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**INTERNATIONAL AGRICULTURAL TRADE  
AND DEVELOPMENT CENTER**

**THE INTERRELATIONSHIPS AND COMPETITION IN  
THE WORLD ORANGE JUICE MARKET**

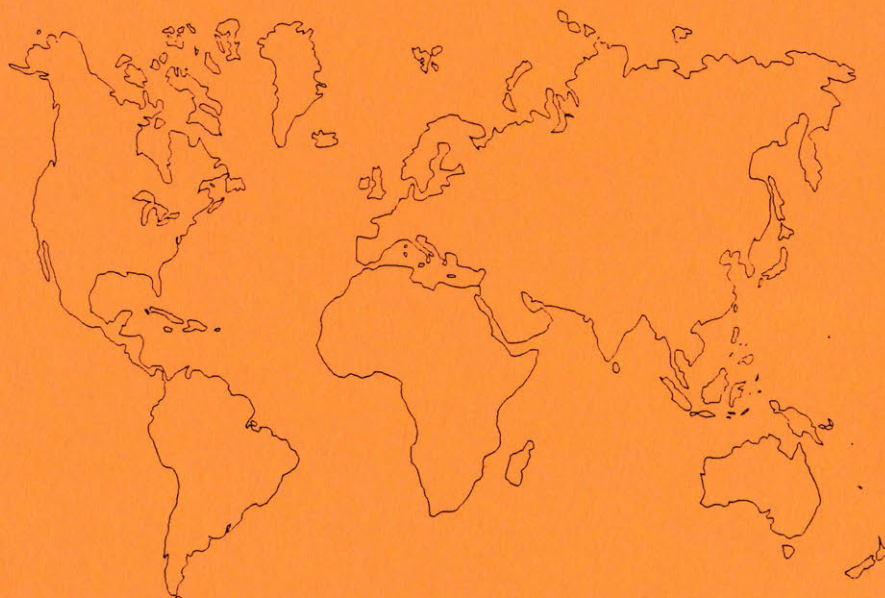
By

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**MISSION AND OBJECTIVE  
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4. Encouraging interaction between the University community and business and industry groups, state and federal agencies and policy makers, and other trade centers in the examination and discussion of agricultural trade policy questions.

## **Interrelationships and Competition in the World Orange Juice Market**

### **Abstract**

Sao Paulo state in Brazil and Florida account for approximately 80 percent of world orange juice production. In this paper, an overview of the citrus industry of Sao Paulo is presented. Comparative costs of production in the two regions are provided. Recent events in the two regions are discussed and analyzed.

Key words: orange juice, Brazil, competition, cost of production

# **The Interrelationships and Competition in the World Orange Juice Market**

Thomas H. Spreen and Ronald P. Muraro<sup>1</sup>

## **Introduction**

World orange juice consumption has grown rapidly over the past 20 years. While the United States is still the largest market for orange juice, markets in Europe and Asia have become increasingly important markets for orange juice. Economic reform in Eastern European countries has resulted in economic growth in those countries. As orange juice consumption occurs mainly in high income countries, the evolution of these economies is a positive sign for world orange juice demand.

Although world orange consumption has extended beyond North America and into the other developed economies of the world, orange juice production is dominated by two states: Sao Paulo, Brazil and Florida in the United States. Most of the expansion of world consumption has come as a direct result of major expansion in orange juice production in both of these regions. Together, Florida and Sao Paulo account for approximately 80 percent of world orange juice production. As production in these two states may continue to expand, their share of the world orange juice market may grow in the future.

The purpose of this paper is to review recent events in the world orange market and assess their implications for Florida orange growers. A comparison of the cost of production in Florida and Sao Paulo is presented. Recent fluctuations in world orange juice prices are discussed. Lastly, a

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quantitative forecast of world orange juice production and on-tree prices for processed oranges is given.

### **The World Orange Juice Market**

The freezes that struck Florida in the decade of the 1980's resulted in a prolonged period of high prices for citrus including oranges used for processing. These high prices stimulated new plantings of orange trees in both Sao Paulo and Florida. The rapid expansion in the orange tree inventory in both locations has led to increased production of orange juice. Orange juice production in Florida and Sao Paulo over the period from the 1980-81 season through the 1996-97 season is shown in Table 1.

