EFFECT OF GREENING ON THE ECONOMY OF CITRUS

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International Citrus and Beverage Conference
Clearwater Beach, FL
September 15-18, 2009
PRESENTATION AGENDA

( Economic Importance of Citrus

( Economic Impact of the Florida Citrus Industry, 2007-08
Rahmani & Hodges, EDIS #FE802, July 2009

( Estimating the Effect of HLB on the Long-Term Economy of Florida Citrus
THERE ARE OVER
5,000 CITRUS
GROVES IN
FLORIDA
1,000,000 BOXES ARE HARVESTED PER DAY DURING PEAK HARVEST
OVER 50 HARVESTING AND HAULING COMPANIES
OVER 40 FRESH FRUIT PACKINGHOUSES
14 PROCESSING FACILITIES RAN FRUIT DURING 2008-09
PROCESSING FRUIT ALONE REQUIRES HUNDREDS OF PEOPLE AT EACH OF THE LARGER PLANTS
PROCESSING FACILITIES ARE CAPITAL INTENSIVE REQUIRING STATE OF THE ART EXTRACTION, EVAPORATION, HANDLING & STORAGE FOR >1B GALLONS OF JUICE PER YEAR
THERE ARE 8 PACKAGING PLANTS CONNECTED TO FRUIT PROCESSORS
ECONOMIC IMPACTS OF THE FLORIDA CITRUS INDUSTRY IN 2007-08

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Institute of Food and Agricultural Sciences
Total citrus production acreage declined by 20% compared to 2003-04.

Total citrus production volume declined by 30% compared to 2003-04.

The total on-tree value of citrus fruit increased by 36% ($892M to $1,212M) due to higher citrus prices.
**Methodology**

- Used published data for the value of fresh citrus fruit, processed citrus juice and by-products in 2007-08 production season.

- **Data sources:**
  - The United States Department of Agriculture/ National Agricultural Statistics Service (USDA/ NASS);
  - The Florida Department of Citrus, and the Florida Agricultural Statistics Service (FASS);
  - The Florida Department of Citrus, Economic Market Research;
  - Citrus Research and Education Center, University of Florida (Citrus Budgets by Dr. Muraro);
  - Florida Citrus Processors Association;
  - Feedstuff’s Magazine;
  - Florida Distillers, Inc. and Peace River Citrus Products.

- Used IMPLAN Pro program to evaluate economic impacts.
Citrus production budgets were estimated “with and without” canker-greening cultural program.

Citrus production budget estimates included four types of citrus fruit in four regions of Florida.

Florida citrus production expenditure budgets were constructed under the assumption (based on the citrus industry expert opinion) that two-thirds of citrus growers follow the recommended citrus canker-greening cultural program and one-third do not follow the canker-greening program.

Production costs per acre for cultural program with canker-greening were higher by 7% to 16% based on citrus type and region.
The economy is driven by consumption or final demand, including exports, and local purchases.

Model constructed for a specific region.

Represents economic linkages between industries, households, and governments in terms of purchases and expenditures.
MARKET STRUCTURE & ECONOMIC IMPACT LINKAGES OF THE FLORIDA CITRUS INDUSTRY

Fruit growers (groves) → Harvesting & Transport Contractors → Fresh fruit packing-houses → Processing sector: canned & frozen juices, byproducts

Citrus Industry

Local and state government → Input and service suppliers → Wholesale and retail distribution

Rest of local economy

Rest of United States and world economy

Jobs: labor/wages → Personal and business taxes → Purchased inputs (indirect effects) → Local consumption and intermediate demand

Commodity exports

Imports (Leakages) → Goods and services (money flows)

Consumer household spending (induced effects)

Resident population employee households

Personal and service suppliers
Microcomputer system for I-O model construction and impact analysis.

Software licensed by MIG, Inc. since 1995 (www.implan.com)

Regional economic database for U.S. states and counties, updated annually, purchased separately.

