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# Economic Impact of Florida's Citrus Industry, 1999-2000[1]

Alan Hodges, Effie Philippakos, David Mulkey, Tom Spreen, and Ron Muraro[2]

## Introduction

The citrus industry in Florida has historically been an important sector of the state's agricultural economy. Citrus fruits, including oranges, grapefruit, tangelos, tangerines, limes, and other specialty fruits, are the state's largest agricultural commodity. Florida is the world's leading producing region for grapefruit, and is second only to Brazil in orange production. The state produces over 80 percent of the United States' supply of citrus. Citrus production in Florida has increased substantially over the past 10 years as a result of large replantings following the disastrous freezes during the mid-1980's. In the 1999-2000 season, a total of 298 million boxes of citrus fruit were produced in Florida from 97 million bearing citrus trees growing on 832,000 acres. The farm-level value of citrus fruit sold to packinghouses and processing plants amounted to $1.73 billion. Nearly 90 percent of Florida citrus is processed into canned, chilled, and frozen concentrate juices. Total industry output was $4.07 billion, including $3.58 billion in sales of citrus juice and processed citrus byproducts and $494 million in sales of fresh citrus fruit. About 93 percent of Florida citrus products, valued at $3.89 billion, were shipped to domestic and international markets outside the state. Income to the regional economy from export sales results in secondary economic impacts. These impacts were evaluated with *Implan*, an input-output modeling and social accounting system that was used to develop a regional economic model for the state of Florida. Total economic impacts associated with the citrus industry were estimated at $9.13 billion in industry output, $4.18 billion in value-added, and 89,700 jobs. This included an indirect impact of $2.13 billion in output attributed to purchases from other industry sectors and an induced impact of $2.93 billion resulting from consumer spending of earnings by industry employees.

## Structure of the Florida Citrus Industry

The economic structure of the Florida citrus industry is illustrated in Figure 1. Florida growers produce a variety of citrus fruits such as oranges, grapefruit, temples, tangerines, tangelos, limes, and lemons. The environment of Florida provides a comparative advantage for citrus production due to the subtropical climate and abundant water resources. Citrus is marketed either as fresh fruit or is processed

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2. Alan Hodges, coordinator of economic analysis; Effie Philippakos, research assistant; David Mulkey, professor; Tom Spreen, professor; and Ron Muraro, professor, Citrus Research and Education Center, Lake Alfred FL; Department of Food and Resource Economics; Florida Cooperative Extension Service, Institute of Food and Agricultural Sciences, University of Florida, Gainesville, FL.

into juice products. Fruit sold for the fresh market is hauled to packinghouses where it is graded and packed, then shipped to terminal points for distribution to retailers such as grocery stores. Culled fruit not meeting grade for the fresh market is sold to processors. Citrus produced for the processed market is transported to processing plants for juice extraction. Bulk juice is moved to concentrate plants for evaporation and freezing into frozen concentrate or to canning plants for retail packaging. Bulk frozen concentrate juice is sold to plants outside Florida for reconstituting and packaging. Florida processors also import orange juice concentrate from Brazil, Mexico, the Caribbean basin countries, and other citrus producing states in the United States. Retail packaged citrus juice products may be exported to distributors outside the state or sold to wholesalers in Florida and then to retailers for sale to consumers under a nationally advertised brand or private grocery chain label. As citrus products change form and move through market channels, value is added from labor, capital, and management. The industry is linked to input supply businesses that provide fertilizers, chemicals, grove care services, packaging materials, transportation, and labor for citrus production, and processing is provided by Florida residents.

## Florida Citrus Producing Regions

Citrus has been produced commercially in Florida since the mid-1800s. It is produced across the southern two-thirds of the Florida peninsula, where there is a low probability of damaging winter freeze events, from Putnam County in the north to Miami-Dade County in the south. The four major citrus producing regions are the East Coast, Lower Interior, Upper Interior, and West Coast Districts (Figure 2). In 1957 citrus production was centered in the Upper Interior District, with 40 percent of total citrus production, followed by the Lower Interior (30%), West Coast (17%), and the East Coast (12%). By 1999, the geographical distribution had shifted towards the Lower Interior District (61%), followed by the East Coast (24%), West Coast (8%), and the Upper Interior (6%). The southward migration of citrus production was a response to a series of freezes in the north central region of the state in the 1980s.