Orange juice production in Florida peaked in the 1979-80 season at 1185 million SSE gallons. Freezing weather reduced orange production in Florida so that by the 1989-90 season, orange juice production was less than one-half that produced 10 years earlier. Since that time, however, orange production in Florida has more than doubled. Estimated orange juice production in the 1996-97 season was 1350 million SSE gallons. It is likely that the level will be eclipsed in the near future.

After expanding rapidly in the 1980's, orange juice production in Brazil has stabilized in the 1990's. Over the past four seasons, orange juice production has fluctuated between 1483 million and 1546 million SSE gallons. As orange production in Florida recovered, the Brazilian industry lost market share in the lucrative North American market and has turned its focus towards markets in Europe and Asia.

Reliable data on orange juice consumption is available only for the United States and Canada. Based upon Brazilian export data to Europe and Asia, one can make a rough estimate of orange juice consumption across various markets. In the 1995-96 season, estimated orange juice consumption

in the United States was 1311 million SSE gallons, which was nearly 50 percent of total world consumption. European countries, including both European Union and non-European Union members, consumed more than 1000 million SSE gallons. Other markets include Canada, Japan, and Korea.

The composition of the destination of Brazilian orange juice exports has changed significantly in recent years. Data on destination of Brazilian orange juice exports is shown in Table 2. In the 1980's, the United States was the most important destination for Brazilian orange juice. By the 1995-96 season, Europe was the largest market for Brazilian juice. Exports to the United States had dropped to less than 200 million SSE gallons and exports to Canada had declined to near zero. It is likely that this trend will continue, although U.S. imports of Brazilian orange juice will likely never reach zero. Juice from Brazil (or Mexico) will be imported for blending purposes.

### **The Citrus Industry in Brazil**

According to the Foreign Agricultural Service (FAS) of the United States Department of Agriculture, the vast majority of Brazil's citrus industry is found in the state of Sao Paulo. In a recent report, FAS reported that an estimated 180 million of the 216 million bearing orange trees in Brazil are located in Sao Paulo. Most oranges produced outside Sao Paulo are consumed in the fresh domestic market. Approximately 75 percent of the oranges produced in Sao Paulo are processed. Sao Paulo and Florida have the highest processed utilization rates of any citrus production regions in the world<sup>2</sup>. Citrus production is dispersed throughout the northern half of Sao Paulo. Surprisingly,

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<sup>2</sup>The exception to this statement may be the Central American producing countries of Belize and Costa Rico. Little information is available regarding fresh versus processed utilization in those countries.

citrus is not the major crop in the state with sugarcane occupying a much larger land area than citrus. FAS estimates in the 1997-98 season, there were 1.82 million acres planted to oranges in Sao Paulo.

In Table 3, bearing orange trees, orange production, and processed utilization of oranges in Sao Paulo state over the 1965-66 through 1996-97 period are shown. Only 30 years ago, orange production in Sao Paulo was a minor crop, with an annual production level that was less than 40 million boxes. Most of this production was utilized in the domestic market. Beginning with the Florida freeze of 1976-77 and spurred by the freezes of 1981, 1982, 1983, and 1985, production expanded rapidly, exceeding 200 million boxes by the 1985-86 season and crossing 300 million boxes in the 1992-93 season. In 1996-97, FAS estimates that 353 million boxes of oranges were produced in Sao Paulo, of which 72 percent were processed. The FAS crop forecast for the 1997-98 season is 400 million boxes with 295 million boxes (74 percent) sent to processing.

The main orange varieties produced in Sao Paulo (Brazil) are shown in Table 4. Hamlin orange represents only 7 percent of the total oranges. Hamlins are an early season orange harvested between May and July. Pera Rio is the predominant orange variety accounting for 41 percent of the total production. Pera Rio, a mid-season orange, has multiple blooms and is primarily harvested between August and October. Natal and Valencia are the late season variety oranges and account for 26 percent and 23 percent, respectively. These two varieties are harvested between October and December. Approximately 3 percent of the orange production is from other varieties.

One of the most notable differences between the citrus industries of Florida and Sao Paulo is the structure of the processing sector. In Table 5, a list of processing companies operating in Sao Paulo is given, along with an estimate of each company's share of the total processing capacity in the state. The four largest companies account for 82 percent of the installed capacity in the state in 1996. In comparison, the four largest firms in Florida account for approximately 40 percent of installed



capacity<sup>3</sup>. Consequently, the market power exercised by the four large Brazilian processing companies is large compared to that in Florida.

