

# LONG-RUN FLORIDA PROCESSED ORANGE OUTLOOK 1991-92 THROUGH 2000-01

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Over the next ten years, Florida's citrus industry is expected to reach record production levels. Florida orange production, which accounts for about 70% of total Florida citrus production, is expected to exceed 200 million boxes within the next three to four seasons and could range from 258 to 280 million boxes by 2000-01 (1). The expected production growth has significant implications for Florida's processed orange industry, which annually utilizes about 93% of the crop. Projected increases in Florida orange production come at a time when worldwide surpluses of orange production are forecast. The Food and Agriculture Organization (FAO) of the United Nations has projected that, by the end of this decade, world orange production will expand by more than 60% over mid 1980 levels. Concurrently, world demand for fresh and processed oranges is not expected to grow as fast as production, suggesting that prices could weaken considerably relative to mid 1980 levels. Although most of Florida's processed orange products are currently marketed in the U.S., Florida's processed orange industry is influenced by conditions in the international arena. The price of orange juice in the U.S. is directly impacted by Brazilian processors of frozen concentrated orange juice (FCOJ), who have a major impact on the price of orange juice in the world market. Brazil is the largest producer of oranges and orange juice in the world, and controls about 75% of the world's exports of FCOJ. Since Florida's citrus industry must import and compete with Brazilian FCOJ in order to satisfy domestic orange-juice requirements, Florida's orange-juice product prices parallel Brazil's FCOJ export price (figure 1). Florida's processed orange industry is also influenced by markets outside the U.S., even though Florida may be a relatively minor supplier to these markets. In a global setting, exchange rates, population and income growth worldwide, market access, and market development activities play an

## Abstract

Citrus production in Florida is continually growing, and namely the orange one, which accounts for 70% of the whole production. This is important for the processing industry which annually uses about 93% of the whole production. That is why, orange and orange juice imports from Brazil — that is the major world producer — are decreasing. Besides, Florida needs to enter new markets, to prevent surplus creation and price reduction, as the Usa demand, even if growing, is still lower than production.

## Résumé

La production des agrumes en Floride est en train d'augmenter et c'est surtout le cas des oranges, qui représentent 70% de la production. Une telle hausse est importante pour l'industrie de transformation, utilisant chaque année 93% de la production. En effet, les importations d'oranges et de jus d'orange du Brésil, qui reste toutefois le producteur mondial de pointe, continuent à diminuer. Il faut alors que la Floride trouve des nouveaux marchés, afin d'éviter la création d'excédents de la production et la baisse des prix, car, tout en augmentant, la demande des Etats Unis est toujours inférieure à la production.

important role in determining world demand and price levels for goods and services traded between countries. In this regard, orange juice is no different than other products that are bought and sold on the world market. Expanding «world» orange-juice demand will become an important priority during the next decade, if production prospects are realized. Marketers of orange juice may have to look beyond the U.S. market, because U.S. orange-juice consumption is relatively mature compared to other developed markets, such as Western Europe and Japan, and is not expected to grow as fast as the expected growth in supply. Even though the U.S. will remain the world's largest orange-juice market for the foreseeable future, expansion of demand in markets outside the U.S. will be needed in order to avoid surplus production and relatively low prices. There are several «market growth opportunities» that could help offset anticipated surpluses, leading to a more favourable price outlook. Japan, for example, represents a potentially large market opportunity for orange juice, as quotas for orange-juice products will be eliminated in April, 1992. Currently, per capita orange-juice consumption levels in Japan are exceedingly low relative to other developed countries. Eastern Europe and the USSR also represent «market growth opportunities», given the trend towards market-based economies and the virtual absence of orange-juice consumption in this region of the world. Although orange-juice consumption in Western Europe has expanded significantly in recent years, Western Europe still represents a potential growth market, since per capita consumption levels are less than one-half comparable U.S. levels. In the report

that follows, the outlook for Florida's processed orange industry is reviewed. Included are orange and orange-juice production projections for Florida and Brazil. Forecasts for orange-juice and grower prices are estimated based upon production projections and assumed demand parameters. Consumption levels for the world's major processed orange markets are also developed, and alternative demand scenarios are considered. Prior to presenting the outlook, a review of world orange production, utilization, processed orange consumption and world orange-juice trade is provided to facilitate a better understanding-of the outlook report.

## World orange production and processed utilization

Based on data compiled by the Food and Agriculture Organization (FAO) of the United Nations and the U.S. Department of Agriculture (USDA), world orange production was 1,139.0 million boxes (2) in 1988-89 (table 1). The largest orange producer in the world is Brazil, accounting for 346.6 million boxes or 30% of the world total in 1988-89. The U.S. is the second largest producer, with 202.6 million boxes or 18% of the world total in 1988-89. The next largest producer is China, with 80.1 million boxes or 7% of world production in 1988-89, followed by Mexico, Spain and Italy, each with about 50 million boxes and 5% of the world's total. FAO projections of orange production in the upcoming years indicate world production could grow to 1,521.2 million boxes by 1999-2000, 62.4% above the average annual production level during the 1984-86 period and 34% above the 1988-89 level (3). Brazil and the U.S.