## Citrus Growers

The number of citrus producers in Florida has remained fairly stable over the past 14 years, increasing slightly (1%) between 1987 and 1992, then declining by six percent to 7,676 farms in 1997 (Census of Agriculture). While the number of citrus producers declined, bearing and non-bearing citrus acreage per farm increased from 90 to 125 acres between 1987 and 1997. Production capacity of citrus growers in Florida increased steadily between 1990 and 2000, reaching 832 thousand acres of bearing groves and 97 million bearing trees in 1999-00. Oranges accounted for 81 percent of the total population of citrus trees, followed by grapefruit (12%); tangerines (4%); tangelos (1%); and temples, limes, lemons, and K-early citrus (Table 1).

## Citrus Fruit Production and Value

Production of Florida citrus fruit increased 46 percent between 1990 and 2000, to 298 million boxes. Oranges and grapefruit were the top citrus commodities, representing 78 percent and 18 percent, respectively, of the total citrus boxes produced in the 1999-00 season (Table 2). One box of citrus fruit is equivalent to 90 pounds in the case for oranges, 85 pounds for grapefruit, and 95 pounds for tangerines. Production of oranges and tangerines has increased substantially during the last ten years. About 89 percent of all citrus was sold for juice processing while 11 percent was sold as fresh fruit. For the top two citrus varieties, 96 percent of oranges and 66 percent of grapefruit went to the processed market. The value of citrus fruit received by packinghouses and processing plants totaled $1.73 billion for the 1999-00 season, with oranges accounting for the largest share of value (78%), followed by grapefruit (18%), tangerines (2%), and tangelos and temples (Table 3). Approximately 83 percent of this value represented citrus sold for processing. Costs for harvesting and hauling fruit from groves to the packinghouse or processing plant averaged $1.84 per box and were consistent across all citrus varieties.

## Fresh Citrus Packinghouses

Fresh citrus fruit is sorted and packed for shipment at packinghouses. During the 1999-00

season, there were 108 citrus packinghouses in Florida, with 54 firms located in the East Coast District, 15 firms in the Upper Interior, 29 firms in the Lower Interior, and 10 firms in the West Coast District. A total of 116 million boxes of fresh fruit were packed, with the majority in the East Coast District (55%), followed by the Lower Interior (30%), Upper Interior (14%), and the West Coast District (1%). Grapefruit was the most important fresh citrus variety, representing 59 percent of all fresh fruit packed, followed by oranges (25%), tangerines (15%), and tangelos (2%). About three quarters of the packinghouse firms were located in the East Coast and Lower Interior Districts, which produce 95 percent of Florida's grapefruit. The packing cost for fresh fruit was $7.75 per box, reflecting an average mark-up in value of 89 percent above the value as received at the packinghouse door.

## Citrus Processing Plants

There were 52 citrus processing plants in the state of Florida that collectively processed 264 million boxes of fruit in 1999-2000. Citrus processors produce fruit juices, including frozen concentrate, chilled, and canned juices. Juice products shipped by Florida processors in 1999-00 were valued at $3.5 billion (Table 3). Orange juice, including juice made from tangerines and temples, was valued at $3.1 billion or 91 percent of the total, while grapefruit juice was valued at $326 million (9%). Chilled juices accounted for 58 percent of the value of all juice products, followed by frozen concentrated juice (40%), and canned juice (2%). Between 1990-91 and 1999-00, the real (inflation adjusted) value of orange and grapefruit juices increased 46 percent and 60 percent, respectively, due to the growth in frozen concentrate and chilled juice products.

Citrus processing plants also produce several important byproducts, including citrus pulp and meal; molasses; and the essential oil, d-limonene. Citrus pulp and meal and molasses are marketed as a cattle feed supplement. D-limonene is used for a variety of chemical products such as cleaners, disinfectants, flavorings, and fragrances. During the 1999-00 season Florida citrus processors produced 1,370,000 tons of citrus pulp and meal, 31,000 tons of molasses, and 35 thousand pounds of D-limonene. Collectively, these byproducts were valued at $123 million, with citrus pulp and meal accounting for $88 million, d-limonene for $33 million, and molasses for $2 million.

## Economic Impact Analysis

An export-based industry such as the Florida citrus industry impacts the regional economy three primary ways, which are referred to as direct, indirect, and induced effects (Miller and Blair, 1985). As direct effects, citrus growers, packinghouses, and processors generate output and value-added, and provide employment and wages to employees. As indirect effects, the industry supports other regional enterprises through inter-industry purchases of inputs to the production process. As induced effects, personal consumption expenditures by employees in both the citrus industry and complementary businesses further stimulate the local economy. The total economic impacts are the sum of the direct, indirect, and induced effects. Since exported goods introduce new money to Florida, commodity sales outside the state are associated with greater economic impacts than sales to Florida consumers. Also, inputs obtained from Florida firms, rather than imported from outside Florida, are associated with greater economic impacts because money is retained and circulated within the state.