Two of the large Brazilian processing companies, Cutrale and Citrusuco, are also large orange growers. Cutrale produced an estimated 25 percent of its processed needs in the 1995-96 season, and Citrusuco grew 23 percent of the fruit processed in its plants. The fifth largest processing company, Cambuhy, is a joint venture between Cambuhy Citrus and Montecitrus, a large grower confederation. Cargill has one large planting of citrus in the state of Minas Geras, which shares a border with Sao Paulo to the northeast. Dreyfus does not own any citrus groves.

Another notable difference between the orange industries of Florida and Sao Paulo is that a smaller proportion of the orange crop in Sao Paulo is processed compared to Florida. With processed utilization in Florida exceeding 90 percent, there is little opportunity for processors to expand processing within a season in response to world market conditions. In Brazil, processors influence the proportion of the crop processed through their pricing policy to growers and thereby can affect world prices through their procurement behavior.

### **Recent Developments in the Citrus Industry of Sao Paulo**

There have been several notable developments in the citrus industry in Sao Paulo. In this section, some of these developments are highlighted, and the possible implications for the Florida citrus industry are discussed.

For many years, processors in Sao Paulo procured oranges through what was known as the

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<sup>3</sup>This figure depends whether capacity is measured on the basis of evaporator capacity or number of installed extractors. The figure cited here is based upon installed extractors.

"master contract". Under the master contract, the season average price from the New York FCOJ futures market was used as the reference price. From this price, the U.S. FCOJ tariff, the Florida equalization tax, transportation to the United States, transportation to the port at Santos, processing costs, and harvesting costs were deducted giving the on-tree price per box. This price was not adjusted for juice yield, so that the prices paid across growers was relatively constant.

In 1994, the master contract was declared invalid by the courts in Sao Paulo. The response of the processors was to offer cash prices for fruit (dollars per box) delivered to the processing plant. Most processors sold off the trucks used to haul fruit and disbanded their harvesting crews. Thus growers had to recruit their own harvest labor and find trucks to haul fruit to the processing plant.

The result is that the control held by the processing plants over the harvest schedule was diminished. As nearly all fruit in Brazil is priced on a per box basis (not on pound solids), poorer coordination of the harvest likely adversely affected juice yields and has had a negative impact on the productive efficiency of the industry. It also spurred the move by large processing companies to become more involved in fruit production. By increasing the share of fruit processed from their own groves, they exert more control over a larger proportion of their processed utilization and diminish the quantity of fruit which "appears at the door" of the processing plant of unknown quality.

After seeing the rapid recovery of orange production in Florida, Brazilian processors realized that their imports to the United States would continue to diminish. It appears that in the 1995-96 season, they pursued a strategy of limiting total processed production and a greater focus on markets in Europe and Asia. The result was that a price of \$1500 per MT @ 65° Brix was maintained in Europe throughout most of the 1995-96 season<sup>4</sup>. In order to maintain this higher price, it was

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<sup>4</sup>This price is equivalent to a price of \$1.04 per pound solid. It included transportation to Europe but did not include the European tariff of 19 percent ad valorem.

necessary to limit processed utilization. This was accomplished by maintaining a price of \$1.50 per box for fruit delivered to the processing plant. Since harvest and hauling costs in Sao Paulo are approximately \$.80 per box, on-tree prices in Sao Paulo were approximately \$.70 per box in the 1995-96 season. It is important to note that some growers had signed long-term contracts before the season and received prices in excess of \$.70 per box on-tree.

The policy of maintaining high prices in Europe directly benefitted Florida growers in the 1995-96 season. High prices in Europe combined with sharply lower imports into the United States served to support higher orange prices in Florida. The result was that the average on-tree price in Florida in 1995-96 was \$4.55 per box for oranges used for processing.

The high price also served to encourage other orange juice producing countries, such as Mexico and Belize, to ship orange juice to Europe in significant quantities for the first time. More importantly, however, is the large processing margin enjoyed by Brazilian processors attracted new entrants to orange processing in Sao Paulo. Two new plants, Kiki and Sucoricco, were constructed and other companies expanded existing plants. Sucoricco is a grower cooperative who is the first Brazilian company to pay on a pound solids basis.

