Economic Impact of Agriculture and Agribusiness in Miami-Dade County, Florida

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by

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ECONOMIC IMPACT OF AGRICULTURE UPON MIAMI-DADE COUNTY'S ECONOMY

Overview of Input/Output Analysis

The purpose of economic impact analysis is to help planners, analysts, and other interested parties estimate the total economic affect that a particular sector or industry has upon a region's economy as a whole, as well as how one given sector is linked to other individual sectors of the local economy. The agricultural sector of Miami-Dade County sells or "exports" the vast majority of its output to locations outside of the county. Unlike local sales, these exports create "new" dollars for the county, which in turn, stimulate additional local economic activity. Input-output analysis is an empirical technique used to estimate the total economic impacts from such outside revenues.

Revenues flowing into a local economy due to the sale of agricultural products outside the area have three types of economic impacts. A direct impact on the local economy occurs when "new" or "outside" dollars are transferred to local accounts. Indirect impacts occur as local agricultural producers, processors and marketing firms use these new dollars to make local purchases for operating inputs, repairs, labor, management, rents, etc. In addition to direct and indirect effects, these outside revenues also create induced impacts on the local economy. Induced effects represent the local spending activities of employees and entrepreneurs (as consumers) who have earned income from employment or endeavors related either directly or indirectly to the sale of locally produced agricultural commodities outside the region. The combined direct, indirect and induced impacts represent the total economic impact due to outside sales that an industry contributes to Miami-Dade County.

The chain of additional economic activity (indirect and induced) triggered by revenues generated from outside sales is known as the multiplier effect. The multiplier for a particular industry represents the increase in total economic activity (direct, indirect, and induced) associated with each dollar of outside sales by the industry in question. Calculating the total economic impact is accomplished by multiplying the estimated outside sales revenues by the sum of the direct, indirect and induced multipliers and then adding this number to the estimated revenues from local sales times the direct multiplier. In the case of output impacts, the direct multiplier is equal to one.

The chain of economic activity from outside sales revenue is not infinite in its ripple effect through a local economy. Some dollars earned in the direct activity are not spent locally. A part of direct sales dollars are used for such things as taxes and fees paid to state and federal agencies, payments to landowners who reside outside the county, and as payment for goods and services that are imported into the local economy (seed purchased from mid-west companies, externally located computer consultants servicing equipment, etc). The size of the multiplier associated with regional export sales varies with the size of the region and with the industry in question. In general, the larger and more diverse the economy of the region and the more complex the industry in terms of its linkages to other local industries, the larger the multiplier effect.

The method of estimating the economic impact that a particular sector has upon a local or regional economy is through use of multipliers, which are estimated from regional input-output (I-O) models. The foundation of the I-O model is a transactions table structured like a mileage chart on a road map. Each industry (or sector) in the region is listed as a selling industry in a row and as a purchasing industry in a column of the table. Entries in the table indicate the distribution of sales and the pattern of purchases for each sector of the regional economy. For example, agricultural products and services are treated as one sector, real estate as a sector, wholesale trade as a sector, etc. until the entire local economy is divided into economic sectors producing similar products. Households are considered a separate sector that purchases goods and services and sells labor. In effect, the transactions table provides a picture of interactions between local sectors and allows the flow of dollars to be traced through the economy. Multipliers are calculated based on the information generated from the transactions table.

Because they are dollar multiples of the initial dollar received for the output (sales) of the industry, total changes in output are referred to as output multipliers. Earnings multipliers for the agricultural industry in Miami-Dade County show the total earnings (direct, indirect, and induced) by households within the county that result from each dollar of outside or local sales (Table 1). Calculating the total earnings impact from outside sales involves multiplying the estimated gross revenues by the sum of the direct, indirect and induced earnings multipliers. Unlike the case with output multipliers, the direct earnings multipliers are not equal to one, since they represent the proportion of incoming revenues that producers pay out

for wage and salary expenses. To accurately account for the earnings impact from local sales revenues, only the direct multiplier is applied.

In addition to output and earnings impacts, changes in agricultural sales also have multiplier effects on employment in other sectors of the local economy. Employment multipliers show how many jobs are created per million dollars of outside and local sales. As with output and earnings impacts, the employment impact from outside sales is calculated by multiplying the outside sales revenue estimates by the sum of the direct, indirect and induced employment multipliers. Again, the direct (local) multiplier is less than one, and it alone is multiplied by local sales to compute the total employment impact due to local sales.

For this study, Miami-Dade County's agricultural sector is divided into four subsectors: (1) vegetable production, (2) fruit production, (3) commercial ornamental horticulture and (4) miscellaneous livestock, which include aquaculture. The multipliers used to compute the economic impacts of Miami-Dade County's agricultural sub-sectors were provided by the Minnesota IMPLAN Group, Inc (MIG) [15] (Table 1). Data and procedures used to derive MIG multipliers closely follow those used by the U.S. Department of Commerce, Bureau of Economic Analysis. This analysis was generated by the University of Florida, Department of Food and Resource Economics as a licensed user of the IMPLAN software and databases for the state of Florida. To provide greater consistency in evaluating the economic impacts of the agricultural sector over time, the input-output analyses of the earlier studies have been re-estimated using the latest multipliers from the IMPLAN Group.

Table 1. Multipliers used to estimate the economic impact of Miami-Dade County's agricultural sector.

	Agricultural Subsectors			
Impact area	Vegetables	Nurseries	Fruits	Miscellaneous Livestock
Total output multipliers	2.112010	2.096773	1.993960	1.120688
Direct output multipliers	1.000000	1.000000	1.000000	1.000000
Total earnings multipliers	0.726162	0.744943	0.607559	0.080396
Direct earnings multipliers	0.272111	0.297931	0.197570	0.031915
Total employment multipliers [a]	26.709	30.202	31.249	8.440
Direct employment multipliers [a]	9.882	15.325	16.348	6.867

Source: Minnesota IMPLAN Group, Inc

[a] represents jobs created per million dollars in local or outside sales.

In order to estimate the impact that agricultural production had upon Miami-Dade County's economy during the 1997-98 production season, (calendar 1997 for nursery crops) gross sales revenues were estimated for each subsector, i.e., vegetables, fruits, commercial ornamental horticulture, and miscellaneous livestock. These production seasons or crop-years represent the most recent official data available. For the impact analysis, vegetable production (traditional and tropical) is aggregated into one subsector. Later, for the purpose of describing the agricultural industry, vegetable production will be disaggregated. The horticultural services industry consisting of landscaping, lawn care, tree surgeons, etc., in Miami-Dade County was not included in this analysis because most of these services are performed within the county and thus do not generate "new" dollars.