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(1) Florida Citrus Production Trends, 1991-92 Through 2000-01, CIR 90-1, Economic Research Department, Florida Department of Citrus, October 24, 1990.

(2) In this report, a box refers to 90 pounds of oranges.

(3) «Longer Term Outlook for Citrus Fruit», Committee on Commodity Problems, Intergovernmental Group on Citrus, CCP:CI 89/3, Montevideo, Uruguay, September 11-15, 1989.

would continue to be the dominant producers, accounting for 23.2% and 21.1% of total world production, respectively. China would experience the greatest growth, with production in 1999-2000 reaching 188.6 million boxes, which would account for 12.4% of the projected total. Elsewhere, production in Mexico, Spain and Italy individually is expected to reach 60 to 70 million boxes by 1999-2000, each accounting for about 4 to 5% of the projected total. In 1988-89, 43% of the world orange crop, or 491.3 million boxes, was processed, according to USDA estimates (**table 2**).

The two largest processors were Brazil and the U.S., which together processed 418.3 million boxes or 85% of the oranges processed in the world in 1988-89 (**figure 2**). Brazil processed 261.9 million boxes or 76% of its crop in 1988-89, while the U.S. processed 156.4 million boxes or 77% of its crop in 1988-89.

As shown in **table 2**, other notable processors include Mexico, Spain, Italy, Morocco, Argentina, Israel, Cuba and Australia. Processed utilization rates in the latter countries, as well as the rest of the world, are

generally much lower than in the U.S. and Brazil. Production in the U.S. and Brazil involves specialization in producing oranges for processing; whereas, in the rest of the world, in general, most oranges are grown

**Table 1 World orange production, 1988-89.**

Country	Production million 90-lb. boxes	Percent of Total %
Brazil	346.6	30.4
U.S.	202.6	17.8
China	80.1	7.0
Mexico	55.6	4.9
Spain	54.4	4.8
Italy	53.2	4.7
Others	346.6	30.4
World	1,139.4 (*)	100.0

(\*) May not add up due to rounding.  
Source: «FAO Yearbook, Trade, 1988», FAO Statistics Series, Vol. 42, No. 91, Rome, Italy, 1990.

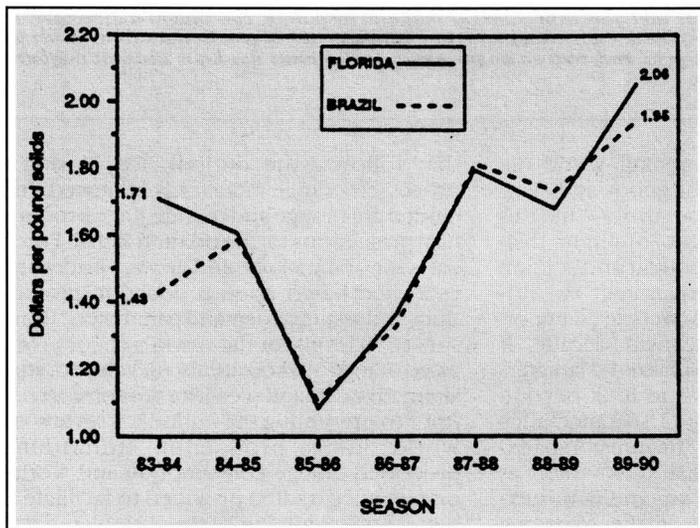


Figure 1 - Brazil and Florida bulk FCOJ prices.

**Table 2 World processed orange utilization, 1988-89.**

Country	Boxes Processed million	Percent Processed %	Percent of Total
Brazil	261.9	75.5	53.3
U.S.	156.4	77.2	31.8
Mexico	8.4	15.2	1.7
Spain	4.0	7.4	0.8
Italy	19.6	36.9	4.0
Marocco	7.1	29.1	1.5
Argentina	3.7	25.9	0.8
Israel	8.4	62.5	1.7
Cuba	3.1	24.0	0.6
Australia	7.6	59.5	1.6
China	—	—	—
Other	11.1	4.1	2.3
World	491.3	43.1	100.0 (*)

(\*) May not add up due to rounding.  
Source: «FAO Yearbook, Trade, 1988», FAO Statistics Series, Vol. 42, No. 91, Rome, Italy, 1990.

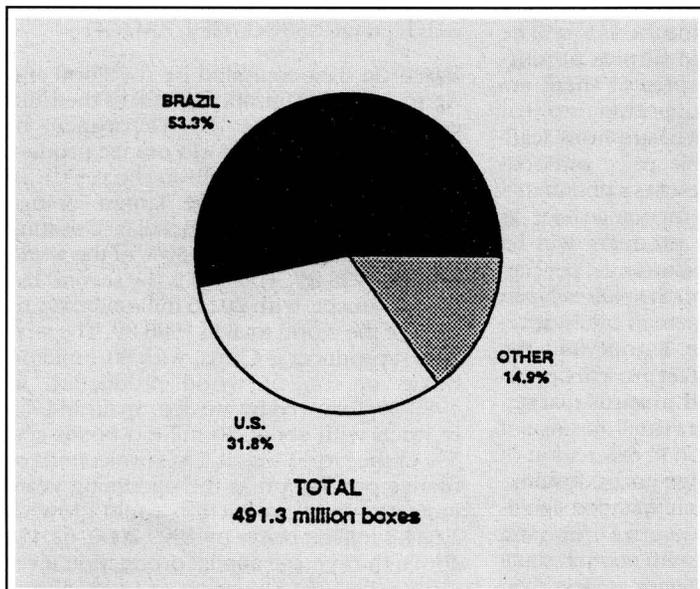


Figure 2 - World processed orange utilization 1988-89.