Consequently, as the 1996-97 season began, the Sao Paulo processors faced new entrants and large inventories of FCOJ from the previous season. The precise circumstances are not known, but by the fall of 1996, FCOJ prices in Europe were falling. The record crop forecasted for Florida released in October hastened the price decline. By December, 1996, the price of FCOJ in Europe was \$1000 per MT (approximately \$.70 per pound solid), a 33 percent price decline from the summer of 1996.

As the price war in Europe broke out, processors in Sao Paulo sought to expand processed production, thus they raised the price offered for fruit delivered to the processing plant. By the end

of the Sao Paulo season in December, spot prices for oranges ranged between \$2.50 and \$2.90 per box. This resulted in a larger proportion of the 1996-97 orange crop being processed compared to the 1995-96 season.

At this time, it is unclear what, if any, policy will be followed by the large Sao Paulo processors. All four companies now have a presence in Florida and may need time to resolve the difficulties of coordinating their Sao Paulo operations with those in Florida.

Another important development in Sao Paulo is the introduction of not-from-concentrate (NFC) orange juice into the domestic market. Nearly all orange consumption in Latin America is through the purchase of fresh oranges which are home-juiced and consumed as orange juice. Both Dannon and Nestle have formed alliances with processing companies to pack NFC product for the Brazilian product. This is a new product for the Brazilian consumer, but its acceptance would mark a major shift in citrus consumption in Latin America.

Citrus variegated chlorosis (CVC) is a viral disease that attacks primarily young citrus trees. It is devastating because those limbs infected with CVC produce fruit which is unmarketable. Sao Paulo is currently experiencing an outbreak of CVC which is most severe in the new production areas in the northern extreme of the state. Fundicitrus, the research organization of the Sao Paulo citrus industry, has conducted a survey of the extent of the outbreak. In 1996, the estimate was that 23 percent of the trees in Sao Paulo are infected with CVC. Control methods range from partial pruning to pushing trees.

Since CVC affects primarily young trees, its impact on current production is likely to be small. Several local sources estimated that CVC may reduce the 1997-98 crop by 10 percent. Its long-term impact, however, will be more profound because as newly planted trees are removed, the future productive capability of the Sao Paulo citrus is negatively impacted. Several observers suggested that

the combination of lower prices for oranges which have reduced both grove care and new plantings combined with the impact of CVC will result in a decrease of the growth rate of Sao Paulo citrus production and that a future decrease in production is possible.

## **Costs Associated with Producing and Marketing**

### **Bulk FCOJ from Sao Paulo, Brazil**

Capital Investment/Grove Establishment Costs. The capital costs for establishing an orange grove in Sao Paulo state is shown in Table 6. The planting density was 260 trees/hectare or 105 trees/acre. The 1996-97 cumulative four-year cost for planting and caring for a new citrus planting was \$2,594.62/hectare or \$1,050.45/acre. Land value was \$2,070.05/hectare or \$838.08/acre. Total establishment cost including land value was \$4,664.67/hectare or \$1,888.53/acre.

Cultural/Production Costs. The 1996-97 average orange yields and cultural costs for Sao Paulo state are presented in Table 7. The estimated average yield for the 1996-97 season in Sao Paulo was 592 boxes/hectare or 240 boxes/acre. This is almost a 25 percent increase over the 1993-94 season. The average pound solids yield was estimated to be 5.95/box.

The cultural/production costs are presented in four units of measures — cost per hectare; cost per acre; cost per box; and cost per pound solids. Cultural costs refers to the direct labor, fertilizer, chemicals, and machinery costs incurred in the production of the orange crop. Total cultural costs for the 1996-97 season was \$700.50/hectare or \$283.60/acre. This represents almost a 10 percent increase over the same costs reported in 1993-94. The cost per box and pound solids was \$1.183 and \$0.1989, respectively. However, due to the higher yields, the box and pound solids unit costs were over 11 percent less than 1993-94. A significant labor cost which employers in Brazil incur is a social tax (similar to U.S. Social Security and Medicare cost) which is almost equal to 89 percent

of the total wages paid. When machinery depreciation, social (labor) taxes, and interest expenses are added to the cultural costs, the total specified costs for growing oranges in Sao Paulo was \$857.68/hectare or \$347.24/acre. The total per box and pound solids was \$1.449 and \$0.2435, respectively.

