alim.	11 482.8
Citrobrasil S/A.	8 813.2
Sanderson Brasil S/A.	7 660.3
Citral S/A. - Exp. Imp.	3 271.7
Cia. Fomento Mercantil	775.3
Fischer S/A.	17.7
Total	96 806.9

AREAS OF CONCENTRATION CITRUS ORCHARDS IN BRAZIL - 1973



CITRUS AREAS STATE OF SÃO PAULO



ROOTSTOCK SHORT COURSE

8:30 pm Discussion
Monday, September 24

Questions for Professor A. A. Salibe

- question:** How many growers do you have in Brazil and are they mainly independent growers or are they large corporate interests?
- answer:** Most Brazilians are like lions, you cannot put them together. The only cooperatives which work well in Brazil are the Japanese cooperatives. Brazilians are very independent. It is very difficult to have a co-op working well there.
- question:** What size are the groves and how many growers do you have there?
- answer:** I do not have the exact information to answer that question but in my county we have 6 million trees. These 6 million trees belong to about 1,000 owners. The size of the plantings vary considerably. Land is cheap. The only really expensive item in setting the orchard is the cost of the nursery tree, as land is cheap and plentiful.
- question:** If you are only averaging about a box to the tree there now, what will you look for in the future? What will happen next year? Do you think the production will maybe double?
- answer:** We have about 70 million trees and they produced about 70 million boxes of citrus for an average of 1 box per tree. Half of this acreage is not into actual production yet or is just coming into production. I think we will go to 200 million boxes by 1980. Some of our friends think we will reach 200 million boxes by 1977.
- question:** Is there any particular reason that you might use to account for such a light crop this past season?
- answer:** The main problem we have is the distribution of rainfall. The trees bloom in August and if after bloom we have a good rainy season we will have a large crop. But if after bloom we have 15 days of heat with no rain we will have a small crop. If there is a prolonged drought we will lose all of the flowers and young fruit and the trees will bloom again at a later date and produce a fair crop. However, if we have a mild drought following bloom, we will usually lose about 1/3 of the crop and there will be no additional bloom. Some varieties will almost always produce a second bloom especially if it is on 'Rangpur' lime rootstock if it suffers from drought during the blooming period.