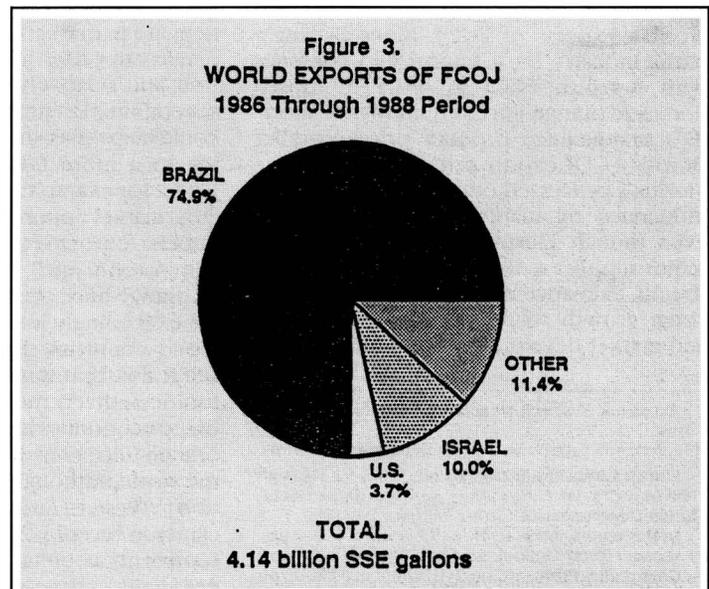


Figure 3 - World exports of FCOJ. 1986 through 1988 Period.

for the fresh market, with the level of processing depending on culled and excess fruit. As such, the U.S. and Brazil are expected to remain the dominant processors of oranges for the foreseeable future.

Florida is the major producer of oranges used in malting juice in the U.S.; while, in Brazil, the processed orange industry is primarily located in the state of Sao Paulo. At the beginning of the last decade, Florida was the largest producer of oranges and orange juice in the world, while Sao Paulo ranked second. The situation changed dramatically with several severe freezes in Florida during the 1980's and expansion in the Brazilian industry, resulting in Sao Paulo becoming the largest producer of oranges and orange juice in the world (**table 3**).

## World orange-juice consumption

Data measuring orange-juice consumption on a country-by-country basis are rather limited and typically must be constructed from production and trade data. The most comprehensive set of statistics is the processed orange consumption data published by FAO. According to FAO, annual world processed orange consumption (mostly orange juice) averaged 2.2 billion single-strength-equivalent (SSE) gallons, during the 1984-86 period (**table 4**). Virtually all of the consumption occurred in the developed markets of North America and Western Europe. The U.S. is by far the largest consuming single-country market, accounting for 55.7% of the world's total during the 1984-86 period. Other notable single-country markets were Germany, the United Kingdom, France and Canada, accounting for 6.6%, 6.5%, 4.7% and 3.8% of world consumption, respectively.

On a per capita basis, the U.S. is also the most mature market for orange-juice consumption. During the 1984-86 period, U.S. per capita consumption of orange juice averaged 5.2 SSE gallons. In contrast, per capita consumption in Western Europe and Canada averaged 1.6 SSE gallons and 3.2 SSE gallons, respectively.

Market that presently consume little orange juice relative to their population size and income level or potential income level include Japan and a number of Pacific Rim countries, as well as the USSR and Eastern Europe. Japan, South Korea, Taiwan, Singapore, Hong Kong, the USSR and Eastern Europe (Bulgaria, Czechoslovakia, East Germany, Hungary, Poland, Romania and Yugoslavia) have a combined population of about 630 million, roughly equal to the combined population of the U.S., the rest of Europe and Canada.

## World orange-juice trade

For the foreseeable future, Brazil and the U.S., mostly Florida, are expected to con-

**Table 3 Orange and orange-juice production, Florida and São Paulo, Brazil.**

Season	Orange Production		Orange-Juice Production	
	Florida	São Paulo	Florida	São Paulo (°)
	million 90-lb. boxes		million SSE gallons	
1979-80	212.7	155.0	1,185.3	605.8
1980-81	176.0	176.0	857.4	686.6
1981-82	129.0	180.0	643.6	838.5
1982-83	144.3	195.0	801.5	790.8
1983-84	119.6	200.0	593.3	864.7
1984-85	107.2	205.0	567.1	1,091.7
1985-86	122.2	239.0	639.2	1,218.5
1986-87	123.1	220.0	708.4	839.7
1987-88	141.6	220.0	828.6	988.7
1988-89	150.4	210.0	888.5	992.8
1989-90	111.6	295.0	542.9	1,392.6

(°) Includes a minor amount of production from Brazilian states outside of São Paulo.