Harvesting Costs. Average harvesting costs for oranges grown in Sao Paulo state are shown in Table 8. The 1996-97 picking and loading-on-transport costs ranged from a low of \$0.45/box to a high of \$0.65/box with an average cost of \$0.53/box. Transportation/hauling costs to the processing plant ranged from \$0.15/box to \$0.35/box with an average of \$0.256/box. The total harvesting cost averaged \$0.786/box with a range from \$0.60/box to \$1.00/box. The average harvesting cost per pound solids was \$0.1332.

Comparative F.O.B. Costs of Bulk FCOJ Delivered to a Florida Processor. A comparative summary of all the costs associated with the F.O.B. cost of bulk FCOJ delivered to a Florida juice processor from the two citrus producing states, Florida (U.S.A.) and Sao Paulo (Brazil), are presented in Table 9. The F.O.B. costs are presented on a cost per pound solids basis. There are five cost categories comprising the total F.O.B. cost. The cost categories are: 1) grower cost; 2) harvesting cost; 3) bulk FCOJ processing cost; 4) domestic costs; and 5) foreign costs. The grower costs consists of cultural costs, interest on operating (cultural) costs, and capital investment costs — i.e., interest on average capital investment. In addition to these cultural costs, land taxes and regulatory fees are included with Florida costs.

The total 1996-97 grower costs per pound solids were \$0.4681 and \$0.3514, respectively, for Florida and Sao Paulo. When the harvesting costs for Florida (\$0.2901/pound solids) and Sao Paulo (\$0.1332/pound solids) are added to the grower costs, the total delivered-in cost per pound solids was \$0.7582 and \$0.4846 for the two respective states.



The bulk processing costs for FCOJ shown in Table 7 are net of any by-products value received from processing oranges; i.e., any value received from dried citrus pulp/pellets, citrus pulp wash, and citrus essence oils. The 1996-97 net bulk FCOJ processing cost per pound solids was \$0.1834 and \$0.1491, respectively, for Florida and Sao Paulo.

The two remaining cost categories are domestic and foreign costs. Domestic costs for Sao Paulo consists of intra-country freight, insurance, bulk storage at harbor, and harbor charges. For Florida, the domestic cost represents the Florida Department of Citrus' grower advertisement/marketing assessment which was \$0.185/box in 1996-97. The domestic costs per pound solids for Florida and Sao Paulo were \$0.0282 and \$0.0289, respectively. The foreign cost category only applied to Sao Paulo. The cost items include insurance and freight costs to Florida, U.S. custom (tariff) taxes, U.S.D.A. inspection fees, and Florida's equalization tax (Florida Department of Citrus Assessment). The total foreign cost for Sao Paulo in 1996-97 was \$0.4438/pound solids. The total F.O.B. cost for bulk FCOJ delivered to a Florida processor in 1996-97 was estimated to be \$0.9698 and \$1.1064 per pound solids for Florida and Sao Paulo, respectively.

Comparative F.O.B. Costs of Bulk FCOJ Delivered to Europe. The comparative cost of delivering bulk FCOJ to Europe from Florida and Sao Paulo is presented in Table 10. The delivered-in and bulk processing are the same as shown in Table 9. However, for Florida an additional cost of \$0.0181 per pound solids must be added to domestic costs for transport to port and other harbor charges. There are no additional domestic costs for Sao Paulo. Florida exports FCOJ in drums rather than on a bulk tanker ship. The cost for shipping FCOJ in drums is about \$0.13 per pound solids or approximately \$0.06 per pound solids more than bulk tanker shipments from Sao Paulo. The total F.O.B. cost for bulk FCOJ delivered to a European port in 1996-97 was estimated to be \$1.1179 and

\$0.7334 per pound solids for Florida and Sao Paulo, respectively. These costs do not include the 16.5 percent European import ad valorem tax, harbor charges, European inspection fees and in-country transportation to a reprocessing facility.