An industry's economic impact on a region is significantly determined by the proportion of its revenues that come from outside the region (county). Therefore, accurately estimating the dollar amounts of gross sales inside and outside the region is critical. The revenues for each subsector from local or in-county sales do not generate indirect or induced effects. That is to say, local sales do not create new activity or rather do not bring in new dollars into the county. However, they do represent local economic activity. In calculating the economic impact of local sales, these estimates are only multiplied by the direct multipliers. To show the total output impact of each subsector (due to local and non-local sales) the local and outside sales impacts are simply added together. Table 2 and Figures 1 through 5 show past and current estimates of gross revenues for Miami-Dade County agriculture from these two sources, in constant 1998 dollars (adjusted using the Consumer Price Index).

Looking at Table 2 and Figures 1 through 5, it can be seen that the proportion of export or non-local sales varies considerably across subsectors. Over 98 percent of traditional fresh vegetables are sold outside of the county. This compares to slightly less than three-quarters of the county's nursery and greenhouse products and approximately 55 percent of the county's miscellaneous livestock production being sold outside the county. Recalling that the total output multipliers from Table 1, which include the direct, indirect and induced effects, are approximately equal to 2 for vegetables, fruits and nursery products, this means that the vegetable subsector will have a significantly greater impact on the county per dollar of total revenues than the other agricultural subsectors. This is not only because it has a larger total

output multiplier than the other subsectors, but also because such a high proportion of its products are sold outside the county.

Table 2. Gross revenues from export and local sales of agricultural goods produced in Miami-Dade County, by subsector, 1997-98

	Gross Revenues					
Subsector	Export sales		Local sales		Total	
	$	%	$	%	$	%
Traditional vegetables	$210,193,239	98.3	$3,595,506	1.7	$213,788,745	100
Tropical vegetables	19,413,983	89.6	2,260,787	10.4	21,674,770	100
Subtotal vegetables	229,607,222	97.5	5,856,293	2.5	235,463,515	100
Ornamental horticulture[1]	179,631,300	74.0	63,113,700	26.0	242,745,000	100
Tropical fruits	63,856,638	86.9	9,642,024	13.1	73,498,662	100
Miscellaneous livestock	4,242,200	55.5	3,405,800	44.5	7,648,000	100
Total	$477,337,360	85.3	$82,017,817	14.7	$559,355,176	100

Sources: USDA National Agricultural Statistics Service, "Florida Vegetable Summary", "Tropical Fruits Summary", and "Census of Agriculture" and personal communication with USDA and University of Florida professionals.

1. 1997 figures

Figure 1. Gross revenues from export and local sales of traditional vegetables produced in Miami-Dade County, 1988-89, 1995-96 and 1997-98 in constant dollars.

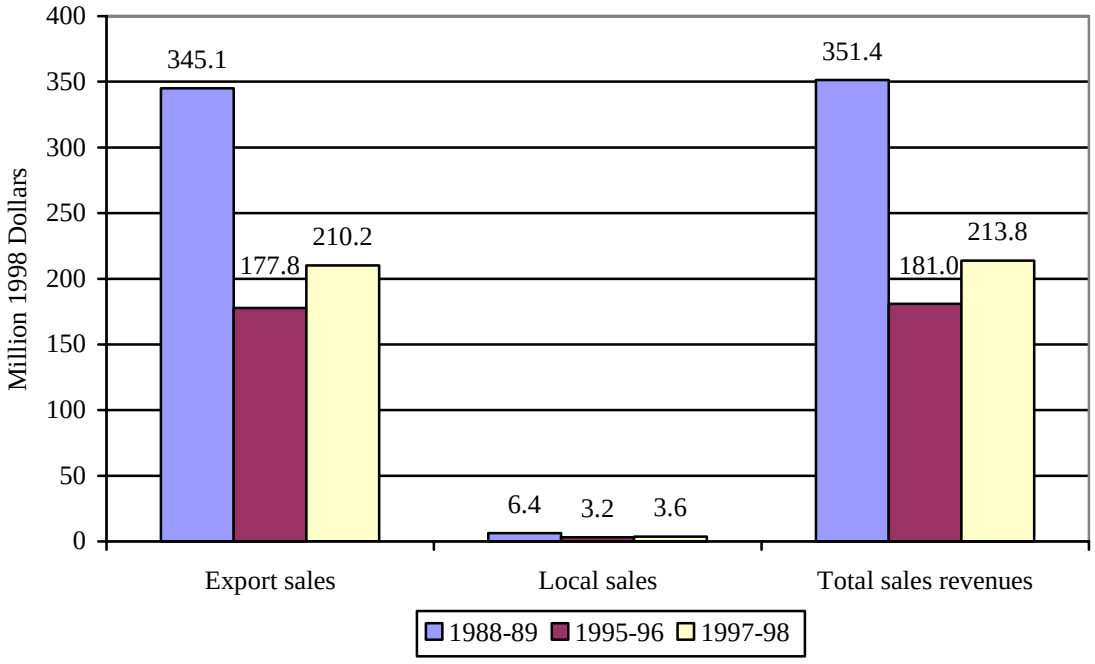


Figure 2. Gross revenues from export and local sales of tropical vegetables produced in Miami-Dade County, 1988-89, 1995-96 and 1997-98.

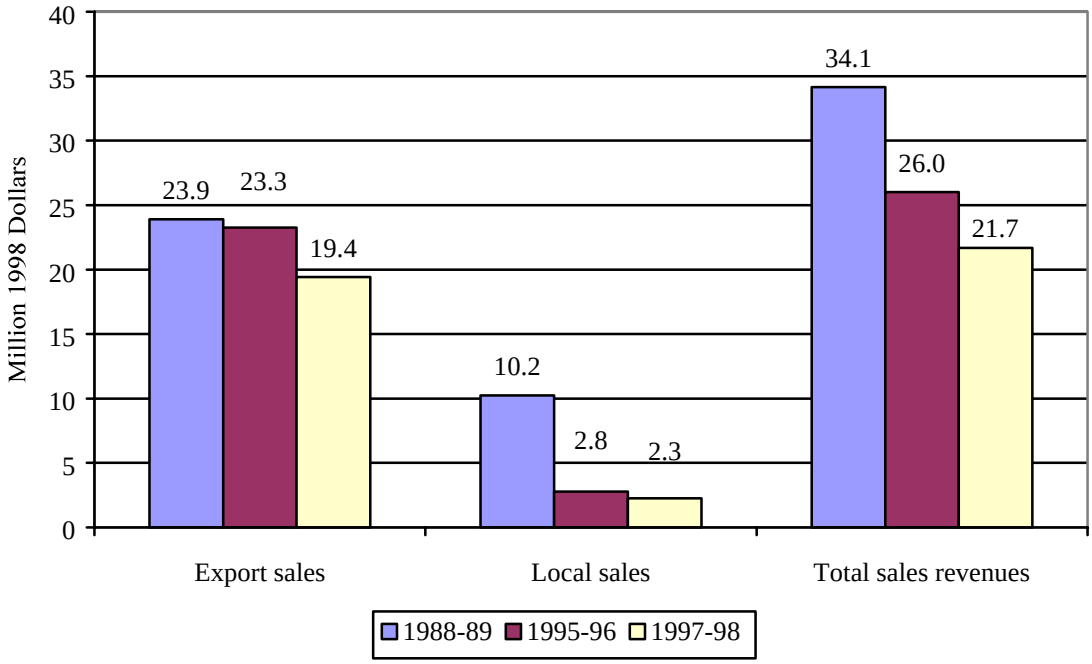


Figure 3. Gross revenues from export and local sales of tropical fruits produced in Miami-Dade County, 1988-89, 1995-96 and 1997-98.