Source: Florida Agricultural Statistics Service, *Citrus Summary 1988-89*; Agricultural Officer, São Paulo, Brazil; Florida Department of Citrus.

**Table 4 World processed orange consumption, annual average, 1984-86 period.**

Market Area/Country	Total Consumption	Per Capita Consumption
	million SSE gal. (°)	SSE gal. (°)
North America	1,331.6	5.0
U.S.	1,227.1	5.2
Canada	84.5	3.2
Western Europe	621.0	1.6
Germany	144.5	2.2
U.K.	143.7	2.6
France	102.9	1.9
Other	229.9	1.1
Eastern Europe and USSR	6.2	(°)
Japan	17.8	0.1
Other Developed Countries	72.0	1.3
Developing Countries	154.4	(°)
Total	2,203.0	0.5

(°) Assumes 6.0 SSE gallons per 90-lb. box.

(°) Less than .05 SSE gallons.

Source: Food and Agriculture Organization, «Longer Term Outlook for Citrus Fruit», Committee on Commodity Problems, Intergovernmental Group on Citrus, CCP:CI 89/3, Montevideo, Uruguay, September 11-15, 1989.

tinue being the major suppliers of orange juice to the aforementioned markets. At this time, Brazil is by far the largest supplier and exporter of orange juice in the world. According to the FAO, Brazil accounted for 74.9% of the world's exports of FCOJ during the 1986-88 period (°) (**figure 3**). Brazil's share of world trade is probably even higher, because FAO export data include re-exports from citrus-producing countries (e.g., Israel and the U.S.). Brazil's major markets are the U.S., Western Europe, and Canada. In 1989-90, the U.S. accounted for 40.4% of Brazil's FCOJ exports, Western Europe 46.0%, Canada 5.5%, and the rest of the world 8.2% (°).

Brazil is the dominant foreign supplier of orange juice to the U.S. market. During the last ten years, domestic production of orange juice has not been sufficient to satisfy U.S. consumption needs, causing increased reliance on imports. In 1988-89,

U.S. orange-juice imports accounted for almost 30% of U.S. orange-juice consumption (°). During the 1980's, Brazil has accounted for slightly more than 80% of U.S. orange-juice imports (**table 5**). Mexico has been the second leading foreign supplier, accounting for about 6% of U.S. orange-juice imports during the 1980's.

The citrus industry in Western Europe is oriented towards supplying the fresh market and consequently produces a relatively small amount of orange juice. Based upon FAO data, it is estimated that only about 10-20% of Western Europe's orange-juice

(°) FAO Yearbook, Trade, 1988», *FAO Statistics Series*, Vol. 42, No. 91, Rome, Italy, 1990.

(°) «Brazilian FCOJ Exports», Economic Research Department, Florida Department of Citrus, Economic Research Reports #BR-89-5 (August 18, 1989) through BR-90-8 (July 19, 1990).

(°) «Florida Citrus Outlook 1990-91 Season», *Working Paper Series*, Economic Research Department, Florida Department of Citrus, October 24, 1990.

consumption is supplied by domestic production, with the balance coming from imports. Most of the imported orange juice comes from Brazil, although measurable amounts also come from Israel and the U.S. According to Eurostat (7), Brazil accounted for 75.1% of the European Economic Community's FCOJ imports in 1989, while Israel and the U.S. accounted for 12.0% and 2.8%, respectively (table 6).

Citrus is not produced in Canada, and consequently this country must rely on imports to meet its orange-juice demand. Brazil is the major supplier of orange juice to Canada, followed by the U.S. According to Statistics Canada, Brazil accounted for 54.0% of Canada's orange-juice imports in 1989, while the U.S. accounted for 39.7% (table 7). The U.S. share declined during the 1980's as reduced Florida orange-juice supply limited exports.

Generally speaking, Brazil is also the leading supplier of orange juice in most of the other important, or potentially important, markets. In Japan, for example, Brazil accounted for 71.5% of orange-juice imports in 1988 (table 8). The U.S. is ranked second, accounting for 27.2% of 1988 Japanese orange-juice imports.

In addition, Brazilian processors recently entered an agreement with the USSR that would entail supplying orange juice to the potentially large Soviet market, which heretofore has had limited or no access to world orange-juice supplies.

### World orange-juice outlook

During the next ten years, the market outlook for orange juice will likely be charac-

(7) «Analytical tables of external trade-Nimexe, imports/agricultural products», Statistical Office of the European Communities, Commission of the European Communities.

**Table 5 U.S. orange-juice imports.**

Season	Brazil	Mexico	Other	Total (*)
million SSE gallons				
1979-80	100.1	2.4	0.2	102.7
1980-81	197.9	6.5	4.0	208.4
1981-82	352.2	17.6	4.3	374.1
1982-83	349.1	26.1	2.0	377.1
1983-84	511.9	28.9	9.1	549.9
1984-85	578.1	9.3	10.1	597.6
1985-86	500.5	32.1	13.7	546.4
1986-87	495.0	39.6	11.7	546.3
1987-88	354.4	53.1	8.2	415.8
1988-89	326.9	45.2	10.7	382.8

(\*) May not add up due to rounding.  
Source: U.S. Department of Commerce.