## **The Long-Run Outlook for World**

### **Orange Juice Prices**

This author presented a long-run outlook for world orange juice prices at the FACTS Conference in 1996. A recent update of that forecast shows a similar price outlook over the next 15 years. The combination of increasing crops from Florida and large orange crops from Sao Paulo will result in a period of lower prices for both bulk FCOJ and prices paid to growers for oranges used for processing. The season average on-tree price for oranges in Florida in the 1996-97 season was approximately \$3.50 per box. As the industry enters the 1997-98 season, FAS has released a forecast of a 400 million box crop in Sao Paulo with projected orange juice production of nearly 1.7 billion SSE gallons, a ten percent increase over 1996-97. The Florida orange crop could well approach 240 million boxes in 1997-98, an increase of nearly 10 percent over 1996-97. If these production levels are realized, the prospect is for substantially lower prices for processed oranges in the upcoming season.

The intermediate-term outlook is that low prices for processed oranges will persist for the next several years. Early in the 21st century, however, prices should begin to recover as orange production stabilizes and world demand continues to expand. New markets in Eastern Europe, the countries of the former Soviet Union, Asia, and possibly Latin America offer hope of expanded world consumption of orange juice. In fact, the prospect of low prices would support expanded orange juice consumption in developing economies. The prospect of improved prices by 2005, however, is

contingent on a lack of new plantings in both Florida and Sao Paulo and no new supply region entering the world market.

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**Table 1. Orange juice production in Florida and Sao Paulo, 1980-81 through 1996-97 seasons.**

Season	Florida	Sao Paulo
	-----million SSE gallons-----	
1980-81	857	685
1981-82	643	839
1982-83	801	791
1983-84	593	865
1984-85	569	1092
1985-86	638	1198
1986-87	707	824
1987-88	831	961
1988-89	886	961
1989-90	542	1427
1990-91	841	1167
1991-92	811	1281
1992-93	1131	1532
1993-94	1057	1483
1994-95	1206	1546
1995-96	1213	1479
1996-97	1350	1546

Source: FCPA, USDA-FAS

**Table 2. Brazilian FCOJ exports by destination.**

	U.S.	Canada	Europe	Japan	Korea	Other	Total
Season	-----million SSE gallons-----						
1983-84	424.36	35.78	312.73			50.00	822.88
1984-85	704.94	58.25	148.67			48.79	960.73
1985-86	453.00	32.59	278.48			56.95	821.02
1986-87	564.55	39.54	395.53			98.39	1,098.13
1987-88	315.76	91.88	385.47			29.48	822.56
1988-89	390.16	64.95	344.52			63.25	862.86
1989-90	492.42	60.50	507.89			76.05	1,136.86
1990-91	354.29	70.60	559.26	59.33	34.73	23.30	1,101.56
1991-92	435.55	30.78	660.36	57.39	60.46	28.92	1,273.54
1992-93	416.29	35.95	846.10	72.70	44.23	40.27	1,455.61
1993-94	497.95	8.12	753.25	88.86	49.96	49.72	1,447.77
1994-95	302.63	2.30	892.27	134.13	66.72	50.04	1,448.06
1995-96	266.32	2.83	1,002.65	94.02	37.40	54.04	1,457.23

Source: SACEX



**Table 3. Bearing trees, production and utilization of oranges in Sao Paulo, 1965-66 through 1996-97 seasons.**

Season	Bearing Trees million	Oranges Produced million boxes	Oranges Utilized for FCOJ percent of total
1965-66	20	24	10
1970-71	29	44	34
1975-76	56	85	63
1980-81	66	170	81
1985-86	87	239	92
1986-87	90	220	77
1987-88	95	220	82
1988-89	99	210	83
1989-90	103	295	86
1990-91	109	242	83
1991-92	112	250	85
1992-93	128	314	87
1993-94	148	306	81
1994-95	154	311	79
1995-96	163	357	74
1996-97	173	353	72

Source: USDA-FAS.

**Table 4. Main orange varieties produced in Sao Paulo (Brazil).**

Variety	Percent of Total	Average Tree Density	Harvest Season
Hamlin	7	235/ha 95/ac	Early season (May - July)
Pera Rio	41	256/ha 104/ac	Mid-season (August - October)
Natal	26	242/ha 98/ac	Late season (October - December)
Valencia	23	255/ha 103/ac	Late season (October - December)
Other Varieties	3	271/ha 110/ac	—
Total	100	251/ha 102/ac	

SOURCE: ABECITRUS and Sao Paulo citrus industry interviews.