Data includes Industry Output (440 industry sectors), Employment, Value Added, Labor Income, Property Income, Taxes, Final Demands, Transfer Payments, Commodity Trade, and Capital Investment.
<table>
<thead>
<tr>
<th>Economic Impact Measures Evaluated in This Study</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>OUTPUT:</strong> The dollar amount goods or services produced or sold by an industry.</td>
</tr>
<tr>
<td><strong>EMPLOYMENT:</strong> A measure of the number of jobs generated by an economic activity.</td>
</tr>
<tr>
<td><strong>VALUE ADDED:</strong> The total labor and property income generated (value added = industry output - industry purchases).</td>
</tr>
<tr>
<td><strong>LABOR INCOME:</strong> All wages and salary earnings plus proprietor’s income to business owners.</td>
</tr>
<tr>
<td><strong>OTHER PROPERTY INCOME:</strong> Rent, interest, dividends, royalties.</td>
</tr>
<tr>
<td><strong>INDIRECT BUSINESS TAXES:</strong> Local and state taxes such as property taxes, sales taxes, water management district levies, intangible taxes, vehicle taxes, and excise taxes.</td>
</tr>
</tbody>
</table>
MULTIPLIERS describe the response of the economy to a stimulus (a change in demand or production) in a given region and for a particular sector. Multipliers express the degree of interdependency between sectors in a region’s economy.

DIRECT EFFECTS: Changes in economic activity of industry or activity analyzed.

INDIRECT EFFECTS: Changes in inter-industry purchases (“supply chain”) as they respond to the new demands of directly affected industries.

INDUCED EFFECTS: Changes in spending by employee households as income increases (or decreases).

TOTAL EFFECTS: Are the sum of direct, indirect, and induced effects.
# Industry Purchases for Florida Citrus Fruit Production, by IMPLAN Sectors, 2007-08

<table>
<thead>
<tr>
<th>IMPLAN Sectors</th>
<th>Fresh Fruit</th>
<th>Processed Fruit</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Greenhouse &amp; Nursery Production</td>
<td>3.6</td>
<td>34.8</td>
<td>38.4</td>
</tr>
<tr>
<td>Agricultural Support Services</td>
<td>80.7</td>
<td>710.5</td>
<td>791.2</td>
</tr>
<tr>
<td>Petrochemical Manufacturing</td>
<td>6.1</td>
<td>42.3</td>
<td>48.4</td>
</tr>
<tr>
<td>Fertilizer mixing &amp; Manufacturing</td>
<td>17.9</td>
<td>205.5</td>
<td>223.5</td>
</tr>
<tr>
<td>Pesticides &amp; Agricultural Chemicals</td>
<td>19.7</td>
<td>168.6</td>
<td>188.3</td>
</tr>
<tr>
<td>Monetary Authorities &amp; Depository Credit Intermediaries</td>
<td>17.9</td>
<td>170.0</td>
<td>178.9</td>
</tr>
<tr>
<td>Other State &amp; Local Government Enterprises</td>
<td>10.0</td>
<td>73.7</td>
<td>83.7</td>
</tr>
<tr>
<td><strong>TOTAL INTERMEDIARY COMMODITY PURCHASES</strong></td>
<td><strong>155.9</strong></td>
<td><strong>1,405.4</strong></td>
<td><strong>1,561.4</strong></td>
</tr>
</tbody>
</table>
## VALUE OF FRESH FLORIDA CITRUS FRUIT AND PACKINGHOUSE MARGINS, 2007-08

<table>
<thead>
<tr>
<th>Citrus Type</th>
<th>Fresh Fruit</th>
<th>Fresh Shipments</th>
<th>Packinghouse Marketing Margins*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Early, Mids &amp; Naval Oranges</td>
<td>44</td>
<td>79</td>
<td>35</td>
</tr>
<tr>
<td>Valencia Oranges</td>
<td>21</td>
<td>38</td>
<td>18</td>
</tr>
<tr>
<td>White Seedless Grapefruit</td>
<td>23</td>
<td>40</td>
<td>17</td>
</tr>
<tr>
<td>Red Seedless Grapefruit</td>
<td>113</td>
<td>187</td>
<td>73</td>
</tr>
<tr>
<td>Tangelos</td>
<td>4</td>
<td>8</td>
<td>4</td>
</tr>
<tr>
<td>Tangerines &amp; Mandarins</td>
<td>48</td>
<td>86</td>
<td>38</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>253</strong></td>
<td><strong>438</strong></td>
<td><strong>185</strong></td>
</tr>
</tbody>
</table>

* Fresh shipment value (F.O.B.) minus cost of purchased fruit (Fresh value).
## VALUE OF FLORIDA FROZEN & CANNED CITRUS JUICE FOR LOCAL CONSUMPTION & EXPORT, 2007-08