**Table 6 European Economic Community imports of frozen concentrated orange juice.**

Year	U.S.	Brazil	Israel	Other	Total
million SSE gallons (*)					
1988	14.8	369.5	53.4	40.0	477.7
1989	15.6	411.8	65.7	55.4	548.5

(\*) Converted to single-strength-equivalent gallons based upon assumptions developed by Florida Department of Citrus.  
Source: Eurostat.

terized by production and consumption growth, and relatively low prices. São Paulo, Brazil, and Florida are expected to continue being the dominant producers of oranges and orange juice.

The most important consuming markets will be the U.S. and Western Europe. However, during the next ten years Japan, other Pacific Rim countries, Eastern Europe, and the USSR represent potential growth markets that could absorb some of the expected supply growth.

In the analysis that follows, the outlook prospects of the world orange-juice market are assessed, and the implications for Flori-

da's orange industry are reviewed.

### Florida and São Paulo orange production and utilization projections

As shown in table 9, Florida orange production is projected to increase from 174 million boxes in 1991-92 to 258 million boxes in 2000-01, a 483% increase.

The projection is based on continuation and then decline of a relatively high planting rate observed in recent years.

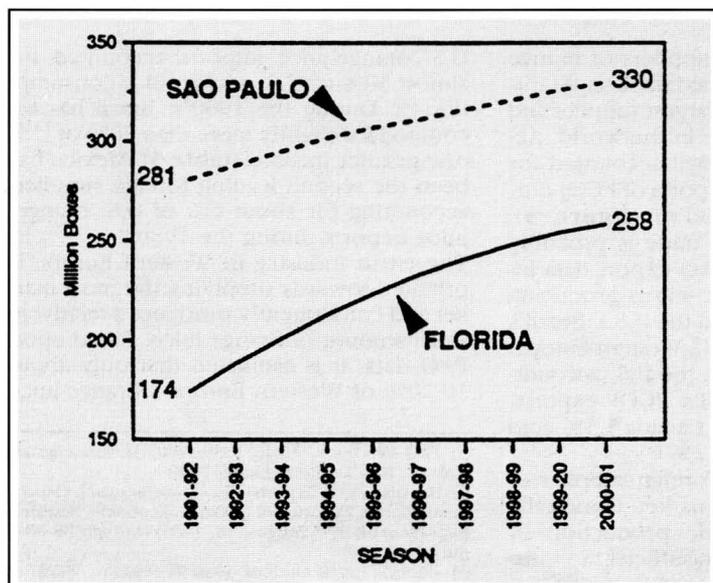


Figure 4 - Estimated Florida and Sao Paulo orange production.

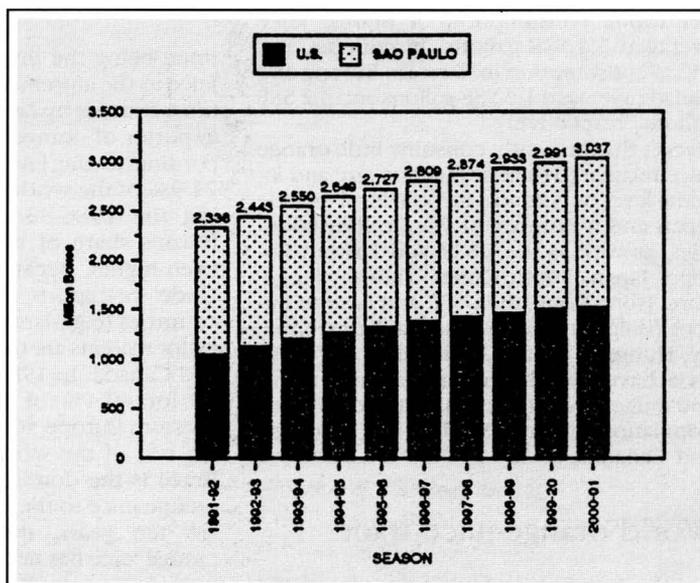


Figure 5 - Estimated U.S. and Sao Paulo orange-juice production.

**Table 7 Canadian orange-juice imports.**

Year	U.S.	Brazil	Other	Total (°)
million SSE gallons (°)				
1979	44.3	48.7	3.1	96.1
1980	52.7	45.5	1.7	99.8
1981	45.2	67.6	3.0	115.8
1982	35.6	64.9	2.8	103.3
1983	43.8	57.1	4.2	105.1
1984	42.2	66.1	1.5	109.7
1985	40.2	56.3	1.0	97.5
1986	43.0	65.1	1.8	109.9
1987	38.2	74.7	2.6	115.5
1988	53.0	51.7	10.2	114.9
1989	45.3	61.5	7.2	114.0

(°) May not add up due to rounding.

(°) Converted to a single-strength-equivalent basis based upon assumptions developed by the Florida Department of Citrus.

Source: Statistics Canada.

**Table 8 Japanese orange-juice imports.**

Year	U.S.	Brazil	Other	Total (°)
million SSE gallons (°)				
1980	0.7	2.7	0.5	3.9
1981	0.6	5.3	(°)	5.9
1982	0.6	7.0	(°)	7.6
1983	1.2	4.2	1.1	6.5
1984	1.1	3.4	0.9	5.3
1985	2.0	20.9	2.7	25.6
1986	1.7	20.0	0.2	21.8
1987	2.0	16.1	0.1	18.2
1988 (°)	4.4	11.2	(°)	15.6

(°) May not add up due to rounding.