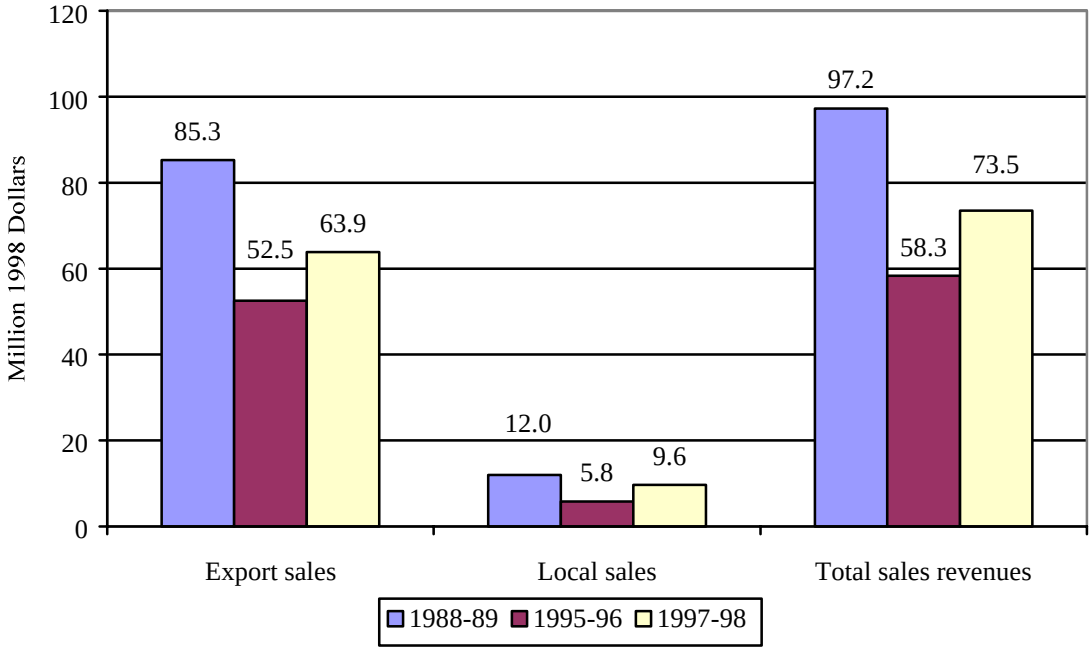


Figure 4. Gross revenues from export and local sales of nursery and greenhouse products from Miami-Dade County, 1989, 1996 and 1997.

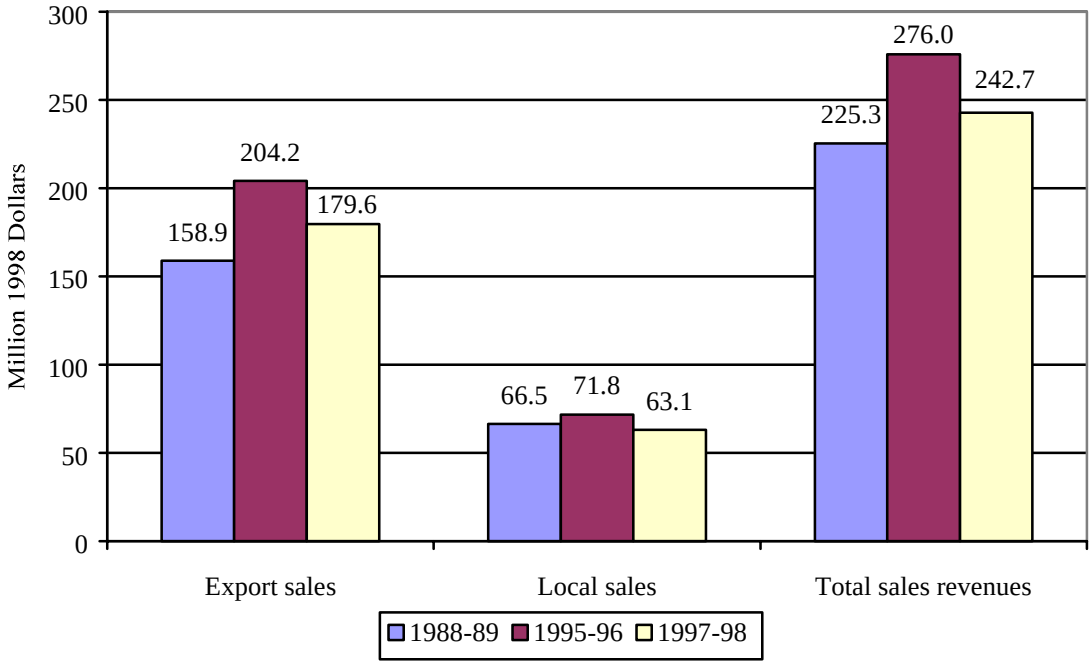
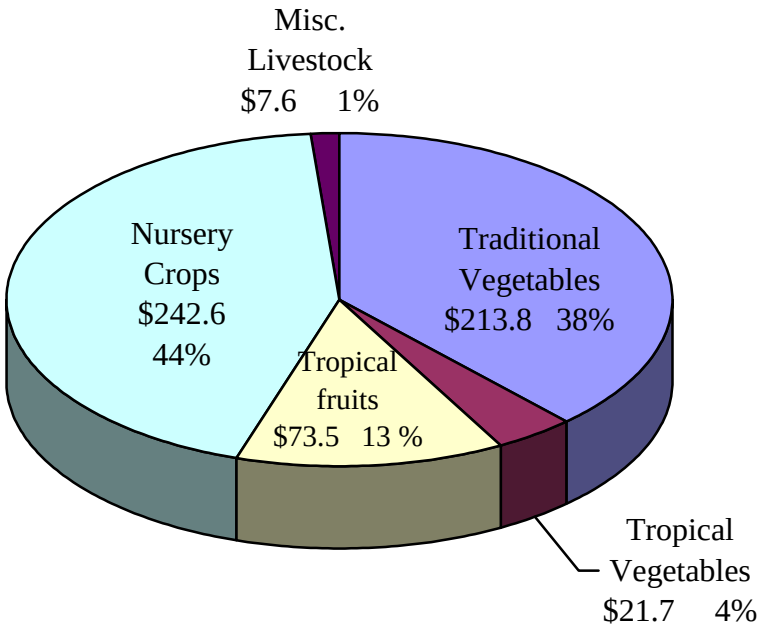


Figure 5. Distribution of gross sales revenues by agricultural subsector for Miami-Dade County, Florida , 1997-98, percent and million dollars.