**Table 5. Processing capacity shares by company in Sao Paulo, Brazil, 1996.**

Company	% Share <sup>a</sup>
Citrosuco	27.7
Cutrale	24.9
Dreyfus	16.3
Cargill	13.1
Cambuhy	9.1
Citrovita	3.4
Bascitrus	2.3
Sucorico	1.6
Kiki	1.5

Source: Confidential

<sup>a</sup>Total does not add to 100 due to rounding error

**Table 6. Capital investment for an orange grove/planting in Sao Paulo, Brazil—1996-97, U.S. Dollars (U.S.\$).**

Tree Value Capital Costs/ Establishment Costs	US\$/ha <sup>a</sup>	US\$/ac
Year 1 <sup>b</sup>	\$1,052.19	\$425.99
Year 2	415.89	168.38
Year 3	568.27	230.07
Year 4	<u>558.27</u>	<u>226.02</u>
Total 4-Year Cumulative Tree Value Capital Costs	\$2,594.62	\$1,050.45
Land Value	<u>2,070.05</u>	<u>838.08</u>
Total Establishment Costs Including Land Value	<u>\$4,664.67</u>	<u>\$1,888.53</u>

<sup>a</sup>Hectare = 2.47 acres

<sup>b</sup>Year 1 includes the cost of land preparation as well as the tree and plating cost of 260 trees/hectare (105 trees/acre).

SOURCE: Dr. Antonio Ambrosio Amaro, Instituto de Economia Agricola (IEA), Sao Paulo (Brazil).

**Table 7. Estimated orange cultural/production costs in the state of Sao Paulo, Brazil — 1996-97, U.S. Dollars (U.S.\$).**

Item	US\$/ha <sup>a</sup>	US\$/ac	US\$/bx	US\$/p.s.
<u>Cultural/Production Costs</u>				
Labor	\$ 56.65	\$ 22.94	\$0.096	\$0.0161
Fertilizer & lime	251.62	101.87	0.425	0.0714
Chemicals & herbicide (Roundup)	243.12	98.43	0.411	0.0690
Machinery (operating costs)	<u>149.10</u>	<u>60.37</u>	<u>0.252</u>	<u>0.0423</u>
Total Cultural/Production Costs	\$700.50	\$283.60	\$1.183	\$0.1989
<u>Other Costs</u>				
Depreciation (machinery)	\$ 50.67	\$ 20.51	\$0.086	\$0.0144
Social taxes	50.47	20.43	0.085	0.0143
Interest/financial costs	<u>56.04</u>	<u>22.69</u>	<u>0.095</u>	<u>0.0159</u>
Total Other Costs	\$157.18	\$ 63.63	\$0.266	\$0.0446
Total All Specified Costs	<u>\$857.68</u>	<u>\$347.24</u>	<u>\$1.449</u>	<u>\$0.2435</u>
Boxes per hectare/acre (box = 40.8 kg or 90 lb)	592 bxs	240 bxs	—	—
Pound solids/box (p.s.)	—	—	—	5.95 p.s.
Trees per hectare/acre	260 trees	105 trees	—	—

<sup>a</sup>Hectare = 2.47 acres

SOURCE: Dr. Antonio Ambrosia Amaro, Instituto de Economia Agricola (IEA), Sao Paulo, Brazil.

**Table 8. Estimated orange harvesting costs per box in the state of Sao Paulo, Brazil — 1996-97, U.S. Dollars (U.S.\$).**

Item	US\$/bx <sup>a</sup>	US\$/bx <sup>a</sup>	US\$/bx <sup>a</sup>	US\$/p.s. <sup>b</sup>
	----- Range -----		Average	Average
Picking/collecting oranges from trees and loading oranges on transport truck/trailer	\$0.450	\$0.650	\$0.530	\$0.0898
Transport oranges to processing/juice factory	<u>0.150</u>	<u>0.350</u>	<u>0.256</u>	<u>0.0434</u>
<b>Total Harvesting Costs</b>	<b><u>\$0.600</u></b>	<b><u>\$1.000</u></b>	<b><u>\$0.786</u></b>	<b><u>\$0.1332</u></b>

<sup>a</sup>box = 40.8 kg or 90 lbs

<sup>b</sup>p.s. = pound solids

SOURCE: Sao Paulo citrus industry interviews by Ronald P. Muraro, CREC, University of Florida/IFAS, Lake Alfred.