(°) Converted to a single-strength-equivalent gallons based upon assumptions developed by the Florida Department of Citrus.

(°) Less than 50,000 SSE gallons.

(°) Through September.

Source: Statistics Canada.

crease from 2,336 million SSE gallons to 3,037 million SSE gallons, a 30% increase (figure 5).

## Florida FOB orange-juice and on-tree prices projections

Florida FOB orange-juice and on-tree processed orange price projections for the upcoming ten years were made based on the production projections in table 10 and demand estimates for the major orange-juice markets in the world—the U.S., Europe, Canada and the rest of the world (ROW). In this analysis, it is assumed that production outside Brazil and the U.S. is absorbed by the world market at the projected price levels. The price projections depend on sensitivity of demand to price and growth in demand over time (the increase in quantity demanded with prices constant), along with growth in Brazilian and U.S. supply. The projections in the present study are based on price elasticities of -1.1 at the retail level for the U.S., -.5 at the FOB Santos level for Europe and -.4 at the FOB Santos level for Canada and the ROW. The U.S. elasticity was estimated from retail scantrack data; the European elasticity was estimated from Brazilian price and shipment data; the elasticity for Canada and the ROW is based on research which suggests that sales in these markets are slightly less sensitive to price than in Europe (°).

Estimating future demand growth is difficult, and depends upon numerous factors. Factors affecting growth in demand include population and income growth, consumer trends, and efforts to expand sales and open up new markets through advertising and promotion. Based on the demand studies previously discussed, U.S. and Canadian orange-juice demand appears to be growing at about 1.5% per year, while demand in Europe and ROW appears to be growing faster at roughly 3% and 4%, respectively.

Assuming demand elasticities and growth rates are consistent with recent historical patterns, Florida FOB and on-tree real prices, in 1990-91 dollars, are projected to decline from 1.14/PS and 3.93/box in 1991-92 to 1.00/PS and 3.07/box in 2000-01, respectively (table 11). In the latter part of the projection period, the price increases because of a slowdown in the growth in supply relative to the growth in demand. It should be noted that the projections are average annual prices, and that actual prices could deviate from projected levels. Moreover, the price projections also assume that the tariff structure in the major orange-juice markets remains unchanged throughout the forecast period. Any change

(°) For example, see «A Monte Carlo Simulation Model of the World Orange Juice Market», dissertation by Emily McClain, Food and Resource Economics, University of Florida, 1989.

The high planting rate is related to recovery from the freezes and favourable orange prices and grower returns. As production expands, orange prices are expected to decline, as subsequently discussed, resulting in reduced grower returns and a slowdown in the planting rate (figure 4).

São Paulo orange production is projected to increase from 281 million boxes in 1991-92 to 330 million boxes in 2000-01, a 17.4% increase, based on FAO growth rates for Brazil 2.3% per year until 1994-95 and 1.5% thereafter, in line with previously stated expectations of declining orange prices as production expands.

The oranges projected to be produced in Florida and São Paulo are expected to be primarily utilized to produce orange juice, based on past utilization trends. The processed utilization rates in Florida and São Paulo have historically been high. In recent years, the processed utilization rate in Florida has been about 93%, while, in São Paulo, it has been about 84%. The processed utilization rates in both producing areas have been fairly stable over time. The estimated processed utilization levels in table 9 are based on the processed utilization rates in recent years.

## U.S. and São Paulo orange-juice production projections

Orange-juice production projections were made by multiplying the boxes of fruit projected to be processed in table 9 by juice yields per box 1.50 42° Brix gallons per box was assumed for Florida and 1.34 42° Brix gallons was assumed for São Paulo, based on recent yield levels. For Florida, orange-juice production is projected to increase from 988 million single-strength-equivalent (SSE) gallons in 1991-92 to 1,467 million SSE gallons in 2000-01, a 48.5% increase (table 10). In São Paulo, orange-juice production is projected to increase from 1,282 million SSE gallons in 1991-92 to 1,504 million SSE gallons in 2000-01, a 173% increase. In addition, California and Arizona are projected to produce 66 million SSE gallons annually, based on the expectation that their future orange production and utilization levels WUI be relatively stable at the averages observed in recent years from 1984-85 through 1989-90. Overall, during the 1991-92 through- 2000-01, projection period, orange-juice production in the U.S. and São Paulo is projected to in

in the tariff structure stemming from on going or future multilateral or bilateral trade agreements could substantially impact the price forecasts as well as the production and consumption projections.

Under the latter price scenario, the U.S., Western European, Canadian and ROW markets, individually, are projected to increase over the 1991-92 to 2000-01 period from 1,371 to 1,642 million SSE gallons, 732 to 1,071 million SSE gallons, 129 to 162 million SSE gallons, and 104 to 163 million SSE gallons, respectively (**table 12**). The Western European market is expected to have the greatest growth in absolute terms, with demand expanding by 339 million SSE gallons over the projection period, an increase of 46.3%. Growth in the U.S. market is projected to be 271 million SSE gallons, an increase of 19.8%; growth in Canada is projected to be 33 million SSE gallons, an increase of 25.6%; and growth in the ROW is projected to be 59 million SSE gallons, an increase of 56.7%.