Results of Economic Impact Analysis

Table 3 summarizes the impacts of agricultural subsectors on the Miami-Dade County economy and includes respective subsector multipliers. Impacts for output, earnings and employment are reported separately for each agricultural subsector and for the agricultural industry in total.

Output Impact

The output multipliers shown in Table 3 (from Table 1) are used to estimate the total economic impact for each dollar of output that the agricultural subsectors sell outside Miami-Dade County. Vegetable production exported (sold) outside Miami-Dade County during 1997-98 totaled $229.6 million. The total output multiplier for vegetables is slightly more than 2.11, indicating that each dollar in vegetable sales outside the county generates a local impact of approximately $2.11. Multiplying the gross export sales (output) of vegetables times the output multiplier, results in an estimated economic impact of $484.9 million on the Miami-Dade County economy during the 1997-98 production season. Similarly, nursery export sales, estimated at $179.6 million, multiplied by the nursery output multiplier of approximately 2.10, gives an estimated economic impact of $376.6 million for the 1997 production season. Export fruit sales, estimated at $63.9 million, times the output multiplier for fruits (1.99) results in an estimated economic impact of $127.3 million for the 1997-98 season. Miscellaneous livestock, including aquaculture, represented the smallest subsector in Miami-Dade County agriculture. Outside sales estimated at $4.2 million in 1997 multiplied by 1.121 gives an economic impact of $4.8 million for miscellaneous livestock.

To obtain the total output impact for each subsector, the revenues from local sales are multiplied by the direct multiplier and the result is added to the impact estimates for outside sales. For vegetables, the total output impact for 1997-98 was $490.8 million, which represents 45.6 percent of agriculture's total economic impact on Miami-Dade County. For nursery and greenhouse production, the total output impact for 1997 was $439.8 million (40.9 percent). For fruits, there is a total economic impact of $137.0 million (12.7 percent) during the 1997-98 production season, and miscellaneous livestock had a total output impact of $8.2 million (0.8 percent) in 1997. The combined total output impacts from vegetables, nursery,

Table 3. Economic impacts of agriculture by subsector for Miami-Dade County, 1997-98.

	Agricultural Sectors				
	Vegetables	Nurseries	Fruits	Misc. livestock	Total
Category	Million dollars and percent				
Total sales	$235.5	$242.7	$73.5	$7.65	$559.4
Percentage of total	42.1%	43.4%	13.1%	1.4%	
Output impact					
Total sales outside county	$229.6	$179.6	$63.9	$4.2	
Percentage of total	48.1%	37.6%	13.4%	0.9%	
Total Multiplier	2.11	2.10	1.99	1.12	
Output impact	$484.9	$376.6	$127.3	$4.8	$993.7
Percentage of total	48.8%	37.9%	12.8%	0.5%	
Total sales within county [a]	$5.9	$63.1	$9.6	$3.4	$82.0
Percentage of total	7.1%	77.0%	11.8%	4.2%	
Direct (Local) Multiplier	1	1	1	1	
Total output impact	$490.8	$439.8	$137.0	$8.2	$1,075.7
Percentage of total	45.6%	40.9%	12.7%	0.8%	
Earnings impact					
Total Multiplier	0.73	0.74	0.61	0.08	
Direct (Local) Multiplier	0.27	0.30	0.20	0.03	
Total earnings impact	$168.3	$152.6	$40.7	$0.45	$362.1
Percentage of total	46.5%	42.1%	11.2%	0.12%	
Employment impact				Jobs and percent	
Total Multiplier	26.71	30.20	31.25	8.44	
Direct (Local) Multiplier	9.88	15.32	16.35	6.87	
Total employment impact	6,191	6,392	2,153	59	14,795
Percentage of total	41.8%	43.2%	14.6%	0.40%	

Sources: USDA-NASS, Minnesota IMPLAN Group, Inc, and Food and Resource Economics Dept., University of Florida

[a] the local output multiplier equals 1.

fruit, and miscellaneous livestock production for Miami-Dade County came to $1,075.7 million for the 1997-98 season (Table 3).

Earnings Impact

Earnings multipliers for a particular subsector provide an estimate of the earnings generated in all Miami-Dade County industries in order for each agricultural subsector to deliver a dollar of output to final demand. Or stated differently, earnings multipliers for each subsector can be viewed as estimates of the total (direct, indirect, and induced) dollar changes in earnings that occur in Miami-Dade County households for each additional dollar of output (sales) the agricultural subsectors deliver to buyers located outside the county. To illustrate, the nursery and greenhouse subsector earnings multiplier equals 0.74 (Table 3) which means that for each dollar of export sales by the nursery subsector, $0.74 in earnings is generated in all Miami-Dade County industries. Similarly, for each additional dollar of export sales delivered by the vegetable, fruit, and livestock industries, there is approximately $0.73, $0.61 and $0.08, respectively, in earnings generated within Miami-Dade County industries. The earnings impact from local sales are not equal to one as with the output impact analysis. In this case, local sales for each subsector are multiplied by their respective direct earnings multipliers, and then added to the earnings impact due to outside sales. The total earnings impact resulting from Miami-Dade County agriculture was $362.1 million during 1997-98. This total is distributed among the subsectors as follows: (a) vegetables $168.3 million or 46.5 percent of the total; (b) nurseries, $152.6 million (42.1 percent); (c) fruits, $40.7 million (11.2 percent) and (d) miscellaneous livestock, $0.45 million (0.12 percent).

Employment Impacts

Employment impacts show the number of jobs created in the county due to local and outside sales of agricultural products. While there are significant problems with agricultural employment data from current sources, these impact estimates are provided here to give a general idea of the relative distribution of these numbers between industries. It is likely that these estimates understate actual agricultural employment, due to its heavy reliance on seasonal and part-time labor. There may also be problems with the classification of

employees by sector. This occurs when one firm conducts economic activities that could be classified as agricultural or some other non-agricultural sector [17].