**Table 9. Estimated F.O.B. costs of bulk FCOJ delivered to a Florida processor for Florida (U.S.A.) and Sao Paulo (Brazil), 1996-97 — U.S. Dollars (U.S.\$).**

	Florida	Sao Paulo
M. Tons/Hectare	38.3	24.2
Boxes/Hectare	938	592
Boxes/Acre	380	240
Pound Solids/Box	6.55	5.95
	-- \$ Per Pounds Solids --	
<b>GROWER COSTS:</b>		
Production/Cultural Costs and Labor/Social Taxes	\$0.2822	\$0.2295
Interest on Operating (Cultural) Costs	0.0125	0.0160
Florida Grower Taxes and Regulatory Fees	0.0241	—
Capital Investment Costs	<u>0.1493</u>	<u>0.1059</u>
Total Grower Costs	\$0.4681	\$0.3514
<b>HARVESTING/HAULING COST</b>	<u>0.2901</u>	<u>0.1332</u>
<b>TOTAL DELIVERED-IN COST</b>	\$0.7582	\$0.4846
<b>BULK PROCESSING COST MINUS BY-PRODUCTS VALUE</b>	\$0.1834	\$0.1491
<b>DOMESTIC COSTS</b>		
(Florida D.O.C. Tax//In-country BULK Transport to Santos Port, Storage, Harbor Charges)	\$0.0282 <sup>b</sup>	\$0.0289 <sup>a</sup>
<b>FOREIGN COSTS:</b>		
U.S.A. FCOJ Tariff	—	\$0.3150
Florida D.O.C. Equalization Tax <sup>b</sup>	—	0.0299
Ocean Freight and Insurance	—	0.0708
U.S.D.A. Inspection, Harbor Charges, In-Country BULK Transport from Port, and Other Costs	—	<u>0.0281</u>
Total Foreign Costs	—	\$0.4438
<b>TOTAL F.O.B. COSTS</b>	<u>\$0.9698</u>	<u>\$1.1064</u>

<sup>a</sup>The ICM and other export/social taxes which were previously reported with the "Domestic Costs" were eliminated by the Brazilian government.

<sup>b</sup>Represents Florida Department of Citrus grower advertisement/marketing assessment.

**SOURCE:** Ronald P. Muraro, CREC, University of Florida-IFAS, Lake Alfred and Dr. Antonio Ambrosio Amaro, Instituto de Economia Agricola (IEA), Sao Paulo and Sao Paulo citrus industry interviews.

**Table 10. Estimated F.O.B./F.O.T. costs of bulk FCOJ delivered to European market for Florida (U.S.A.) and Sao Paulo (Brazil), 1996-97 — U.S. Dollars (U.S.\$).**

	Florida to Europe	Sao Paulo to Europe
	-- \$ Per Pounds Solids --	
TOTAL DELIVERED-IN COST	0.7582	0.4846
BULK PROCESSING COST MINUS BY-PRODUCTS VALUE	0.1834	0.1491
DOMESTIC COSTS		
In-Country BULK Transport to Port, Storage, Harbor Charges	0.0181	0.0289
Florida D.O.C. Tax	<u>0.0282</u>	<u>—</u>
Total Domestic Costs	0.0463	0.0289
FOREIGN COSTS: <sup>a</sup>		
(Ocean Freight and Insurance to Europe)		
Drums from U.S.	0.1300	—
Bulk Tanker	<u>—</u>	<u>0.0708</u>
Total Foreign Costs	0.1300	0.0708
TOTAL F.O.B./F.O.T. COSTS	<u>1.1179</u>	<u>0.7334</u>

<sup>a</sup>Delivered to European port; does not include 16.5 percent European import ad valorem tax, harbor charges, European inspection fees and in-country transportation to reprocessing facility.

SOURCE: Ronald P. Muraro, CREC, University of Florida-IFAS, Lake Alfred and Dr. Antonio Amaro, Instituto de Economia Agricola (IEA), Sao Paulo (Brazil) and Sao Paulo citrus industry interviews.