The total economic impacts of the citrus industry in Florida were estimated with economic multipliers developed using the *IMPLAN PRO*™ (IMPLAN) software and associated databases for Florida licensed from Minnesota Implan Group (MIG, Inc.). The *IMPLAN* system enables construction of regional input-output models for any county, group of counties, or state in the United States based on a combination of county-level and national economic data. Industries are classified in 528 sectors, corresponding to the four-digit Standard Industrial Classification (SIC) System. Multipliers for each sector are available for the economic indicators of output, value-added, employment, employee compensation, labor income, other proprietary income, and indirect business taxes. In the IMPLAN system, citrus growers are classified under the fruits sector, which includes berry crops, grapes, and

deciduous tree fruits, in addition to citrus fruits. Citrus processors are classified with processors of frozen fruits and vegetables, frozen fruit juices and concentrates, and quick frozen and coldpack fruits and vegetables. The fruits sector of the Florida IMPLAN model was customized to reflect the specific characteristics of fresh citrus production based on operating budgets for Florida citrus growers (Muraro et al., 2000). Default information for the processing sector was not modified due to lack of data on operating expenditures.

The total value of output of fresh citrus fruit, citrus juice, and processed citrus by-products was $4.1 billion during the 1999-00 season (Table 4). The value of exports (sales outside Florida) of citrus products was $3.8 billion, including 97 percent of fresh citrus, 94 percent of citrus juice products, and 81 percent of citrus by-products. The value of citrus juice exports was calculated by deducting the estimated Florida consumption from the total value of output, and it was assumed that national per-capita consumption of citrus juices and prices for citrus juices applied in Florida. The proportion of d-limonene and molasses exported from Florida was assumed to be consistent with the proportion of citrus pulp and meal exported.

Total economic impacts of the state's citrus industry were estimated at $9.1 billion in output, 89,700 jobs, and $4.2 billion in value-added (Table 5). The total value-added includes wages earned by industry employees, income to business owners, and business taxes paid. This represents the net economic contribution by the industry to the state's economy. The total economic impacts of processed citrus juice and by-products included $8.0 billion worth of output, over 72,000 jobs, and $3.7 billion in value-added. Total economic impacts of fresh citrus fruit were $1.1 billion in output, over 17,000 jobs, and $509 million in value-added. Note that in order to avoid double-counting of impacts, estimates for the processed citrus sector represent the farm production activities of citrus fruit utilized for juice, while the impact estimates for the fresh fruit sector represent only the fruit sold for fresh consumption. Indirect impacts amounting to $2.13 billion in output accounted for the economic activity stimulated in other business sectors that furnish inputs to citrus production and processing and represented 23 to 30 percent of the total economic impacts. Induced impacts of $2.93 billion in output represented additional personal consumption expenditures resulting from employee earnings. The total economic impacts were over twice as great as the direct impacts of industry sales.

## Conclusion

This study demonstrates that the Florida citrus industry has a very large impact on the state's economy, estimated at $9.13 billion in output and $4.18 billion in value-added in the 1999-2000 season. The magnitude of total economic impacts was over twice as large as the direct impact of industry sales, as a result of the high proportion of total output that is shipped outside the state, which brings new money into the regional economy and stimulates additional economic activity. Industry production and value have increased significantly over the past ten years. The information used for this analysis was the most recent available and appears to have been a normal year for the industry, consistent with long-term trends. The economic impacts of the Florida citrus industry estimated in this study were significantly larger than indicated by previous studies (e.g., Benioudakis and Brown, 2000) due to continued growth in the industry and use of an updated regional economic model. The *Implan* multipliers used in this analysis more fully accounted for the indirect and induced effects than previous models, particularly the impact of personal consumption expenditures. Multipliers used for the fresh fruit sector were based on production expenses for Florida citrus fruit production. One limitation of this study is that information on expenditures by Florida citrus processors was unavailable, so the multipliers used for the processing sector reflected typical interindustry expenditures for fruit juice and frozen vegetable processing firms throughout the United States. To the degree that Florida citrus processing firms differ from national averages in the pattern of expenditures, the results of this analysis may vary.