The multipliers for employment are presented in terms of jobs created per million dollars in sales. The fruit subsector is the most labor intensive generating 31.2 jobs per million dollars of outside sales and 16.3 jobs per million dollars of local sales (Table 3). Nurseries and greenhouses generate 30.2 and 26.7 jobs per million dollars in outside and local sales respectively. Comparable numbers for the vegetable subsector are 26.7 and 9.9. A million dollars of outside and local sales by the livestock sector generates 8.4 and 6.9 jobs respectively. The relative sizes of the employment impacts for the different agricultural sectors are quite similar to their output and earnings impacts. Traditional and tropical vegetable production created 6,191 jobs or 41.8 percent of agriculture's total employment impact for the 1997-98 production season. Nurseries, tropical fruit and miscellaneous livestock generated 6,392 (43.2 percent), 2,153 (14.6 percent) and 59 (040 percent) jobs respectively. It should be noted that these numbers not only represent jobs created directly within these subsectors, but also those resulting from indirect and induced impacts as well.

Economic Interrelationships

In addition to the total aggregate impacts noted above, input-output techniques also permit the computation of specific economic interrelationships between a wide array of industries within a particular region. These interrelationships were estimated for over 500 other industries in the Miami-Dade County economy for output, earnings and employment, and the results are presented in Appendices A, B and C respectively. Approximately 380 industries have positive economic interrelationships with at least one of the four agricultural sectors. It should be noted, however, that many of these interactions may derive from indirect and induced effects. Table 4 shows the results for the top 30 industries economically impacted by agriculture in the county. The numbers shown in these tables represent that part of the total agricultural impact that occurs in the sector listed for a particular row. Each table (Table 4 and Appendix A, B and C) shows the disaggregated multiplier value for each agricultural sector and dollar or job impacts for each sector. Disaggregated impacts are reported only for export sales. Thus the totals in these tables match those numbers in Table 3 that represent impacts from outside sales. The industries are listed on the left hand column of each appendix

table and the four agricultural subsectors are shown across the top. The final row of each table reflects the total impacts for each agricultural subsector across all industries, and the last column reflects the aggregate agricultural impact on each of the other industries of the Miami-Dade economy.

The greatest amount of economic activity generated by agriculture in the county occurs within the agricultural sector itself. For example, of the nearly $485 million economic impact generated by export sales of vegetables, about $232 million occurs within the vegetable sector itself (Table 4, Appendix A). Similarly, for the nursery and greenhouse sector, approximately $195 million of $377 million dollar output impact occurs within that sector itself. Outside the production agriculture, the Wholesale Trade industry is the most significantly affected by outside agricultural sales. For example, for every dollar of outside sales of fruits, more than $0.14 of economic activity is created for the wholesale trade sector (Table 4, Appendix A). Agricultural Services benefit by an additional $37.4 million as a result of outside sales of all four agricultural sectors. Approximately $17.5 million of economic activity in the real estate sector is due to the vegetable industry alone.

In a manner similar to that for output above, Appendices B and C, tabulate the disaggregate earnings and employment impacts of the four agricultural subsectors across nearly 400 industries of the Miami-Dade economy. In each case estimates include direct, indirect, and induced activity.

Summary of Economic Impact Analysis and Comparison to Previous Studies

The total economic impact from all production agriculture sales originating from Miami-Dade County exceeded $1.07 billion for the 1997-98 crop years (Table 3). Fresh vegetable production was the largest contributor to this impact at nearly $491 million, or 45.6 percent of the total. The greenhouse/nursery industry was responsible for nearly 41 percent or $439.8 million of the total economic impact. Although sales revenues generated by nurseries and greenhouses exceeded those for vegetables by over $7 million during this period (Table 3), a greater proportion of vegetables are shipped outside the County, thereby generating more "new" dollars and a greater economic impact. Sales of tropical fruits produced in the county created an output impact of $137 million, representing about 12.7 percent of agriculture's total contribution to the Miami-Dade economy. Miscellaneous livestock sales, which includes aquaculture, was the smallest evaluated segment of agriculture's economic impact on the county. It generated an economic impact of about $8.2 million, representing less than one percent of agriculture's total economic impact.

The relative magnitudes of subsector contributions to earnings and employment impacts are similar to those estimated for output (Table 3). Agriculture's impact on earnings in Miami-Dade County totaled over $362 million for 1997-98. Approximately 46.5 percent, or $168 million, of this earnings impact was generated by the vegetable industry. More than 42 percent, or approximately $153 million, was contributed by the greenhouse and nursery subsector. The tropical fruit subsector generated nearly $41 million (11.2 percent) and miscellaneous livestock was responsible for $450 thousand (0.12 percent) of agricultural earnings impact for Miami-Dade County in 1997.

Agriculture created an estimated 14,795 jobs in Miami-Dade County for 1997/98. The nursery and greenhouse subsector was responsible for the largest employment impact within agriculture, with 6,392 jobs, or 43.2 percent of the total employment impact. Vegetable production was a close second, generating 6,191 jobs in 1997, or nearly 42 percent of the total. Nearly 15 percent (2,153 jobs) of agriculture's employment impact was due to fruit production and sales, while miscellaneous livestock sales generated approximately 59 jobs, or 0.40 percent of agriculture's total contribution to employment in Miami-Dade County.

Comparison to Earlier Impact Estimates

Since the source and methodology behind the impact multipliers used for this analysis have changed significantly from those employed in the two previous economic updates, the impact estimates discussed above can not be directly compared to previously published numbers. Instead, the current set of impact multipliers are used to re-estimate the economic impacts from previously reported sales revenue figures. This permits a more consistent comparison of the changing economic importance of the agricultural sector and its subsectors for the county over time. An inherent assumption when using identical multipliers over this time period (1988-1998) is that there has been no significant change in production technology or in the economic relationships between agriculture and other sectors of the local economy. Tables 5, 6 and 7, and Figures 6, 7 and 8 present the results of these calculations for the different times periods, subsectors and types of impacts. All estimates have been converted to constant 1998 dollars using the Consumer Price Index.

Table 5 and Figure 6 show the distribution of estimated economic output impacts across time and subsector in both absolute and percentage terms. Revenue estimates for the 1988-89 period translate into a total output impact of about $1.38 billion. This compares to slightly over $1.04 billion estimated for the 1995-96 season, and nearly $1.08 billion for the 1997-98 season. Thus, despite a 3.3 percent increase in agriculture's economic impact between the 1995-96 and 1997-98 seasons, its impact has not recovered to the levels achieved during the 1988-89 season.

Table 5. Agriculture's economic output impact on Miami-Dade County by subsector, 1988-89, 1995-96 and 1997-98 (1998 dollars).

	Total Output Impact					
	1988-89		1995-96		1997-98	
Sector	Million $	Percent	Million $	Percent	Million $	Percent
Vegetables	795.8	57.8	430.6	41.4	490.8	45.6
Greenhouse and Nursery	399.6	29.0	500.0	48.0	439.8	40.9
Fruit	182.0	13.2	110.5	10.6	137.0	12.7
Miscellaneous Livestock	NA	NA	NA	NA	8.2	0.8
Totals [a]	$1,377.3	100	$1,041.1	100	$1,075.7 [b]	100

[a] Totals may not sum to 100 due to rounding.
[b] In order to be comparable to previous years' totals, the Miscellaneous Livestock total should be deducted from the overall total.