## Outlook implications

The foregoing discussion has important implications and raises some questions with respect to trade, production and marketing issues.

With respect to trade, since U.S. orange-juice production is expected to increase at a faster rate than U.S. orange-juice consumption, U.S. imports of orange juice are projected to decline from 312 million SSE gallons, 22.8% of domestic sales, in 1991-92 to 100 million SSE gallons, 6.1% of domestic sales, in 2000-01 (**table 13**).

It is important to note that the projected decline in U.S. import requirements reflects declines in net imports (i.e., the difference between imports and exports), and not necessarily actual imports. It is entirely possible that Florida could become a more important supplier of orange juice to Japan, for example, during the next ten years, which would increase U.S. orange-juice import re-

quirements above projected levels.

The foregoing analysis also raises some questions regarding production prospects. Overall, during the next ten years orange-juice prices can be expected to be relatively low compared to prices observed during the 1980's. In fact the price projections appear to be lower than production costs for both Florida and Brazil, based on estimates reported in a recent Food and Resource Economics, Institute of Food and Agricultural Sciences publication (?).

As such, the projected orange-juice price levels may not only reduce tree plantings, as previously discussed, but may also reduce yields. The latter appears to apply, in particular, to Brazil.

The Agricultural Attache reports that, in response to the dramatic price decreases that have already occurred this season, growers are already reducing fertilizer purchases, suggesting yields may be lower than has been assumed<sup>(10)</sup>. As such, Brazil's orange-juice production projections may

**Table 9 Estimated orange production and utilization, Florida and São Paulo, Brazil.**

Season	Florida			São Paulo		
	Fresh (a)	Processed (a)	Total (b,c)	Fresh (d)	Processed (d)	Total (e)
	million 90-lb. boxes					
1991-92	13	161	174	44	237	281
1992-93	14	174	188	46	242	288
1993-94	15	186	201	47	248	295
1994-95	16	197	213	48	254	302
1995-96	17	206	223	49	258	307
1996-97	17	216	233	49	262	311
1997-98	18	223	241	50	266	316
1998-99	19	229	248	51	270	321
1999-2000	19	235	254	51	274	326
2000-01	19	239	258	52	278	330

(a) Assumes average fresh and processed utilization rates for 1985-86 through 1988-89, 7.5% and 92.5%, respectively.

(b) Includes Temples.

(c) Estimates are from «Florida Citrus Production Trends, 1991-92 Through 2000-01», October, 1990, Economic Research Department, Florida Department of Citrus; annual tree plantings for 1989-90 through 1990-91 were assumed to be the average tree-planting level per year observed over the 1987 through 1989 period; tree plantings for 1991-92 were assumed to be one-half the observed average; and tree plantings thereafter were assumed to be one-fourth the observed average.

(d) Assumes average fresh and processed utilization rates for 1985-86 through 1989-90, 15.8% and 84.2%, respectively.

(e) Based on projected growth rates in «Longer Term Outlook for Citrus Fruit, CCP:CI 89/3, July, 1989, Food and Agriculture Organization of the United Nations; 2.33% per year from 1990-91 to 1994-95 and 1.51% per year for 1995-96 through 2000-01.

**Table 10 Estimated U.S. and São Paulo orange-juice production, 1991-92 through 2000-01 seasons.**

Season	U.S.		São Paulo (e)	Total
	Florida (a)	Other U.S. (a)		
	million SSE gallons			
1991-92	988	66	1,282	2,336
1992-93	1,068	66	1,309	2,443
1993-94	1,142	66	1,342	2,550
1994-95	1,209	66	1,374	2,649
1995-96	1,265	66	1,396	2,727
1996-97	1,326	66	1,417	2,809
1997-98	1,369	66	1,439	2,874
1998-99	1,406	66	1,461	2,933
1999-2000	1,443	66	1,482	2,991
2000-01	1,467	66	1,504	3,037

(a) California and Arizona production is estimated at 66 million SSE gallons per season, based on production and utilization in recent years.

(b) Estimated processed utilization for Florida in Table 5 times 6.06 SSE gallons per box (1.50 42° Brix gallons per box).

(c) Estimated processed utilization São Paulo in Table 5 times 5.41 SSE gallons per box (1.34 42° Brix gallons per box, the average for 1985-86 through 1989-90). Includes a minor amount of production from Brazilian states outside São Paulo.

not be achievable, which could improve the price outlook considerably.