## References

Benioudakis, Nikolaos and Mark Brown. "The economic impact of the Florida citrus industry on

Florida's economy." Staff Report 2000-1. Florida Department of Citrus, Gainesville, FL. May 2000.

Florida Agricultural Statistics Service (FASS). "Citrus Summary 1999-00." Tallahassee, Florida. January 2001.

Florida Agricultural Statistics Service (FASS). "Commercial Citrus Inventory 2000." Tallahassee, Florida. December 2000.

Florida Agricultural Statistics Service (FASS). "Farm Cash Receipts and Expenditures." Tallahassee, Florida. August 2000.

Florida Citrus Processors Association. "Statistical Summary 1999-00 Season." Winter Haven, Florida. 2000.

Florida Department of Agriculture and Consumer Services, Division of Fruit and Vegetables, Winter Haven, Florida.

Florida Department of Citrus. "Florida citrus: cultivating an industry." Lakeland, FL. www.floridajuice.com/floridacitrus/aninfo/news13.htm.

Florida Department of Citrus. "Florida fresh citrus shipments 1999-00 annual report." Economic and Market Research Department, Gainesville, FL. September 2000.

Miller, R.E. and P.D. Blair. *Input-Output Analysis: Foundations and Extensions.* Englewood Cliffs, NJ: Prentice-Hall Publishers. 1985. 464pp.

Minnesota Implan Group (MIG). Implan economic impact and social accounting software, and data for Florida. Stillwater, MN. 2001.

Muraro, Ronald P. and Max Still. "Budgeting cost and returns for Central Florida citrus production, 1999-00." Department of Food and Resource Economics Economic Information Report EI 00-6. University of Florida, Gainesville, FL. December 2000.

Muraro, Ronald P., John W. Hebb and Ed W. Stover. "Budgeting cost and returns for Indian River citrus production, 1999-00." Department of Food and Resource Econmics Economic Information Report EI 00-8. University of Florida, Gainesville, FL. December 2000.

Muraro, Ronald P., Fritz M. Roka, and Robert E. Rouse. "Budgeting cost and returns for southwest Florida citrus production, 1999-00." Department of Food and Resource Econmics Economic Information Report EI 00-7. University of Florida, Gainesville, FL. December 2000.

National Agricultural Statistics Service (NASS), United States Department of Agriculture. *Agricultural Prices*. Washington, DC. 2000.

United States Census Bureau. *1997 Census of Agriculture*, Volume 1, Geographic Area Series, Florida, AC-97-A-9. Washington, DC: United States Department of Agriculture. 2000.