Table 6. Agriculture's earnings impact on Miami-Dade County by subsector, 1988-89, 1995-96 and 1997-98 (1998 dollars).

	Earnings Impact					
	1988-89		1995-96		1997-98	
Sector	Million $	Percent	Million $	Percent	Million $	Percent
Vegetables	272.4	58.6	147.6	41.7	168.3	46.5
Greenhouse and Nursery	138.1	29.7	173.5	49.0	152.6	42.1
Fruit	54.2	11.7	33.1	9.3	40.7	11.2
Miscellaneous Livestock	NA	NA	NA	NA	0.4	0.1
Totals [a]	$464.7	100	$354.2	100	$362.1 [b]	100

[a] Totals may not sum to 100 due to rounding.
[b] In order to be comparable to previous years' totals, the Miscellaneous Livestock total should be deducted from the overall total.

Table 7. Agriculture's employment impact on Miami-Dade County by subsector, 1988-89, 1995-96 and 1997-98 (1998 dollars).

	Employment Impact					
	1988-89		1995-96		1997-98	
Sector	Jobs	Percent	Jobs	Percent	Jobs	Percent
Vegetables	10,018	53.6	5,428	37.6	6,191	41.8
Greenhouse and Nursery	5,817	31.1	7,268	50.4	6,392	43.2
Fruit	2,860	15.3	1,736	12.0	2,153	14.6
Miscellaneous Livestock	NA	NA	NA	NA	59	0.4
Totals [a]	18,695	100	14,432	100	14,795 [b]	100

[a] Totals may not sum to 100 due to rounding.
[b] In order to be comparable to previous years' totals, the Miscellaneous Livestock total should be deducted from the overall total.

Figure 6. Economic output impacts for agriculture in Miami-Dade County Florida, 1988-89, 1995-96 and 1997-98

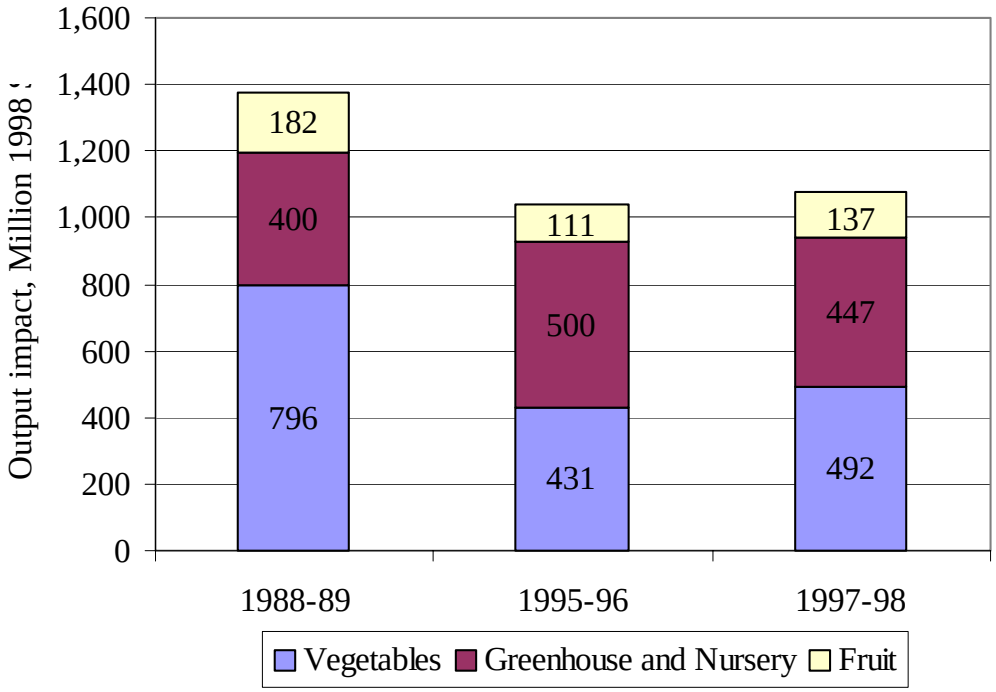


Figure 7. Economic earnings impacts for agriculture in Miami-Dade County Florida, 1988-89, 1995-96 and 1997-98

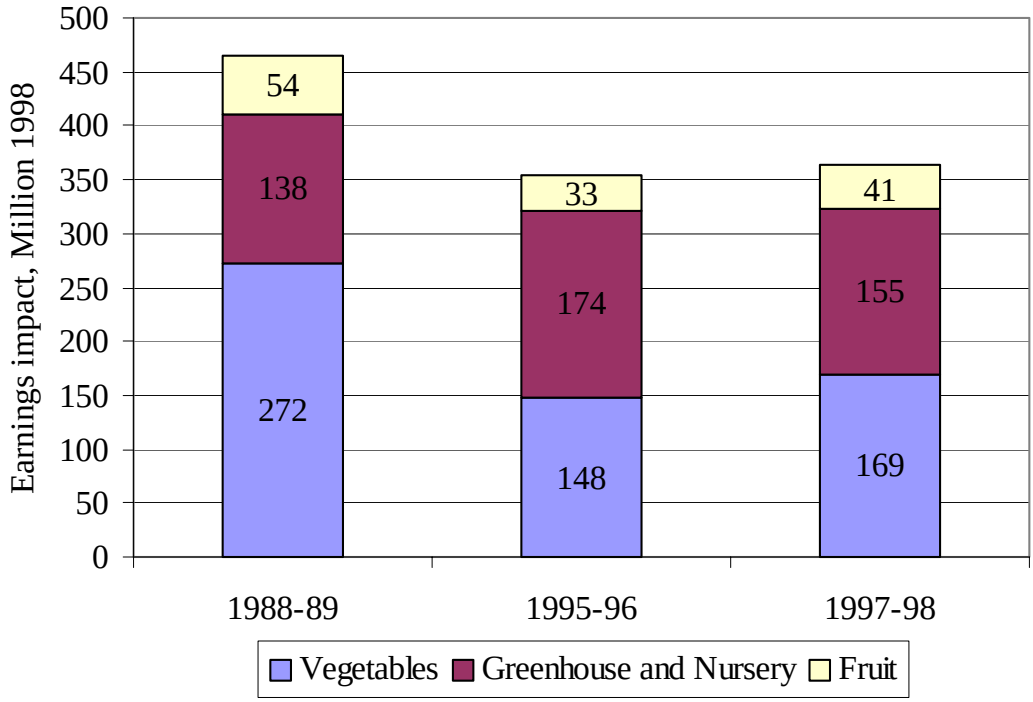
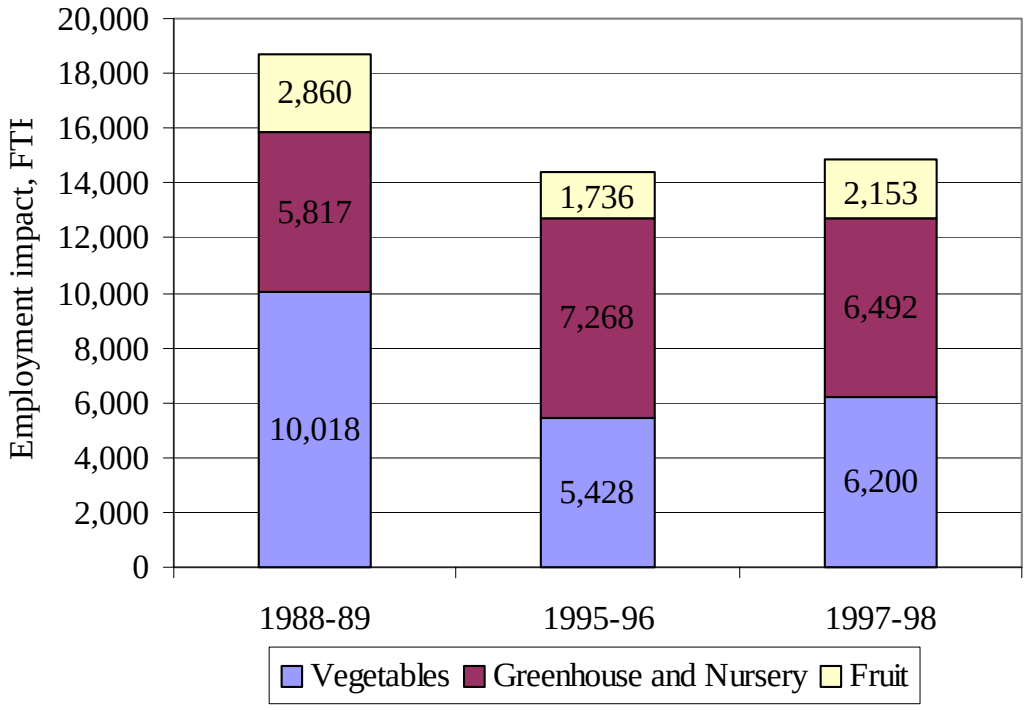