<table>
<thead>
<tr>
<th>Products</th>
<th>Out-of-State Shipments</th>
<th>In-State Consumption</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frozen Orange Juice</td>
<td>972.4</td>
<td>57.5</td>
<td>1,029.9</td>
</tr>
<tr>
<td>Chilled &amp; Canned (bottled)</td>
<td>2,141.0</td>
<td>132.7</td>
<td>2,273.7</td>
</tr>
<tr>
<td>Orange Juice</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Frozen Grapefruit Juice</td>
<td>50.6</td>
<td>1.5</td>
<td>52.1</td>
</tr>
<tr>
<td>Chilled &amp; Canned (bottled)</td>
<td>87.8</td>
<td>4.3</td>
<td>92.1</td>
</tr>
<tr>
<td>Grapefruit Juice</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TOTAL FOR ALL CITRUS JUICE PRODUCTS</td>
<td>3,251.8</td>
<td>196.0</td>
<td>3,447.8</td>
</tr>
</tbody>
</table>
## Volume and Value of Florida Processed Citrus Byproducts, 2007-08

<table>
<thead>
<tr>
<th>Products</th>
<th>Production Volume</th>
<th>Unit</th>
<th>Price</th>
<th>Total Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Citrus Pulp &amp; Meal</td>
<td>722,895</td>
<td>Tons</td>
<td>$140.00</td>
<td>$101.2</td>
</tr>
<tr>
<td>Molasses</td>
<td>57,058</td>
<td>Tons</td>
<td>$125.00</td>
<td>$7.1</td>
</tr>
<tr>
<td>Citrus Oil</td>
<td>24,041,791</td>
<td>Pounds</td>
<td>$1.15</td>
<td>$27.7</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td></td>
<td></td>
<td></td>
<td><strong>$136.0</strong></td>
</tr>
<tr>
<td>Type of Effect</td>
<td>Output</td>
<td>Employment*</td>
<td>Value Added</td>
<td>Labor Income</td>
</tr>
<tr>
<td>---------------</td>
<td>---------</td>
<td>-------------</td>
<td>-------------</td>
<td>--------------</td>
</tr>
<tr>
<td></td>
<td>- Million $ -</td>
<td>- Jobs -</td>
<td>- Million $ -</td>
<td>- Million $ -</td>
</tr>
<tr>
<td>Direct</td>
<td>4,020</td>
<td>27,256</td>
<td>1,715</td>
<td>848</td>
</tr>
<tr>
<td>Indirect</td>
<td>1,372</td>
<td>16,967</td>
<td>776</td>
<td>543</td>
</tr>
<tr>
<td>Induces</td>
<td>4,020</td>
<td>31,436</td>
<td>2,128</td>
<td>1,376</td>
</tr>
<tr>
<td>TOTAL</td>
<td>8,906</td>
<td>75,828</td>
<td>4,619</td>
<td>2,767</td>
</tr>
</tbody>
</table>

* Employment impact represents full-time, part-time, and seasonal jobs
EMPLOYMENT IMPACTS OF THE FLORIDA CITRUS INDUSTRY, 2007-08

Employment impact represents full-time, part-time, and seasonal jobs.
VALUE ADDED IMPACTS OF THE FLORIDA CITRUS INDUSTRY, 2007-08

Million dollars

- Citrus juice processing and byproducts
- Citrus production for juice processing
- Citrus production for fresh consumption
- Fresh citrus marketing margins

Induced
Indirect
Direct
LABOR INCOME IMPACTS OF THE FLORIDA CITRUS INDUSTRY, 2007-08

Million dollars

- Citrus juice processing and byproducts
- Citrus production for juice processing
- Citrus production for fresh consumption
- Fresh citrus marketing margins

- Induced
- Indirect
- Direct
OUTPUT & VALUE-ADDED IMPACTS OF THE FLORIDA CITRUS INDUSTRY BY MAJOR INDUSTRY GROUP IN 2007-08

- Manufacturing: 746 million dollars
- Agriculture, forestry, fisheries & Hunting: 1,167 million dollars
- Wholesale trade: 548 million dollars
- Real estate and rental: 534 million dollars
- Government & non-classifies sectors: 428 million dollars
- Construction: 409 million dollars
- Finance and insurance: 363 million dollars
- Health and social services: 347 million dollars
- Professional, technical & scientific services: 343 million dollars
- Others*: 318 million dollars
- Retail trade: 312 million dollars
- Transportation and warehousing: 181 million dollars
- Accommodation and food services: 163 million dollars
- Information: 155 million dollars
- Management of companies: 137 million dollars
- Administration and waste services: 129 million dollars

*Mining, Utilities, Education, Art-entertainment & Recreation, and Other services
EMPLOYMENT IMPACTS OF THE FLORIDA CITRUS INDUSTRY BY MAJOR INDUSTRY GROUP IN 2007-08