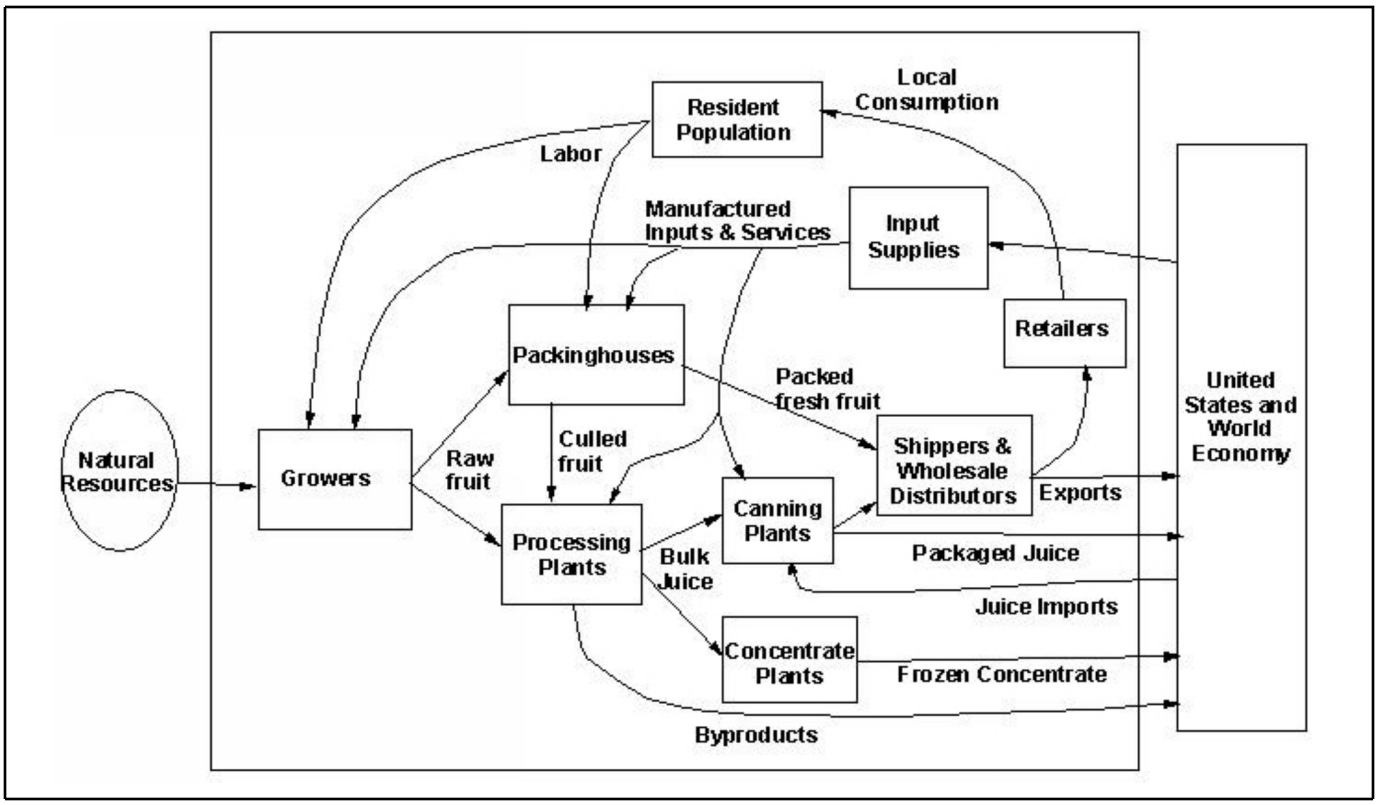


**Figure 1.** Economic structure of the Florida citrus industry.

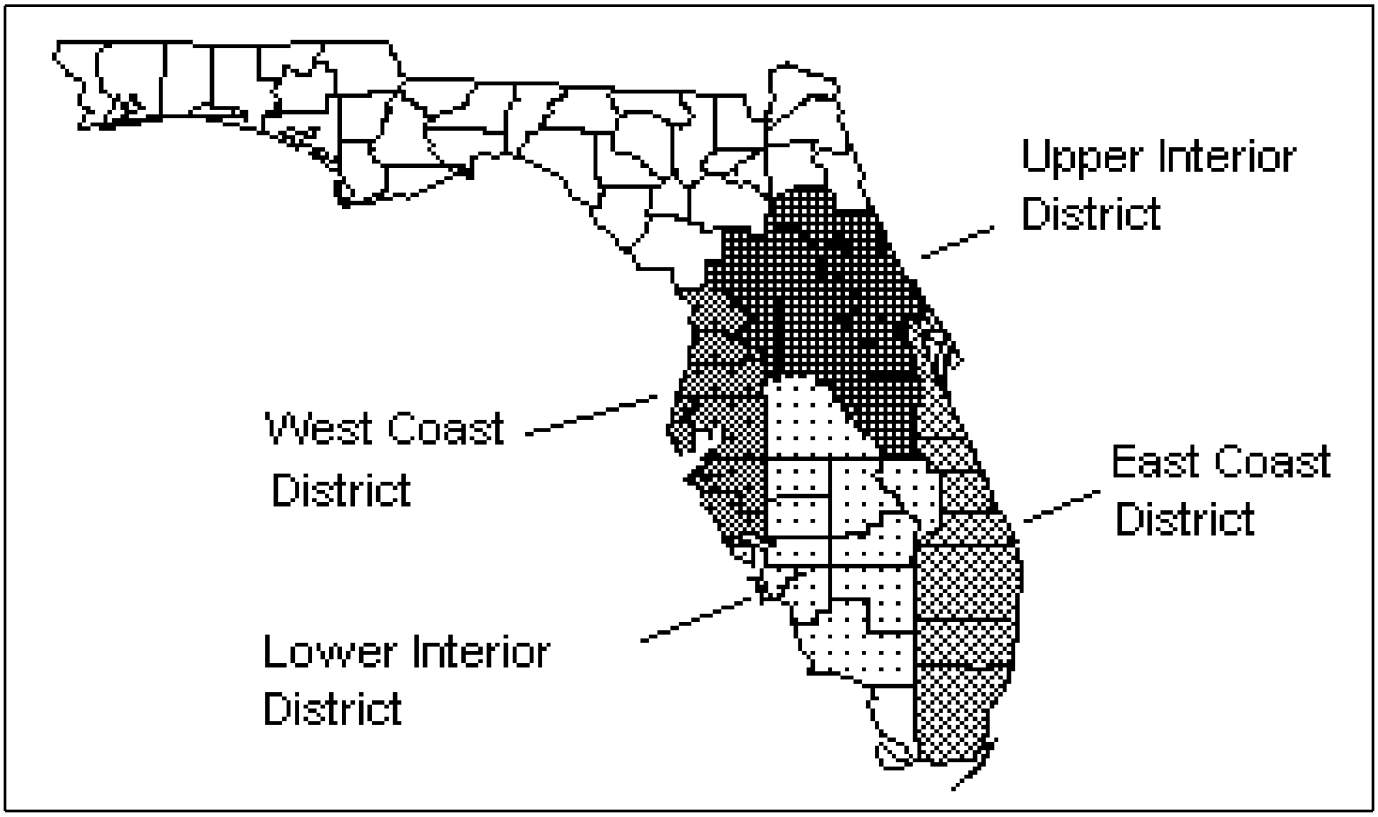


**Figure 2.** Florida's citrus producing regions.

**Table 1.** Bearing acreage and number of bearing citrus trees in Florida, by variety, 1999-00.

| **Variety** | **Acreage** (*1,000*) | **Trees** (*1,000*) |
|---|---|---|
| Oranges | 666 | 87,200 |
| Grapefruit | 118 | 12,669 |
| Tangerines | 28 | 4,195 |
| Tangelos | 12 | 1,422 |
| Temples | 6 | 687 |
| Limes, Lemons, K-early | 3 | 482 |
| Total, All Varieties | 832 | 97,381 |

Source: Florida Agricultural Statistics Service, Commercial Citrus Inventory, 2000.

**Table 2.** Production quantity and value of Florida citrus fruit, by variety, and market channel, 1999-00.

| **Variety** | **Quantity (1,000 Boxes)** | | **Value ($1,000)*** | |
|---|---|---|---|---|
| | *Fresh* | *Processed* | *Fresh* | *Processed* |
| Oranges | 9,395 | 223,605 | 71.6 | 1,236.5 |
| Grapefruit | 18,191 | 35,209 | 156.6 | 176.0 |
| Temples | 440 | 1,510 | 3.4 | 5.7 |
| Tangelos | 736 | 1,464 | 6.0 | 5.5 |
| Tangerines | 4,405 | 2,595 | 59.9 | 13.3 |
| Total | 33,167 | 264,383 | 297.6 | 1,437.1 |

Source: Florida Agricultural Statistics Service.
* Value calculated from packinghouse door price multiplied by production quantity for each variety and market channel.

**Table 3.** Value of processed Florida citrus juice and by-products, 1999-00.

| **Juice Products** | **Value** (*million dollars*) |