Figure 7. Economic employment impacts for agriculture in Miami-Dade County Florida, 1988-89, 1995-96 and 1997-98



The relative contribution of the three subsectors to the county's economy has also changed over time (Tables 5, 6 and 7, Figures 6, 7 and 8). Vegetables clearly dominated agriculture's economic impact in the late 1980s, representing nearly 58 percent of the output impacts, 59 percent of earnings impacts and 54 percent of the employment impact. In 1995-96 the importance of vegetables had declined to 41 percent, 42 percent and 38 percent for output, earnings and employment impacts respectively. For the 1997-98 season, the results indicate a modest recovery for vegetables from their 1995-96 share levels, with output, earning and employment impacts accounting for approximately 46, 47 and 42 percent respectively.

It appears from Tables 4–7 and Figures 6–8 that the output, earnings and employment impacts of the nursery sector for the 1997-98 season fell by approximately 12 percent from their 1995-96 levels. However, there is a major difference in the data sources for the 1989, 1996 and 1997 production years. Economic impact estimates for 1989 and 1996 were based upon surveys conducted by the University of Florida. The 1997 results, however, are based on official USDA Census of Agriculture data. While participation in the University of Florida surveys was voluntary, compliance with Census of Agriculture surveys is mandated

by law. Since the response rate to the UF surveys was approximately 50 percent, it was necessary to extrapolate the available sample data results across remaining 50 percent of nurseries in Miami-Dade County that did not respond. It is possible that larger and more progressive firms chose to participate in the University of Florida surveys, which would result in an upward bias in the results for those years. In contrast, the 1997 Census of Agriculture data more closely represents a complete survey of all nurseries in the county and the estimates based on these Census data are likely to be more accurate. This may account for a significant proportion of the apparent 12 percent decline in economic impacts by the nursery sector between 1996 and 1997. Despite this concern due to data sources, the economic impact of the nursery and greenhouse subsector is up by more than 10 percent from levels reported for 1988-89, which indicates long-term growth. Because of its higher labor intensity, the nursery and greenhouse subsector has remained the largest source, 43 percent, of employment impact within the agricultural sector for Miami-Dade County.

The tropical fruit subsector provides a smaller contribution to agriculture's economic impact in Miami-Dade County, representing between 11 and 14 percent during the three seasons evaluated. Despite its smaller size, this subsector experienced the greatest proportional growth (20+ percent) between the 1995-96 and 1997-98 seasons. This is probably indicative of its continued recovery from damage inflicted by Hurricane Andrew in 1992.

The relative economic impacts among the three major agricultural subsectors in Miami-Dade County have differed over time. Greenhouse and nursery subsector impacts have generally trended upward over the last ten years, whereas the impacts of the fruit and vegetable subsectors are still below their 1989 levels. To a significant extent, this counter-vailing phenomenon has helped stabilize the economic contribution of the county's agricultural sector as a whole.

Table 11. Census of Agriculture acreage and market value of agricultural production by subsector for Miami-Dade County, 1974, 1978, 1982, 1987, 1992 and 1997.

	Subsectors								
	Fruits [b]		Vegetables [c]		Field Crops [d]		Ornamental Horticulture [e]		Livestock
Year	Acres	$1,000	Acres	$1,000	Acres	$1,000	Acres	$1,000	$1,000
1978	14,970	53,925	29,498	134,664	18,535	36,068	2,269	141,777	15,260
1982	15,644	33,466	29,068	124,239	11,173	24,708	3,144	110,522	9,165
1987	17,452	39,222	42,356	120,753	6,739	18,489	5,107	169,727	7,757
1992	16,507	20,305	37,170	196,442	1,487	na.	7,084	176,720	3,916
1997	12,617	19,795	40,108	131,204	925	357	7,753	246,526	7,767

Source: Census of Agriculture, Table 2. USDA-NASS

[a] Dollar values are real 1998 dollars derived using the consumer price index.

[b] Fruit acres represent planted acreage.

[c] Vegetable acreage represents harvested acres.

[d] Field crop acres represent corn for grain or seed, and hay. Prior to 1992 the category included sweet corn.

[e] Acres represents the sum of "protected" area and acres in the open.

Figure 8. Value of agricultural crop production for different subsectors of Miami-Dade County, 1978 - 1997 as reported by the Census of Agriculture.