There are numerous market growth scenarios that could also improve the price outlook. It is possible that the assumed growth rates understate growth rates that might be expected, particularly in countries making up the ROW. Japan, for example, is likely to increase significantly its imports of orange juice following the April, 1992,

elimination of its orange-juice quota. Market observers believe Japanese orange-juice consumption could grow to nearly 300 million SSE gallons, or roughly 2.5 SSE gallons per capita, by the year 2000<sup>(11)</sup>. While these projections seem reasonable considering that projected Japanese per capita consumption levels would be less than half comparable U.S. levels, there are several factors that suggest a more cautious view be

taken. At the present time, annual Japanese consumption of all pure juice solids in juice and juice-drink products totals about 200 million SSE gallons, with orange juice accounting for about 50% of the total<sup>(12)</sup>. Given the size of the juice and juice-drink market, and product availability within the category, it does not seem likely that the aforementioned consumption prospects could be achieved without an extraordinary investment in market development and expansion activities. In the U.S., for example, it has taken decades of investment by the Florida citrus industry in market expansion activities to facilitate the attainment of current levels of orange-juice consumption. As such, expectations of market growth in Japan and elsewhere around the world should be tempered by expectations of investment in market development and expansion activities.

## Concluding comments

Florida and Brazil are expected to continue to be the dominant producers of oranges and orange juice in the world. With existing tree populations in Florida and Brazil at record levels and with tree age distributions dominated by young trees which will bear increasing amounts of fruit in the future, orange and orange-juice production can be expected to increase substantially in the upcoming years, even allowing for sharp declines in tree planting rates. Unless new markets are developed and/or existing markets are expanded more rapidly than in the recent past, orange-juice production is likely to grow faster than demand, resulting in further orange-juice price declines. In Brazil, lower prices may result in reduced grove care and lower yields, moderating the growth in orange-juice supply and the expected price declines. Growth in Florida orange-juice production will greatly reduce reliance on Brazilian imports.

Finally, U.S. orange-juice consumption is not expected to increase as fast as the growth in supply, which means growth in markets such as Western Europe, Japan, Eastern Europe and the USSR will be needed to avoid projected surpluses and relatively low prices. ●

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<sup>(9)</sup> R.P. Muraro and A.A. Amaro, «An Overview of Florida (USA) and Sao Paulo (Brazil) Processed Orange Industries with Comparative Costs and Returns, 1979-80 through 1987-88 Seasons», *Economic Information-Report 274*, Food and Resource Economics Department, Institute of Food and Agricultural Sciences, University of Florida, Gainesville, FL, June 1990.

<sup>(10)</sup> USDA/FAS, «Semi-Annual Citrus Report--Brazil», BROO37 and BROO38, São Paulo, Brazil, November 9, 1990.

<sup>(11)</sup> USDA/FAS, «Brazilian-Japanese FCOJ Joint Venture Likely to Get Off to Slow Start», JA9207, Tokyo, Japan, October 17, 1989.

<sup>(12)</sup> Japan's Ministry of Agriculture, Forestry and Fisheries.

**Table 11 Projected Florida FOB orange-juice and on-tree prices.**

Season	Real Prices <sup>(a)</sup>		Nominal Prices <sup>(b)</sup>	
	FOB	On-Tree	FOB	On-Tree
	£/PS	£/box	£/PS	£/box
1991-92	1.14	3.93	1.20	4.13
1992-93	1.09	3.62	1.20	3.99
1993-94	1.05	3.35	1.22	3.88
1994-95	1.01	3.16	1.23	3.88
1995-96	1.00	3.07	1.28	3.92
1996-97	0.98	2.98	1.31	3.99
1997-98	0.98	2.96	1.38	4.17
1998-99	0.98	2.98	1.45	4.40
1999-2000	0.99	3.00	1.54	4.65
2000-01	1.00	3.07	1.63	5.00

<sup>(a)</sup> In 1990 dollars.  
<sup>(b)</sup> Assumes annual inflation rate of 5%.

**Table 12 Projected orange-juice demand by region <sup>(a)</sup>.**

Season	U.S.	Western Europe	Canada	Rest of the World	Total <sup>(b)</sup>
Million SSE gallons					
1991-92	1,371	732	129	104	2,336
1992-93	1,414	782	135	111	2,443
1993-94	1,456	834	141	119	2,550
1994-95	1,493	883	146	127	2,649
1995-96	1,523	921	150	133	2,727
1996-97	1,553	962	154	140	2,809
1997-98	1,578	994	157	146	2,874
1998-99	1,601	1,022	159	152	2,933
1999-2000	1,623	1,050	161	157	2,991
2000-01	1,642	1,071	162	163	3,037

<sup>(a)</sup> Based on 1.5% per year demand growth in the U.S. and Canada, 3% per year demand growth in Europe, and 4% growth in the rest of the world.  
<sup>(b)</sup> May not add up due to rounding.

**Table 13 Estimated U.S. orange-juice import needs.**

Season	U.S. Domestic Orange-Juice Sales <sup>(a)</sup>	U.S. Orange-Juice Production <sup>(b)</sup>	U.S. Import Needs	
	million SSE gallons		% of sales	
1991-92	1,371	1,054	312	22.8
1992-93	1,414	1,134	274	19.4
1993-94	1,456	1,208	242	16.6
1994-95	1,493	1,275	212	14.2
1995-96	1,523	1,331	185	12.2
1996-97	1,553	1,392	154	9.9
1997-98	1,578	1,435	135	8.6
1998-99	1,601	1,472	121	7.6
1999-2000	1,623	1,509	105	6.5
2000-01	1,642	1,533	100	6.1

<sup>(a)</sup> U.S. demand in Table 12.  
<sup>(b)</sup> U.S. production in Table 10.