- Agriculture, forestry, fisheries & Hunting: 30,568
- Manufacturing: 7,607
- Government & non-classifies sectors: 5,284
- Retail trade: 4,682
- Health and social services: 4,143
- Others*: 3,749
- Wholesale trade: 3,134
- Construction: 2,943
- Professional, technical & scientific services: 2,612
- Accommodation and food services: 2,602
- Administration and waste services: 1,987
- Finance and insurance: 1,897
- Real state and rental: 1,844
- Transportation and warehousing: 1,582
- Management of companies: 627
- Information: 566

*Mining, Utilities, Education, Art-entertainment & Recreation, and Other services
ESTIMATING THE EFFECT OF GREENING ON THE LONG-TERM ECONOMY OF FLORIDA CITRUS

( Lots of Unknowns
  • Spread of Greening and Tree Mortality
  • Viability of Processors and Packagers
  • Consumer Demand for the Output

( Changing Impacts
  • Technology/Productivity
  • Costs of Inputs (Labor, Fertilizer, Pesticides)

( Lots of Work to Do
  • Gather the Relevant Data/Assumptions
  • Estimate the Relationships
  • Calculate the Impacts
FLORIDA BEARING ORANGE TREES

SOURCE: Florida Agricultural Statistics Service.
PERCENT ANNUAL ORANGE TREE LOSS RATE

- 94-96: 1.2%
- 96-98: 1.9%
- 98-00: 2.3%
- 00-02: 3.8%
- 02-04: 4.3%
- 04-06: 9.3%
- 06-08: 7.7%
## Historical Grove Care Costs for Central Florida Processed Oranges

### 1982-83 to 2007-08 in 5-Season Intervals

<table>
<thead>
<tr>
<th>Five-Season Intervals</th>
<th>Total Costs</th>
<th>Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>1982-83</td>
<td>$548.46</td>
<td>42.8%</td>
</tr>
<tr>
<td>1987-88</td>
<td>$628.30</td>
<td>14.6%</td>
</tr>
<tr>
<td>1992-93</td>
<td>$778.71</td>
<td>23.9%</td>
</tr>
<tr>
<td>1997-98</td>
<td>$765.65</td>
<td>-1.7%</td>
</tr>
<tr>
<td>2002-03</td>
<td>$778.26</td>
<td>1.6%</td>
</tr>
<tr>
<td>2007-08</td>
<td>$1,752.81</td>
<td>125.2%</td>
</tr>
</tbody>
</table>

Source: R. Muraro, UF/IFAS, April 2009.
ALTERNATIVE FUTURE SCENARIOS

CROP DECLINES ARE INEVITABLE

( Declines are limited by new technologies and methods

( Scenario 1: Declining Economic Impacts

( Prices DO NOT increase due to declining production. Maintenance, Market, and Investments decline

( Scenario 2: Stable Economic Impacts

( Prices increase due to declining production. Market Demands Encourage Maintenance and Investments
FLORIDA ORANGE PRODUCTION & PRICE SCENARIO 1
ASSUMES 1.5% DECLINE IN DEMAND

Production

Price

Season

09-10 10-11 11-12 12-13 13-14 14-15 15-16 16-17 17-18 18-19

Million Boxes

$ Per PS

165
160
155
150
145
140
135
130
125
120
115
1.65
1.60
1.55
1.50
1.45
1.40
1.35
1.30
1.25
1.20
1.15

36
FLORIDA ORANGE PRODUCTION & PRICE SCENARIO 2
ASSUMES ANNUAL 1% & 2% GROWTH IN U.S. AND ROW DEMAND

Graph showing the relationship between production and price over seasons from 2009-10 to 2018-19.

- Production line shows a peak in 2011-12 and a decline thereafter.
- Price line shows an increase from 2009-10 to 2018-19, with a plateau in 2011-12.

The graph illustrates how production and price trend together over the seasons.
DECLINING IMPACT SCENARIO

- OJ Value Impacts
  - Less Production and Value
  - Factors of production decrease
    - Ag. Services
    - Chemical Inputs
    - Pesticides
    - Harvesting
    - Processing
    - ~$400MM decline in Direct OJ value

- Value-added impacts
  - Less Packaging
    - ~ $200MM decline in Direct OJ Value-add

- Implied Multipliers
  - ~$1.4B decrease in Total Economic Impact
SUMMARY

- Florida Citrus is a Complex, Vertically and Horizontally Integrated, Mature Industry

- Current Economic Impacts are $8.9B and 76,000 jobs

- Even under favorable recovery scenarios, Greening and Canker jeopardizes a significant amount of economic impact and jobs

- Markets and Consumer demands must be maintained to minimize negative economic impacts and encourage future maintenance and investments.

www.floridajuice.com