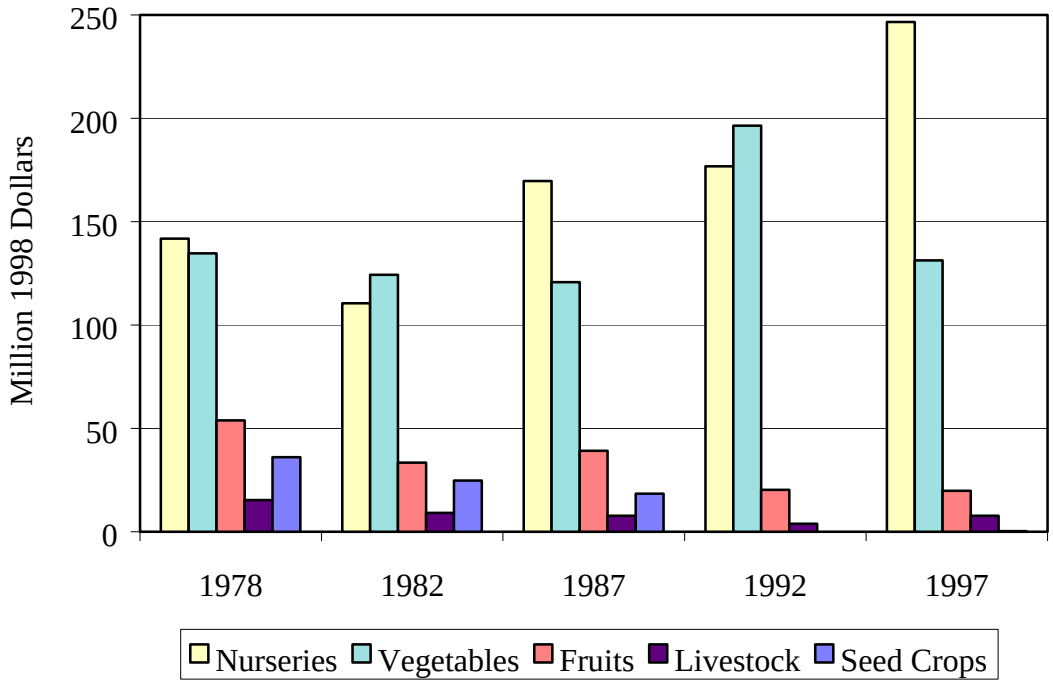
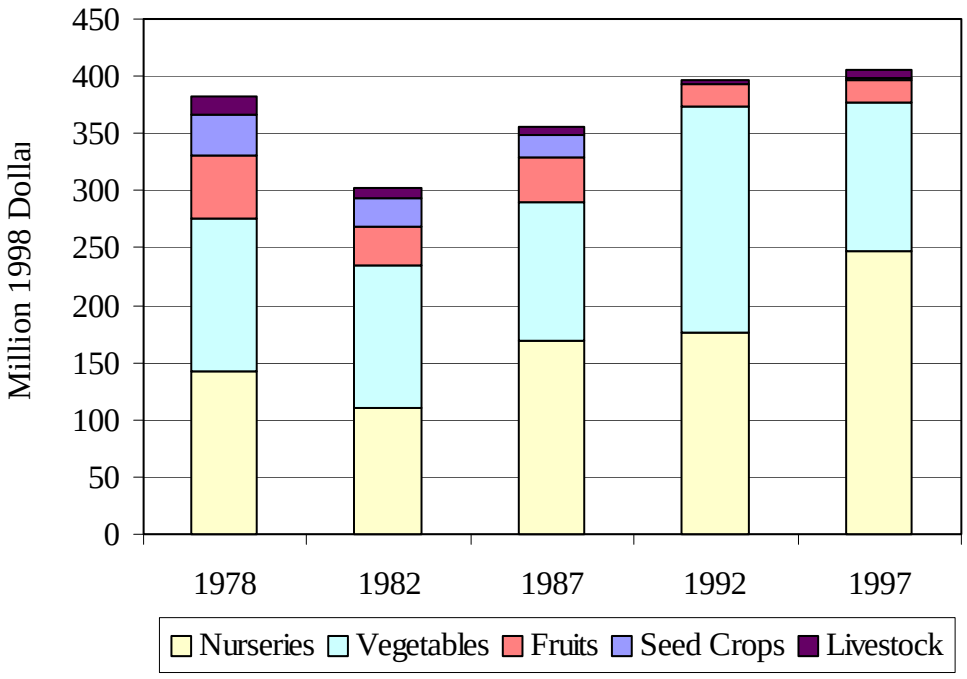


Figure 9. Value of Production for different subsectors of Miami-Dade County Agriculture, 1978 - 1997 from Census of Agriculture (nominal dollars).



Source: USDA-NASS, Census of Agriculture, various years

Although field crop production appears to have almost disappeared in Miami-Dade County over the last 20 years (Table 11, Figures 8 and 9), on occasion, fairly large acreages will be produced when seed-crop production in other parts of the United States or other countries fails. For example, seed corn production in the county increased to approximately 9,000 acres during the 1988-89 season to compensate for crop failures in the mid-west.

Organic farming and farm products have become more popular and practical as public concerns over the use of pesticides and synthetic fertilizers in agriculture have increased over time. Environmental factors related to Miami-Dade County's sub-tropical climate are generally less favorable to this form of agricultural production compared to other regions of the nation. None the less, a few relatively small organic producers have been operating in the area for a number of years. At this point in time, this form of agricultural production does not constitute a significant component of the counties agricultural sector.

Based on available Agricultural Census data, the total FOB value of agricultural production in Miami-Dade County was nearly 405 million dollars in 1997 (in 1998 dollars, Figure 9). In real terms, this is about 1 percent higher than the value estimated in 1992. Clearly, the sustaining factor and growth in Miami-Dade agriculture has come from its ornamental horticulture subsector. As of 1997, this subsector generated the largest share of revenues for the county's agricultural sector, accounting for nearly 61 percent of the total. This compares to its 44 percent share in 1992, and 37 percent in 1978. Vegetable production garnered less real sales revenues in 1997 than it did in 1978, despite being the largest revenue generating agricultural subsector in 1992. The relative contribution of vegetable production has declined slightly over the last two decades, from about 35 percent in 1978, to about 32 percent in 1997. In both absolute and relative terms, fruit and seed-crop production are becoming minor agricultural enterprises for Miami-Dade County. Fruit production generated only 4.9 percent of Miami-Dade County's agricultural sales revenues in 1997, down from 14.1 percent in 1978. Revenues from seed crop production have plummeted since1978, contributing slightly less than 1 percent to the total value of agricultural production in Miami-Dade County in 1997. Although revenues from livestock sales rebounded in 1997, this subsector was only responsible for about two percent of the county's total agricultural revenues for this period. This share is down from four percent in 1978. Aquaculture is an important component of the livestock subsector for Miami-Dade County. Unlike other types of livestock production, most aquaculture products are sold outside the county.