|---|---|
| Frozen concentrated juice | 1,384 |
| Chilled juice | 2,000 |
| Canned juice | 70 |
| Total juice products | 3,453 |
| **By-Products*** | **Value** (*million dollars*) |
| Citrus pulp and meal | 87.9 |
| D-Limonene | 33.1 |
| Molasses | 2.1 |
| Total by-products | 123.1 |

Source: Florida Citrus Mutal, Florida Citrus Processors Association.
* By-product values estimated from production quantitites multiplied by corresponding average annual prices reproted in *Feedstuffs* and *Chemical Market Reporter*.

**Table 4.** Value of Florida citrus industry's output and exports, 1999-00.

| **Product** | **Output** (*million dollars*) | **Exports** (*million dollars*) |
|---|---|---|
| Fresh citrus fruit | 493.6 | 476.6 |
| Processed citrus fruit and by-products | 3,575.7 | 3,332.7 |
| Total | 4,069.3 | 3,809.3 |

Source: Florida Department of Agriculture and Consumer Services, National Agricultural Statistics Service, Florida Department of Citrus, and Florida Citrus Mutal.

**Table 5.** Direct, indirect, and induced economic impacts of Florida's citrus industry, 1999-00.

| **Impact** | **Output** (*million dollars*) | **Value-Added** (*million dollars*) | **Employment** (*Jobs*) |
|---|---|---|---|
| Direct | 4,069.3 | 1,040.9 | 22,883 |
| Indirect | 2,130.7 | 1,209.3 | 26,885 |
| Induced | 2,932.8 | 1,927.5 | 40,010 |
| Total | 9,132.8 | 4,177.7 | 89,778 |