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The University of Florida Institute of Food and Agricultural Sciences






Measuring the Economic Impacts of Florida Agriculture and Natural Resources

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UF/IFAS: Relevant and Responsive

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Perspective

By Michael V. Martin

Mike Martin
Vice President
for Agriculture
and Natural Resources

UF/IFAS: Relevant and Responsive

Common sense and fundamental business principles support the notion that prudent state investments should be made in sectors that sustain the economy through good times and bad.

Florida weathered the latest economic downturn better than most states. For example, Florida's current unemployment rate stands at about 5.1 percent, compared to 5.4 percent nationally. Other state unemployment rates include 6.6 percent in California, 5.8 percent in Colorado, 5.5 percent in Massachusetts, 6.1 percent in North Carolina, 8.2 percent in Oregon and 7.3 percent in Washington. These states have explicitly pursued high-tech industry economic development strategies.

In addition, during the 1990s, Florida's gross state product grew by 90 percent, compared to a 75 percent growth rate in gross national product.

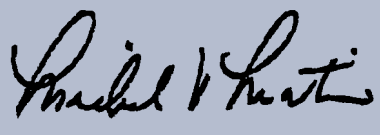
Florida owes much of its success to the solid performance of its agriculture and natural resource industries sector – agricultural production and related processing, aquaculture, fisheries, forestry, and parts of tourism, as opposed to high-tech industries. As defined, this sector accounts for $62 billion in annual economic impacts across the state, including $31 billion in value-added impacts and 649,000 jobs. When contrasted with the inherent ups and downs of high-tech industries, Florida's agriculture and natural resource sector has shown strength, vitality and diversity, and remains a stable, productive cornerstone of Florida's economy.

Although Florida's agricultural industry is among the most diverse in the United States, there has been virtually no major private research and development investment in it. Major companies would rather develop a product or technology to serve 12 million acres of corn in Iowa than serve 850,000 acres of Florida citrus (the state's largest crop in terms of acreage).

Florida agricultural research and development is vested in the University of Florida's Institute of Food and Agricultural Sciences (UF/IFAS), which brings relevant and responsive research and education programs to bear on specific contemporary issues or needs, and helps keep Florida strong and competitive.

Yet, the state annually invests less than 0.2 percent of the annual economic value of this sector in the UF/IFAS operating budget. The investment has been falling. The obvious result of diminished funding is the diminished ability of UF/IFAS to serve the agricultural and natural resource sector. Budgetary shortfalls invariably result in difficult funding decisions. However, Florida must act with care when choosing where those cuts fall. Short-term solutions will have long-term consequences for this great state.

Florida should demonstrate wisdom and farsightedness and to the fullest extent support the state's agriculture and natural resources sector through the relevant and responsive research and development programs of UF/IFAS.



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On the Cover: A new study, *Regional Economic Impacts of Florida's Agriculture and Natural Resource Industries*, includes data from eight different regions of the state, and the findings are highlighted in this issue of IMPACT magazine. The economic viability of these industries is linked to the statewide research and education programs of UF/IFAS. (UF/IFAS file photos)

Show of Strength

A new study by the University of Florida's Institute of Food and Agricultural Sciences on the regional economic impacts of Florida's agricultural and natural resource industries shows that they are strong contributors to the state's economy – generating billions of dollars in revenue and tax contributions, and hundreds of thousands of jobs. In addition to their $62 billion economic impact, these industries provide wildlife habitat, aquifer recharge areas and the amenities of open space.

While tourism and high-tech industries were hit hard during the recent economic downturn, Florida agriculture and natural resource industries continued to show remarkable signs of strength.

"In fact, the agriculture and natural resource sectors performed better over the past two years than any other major sector of Florida's $484 billion economy," said David Mulkey, a professor with UF's Institute of Food and Agricultural Sciences (UF/IFAS) and co-author of a new economic impact study for eight separate regions of the state.

"Make no mistake about it, the agriculture and natural resource industries are big in Florida, and their economic impact is statewide," he said. "Agriculture – considered the state's most basic industry – did not get hit as hard as tourism and other major economic sectors."

According to the latest data from the U.S. Department of Commerce, personal income in Florida increased by 26 percent in the farm sector. Income in the nonfarm sector increased by only 8 percent during the past two years, since the first quarter of 2001, before the recent recession.

Alan Hodges, an associate in the UF/IFAS food and resource economics department who worked on the study with Mulkey, said the nursery plant business was one major segment in Florida agriculture that suffered during the downturn, dropping by about 10 percent. He said that ornamental plants, which are considered somewhat of a luxury item, have since recovered.

Mulkey said output, employment and value-added impacts are the three principal measures of economic activity. Industry output represents total income or sales plus inventory change. Employment includes both full-time and part-time or seasonal positions. And value-added impacts represent the value of output less the value of purchased inputs used in the production of goods or services for final consumption.

He said the agriculture and natural resource industries include a wide range of enterprises associated with the production, processing and service activities for food, fiber, ornamental and mineral products. The state's subtropical climate provides a comparative advantage for the production of high-value crops such as citrus, vegetables, ornamental plants and sugar. The state is also a leading producer of forest products,

Florida agriculture and natural resource industries are not as well known as tourism, but they contributed more than $62 billion in output impacts to the state's economy last year. Agriculture also performs a vital role in maintaining valuable green space and protecting the rural environment. (Eric Zamora)

livestock and animal products, seafood and phosphatic fertilizers. And Florida has more golf courses than any other state.

"Florida's total land area is nearly 54,000 square miles, and the state has more than 16,000 square miles in agricultural and forestry land, producing fruits, vegetables, ornamental plants, dairy and meat products, forest products and seafood – plus an array of industries that provide supporting inputs and services," Mulkey said.

Overall, these industries generated nearly $62 billion in output impacts, including $31 billion in value-added impacts. These industries supported 644,673 jobs that generated $19 billion in labor income. State and local governments received almost $3 billion in indirect business taxes.

For the economic analysis, the state was divided into eight regions each including a core metropolitan area and surrounding counties defined by employee commuting patterns, as shown in the map on page 9. The value of each region's impact is influenced by the number of counties included, population levels, size of metro areas, and the size and scope of its economic activity. The regional assessments were divided into three tiers.

In the first tier, the regional economic impacts were greatest in the Orlando area with $16.9 billion, followed by the Miami/Fort Lauderdale area with $15.8 billion. A second tier of regions included the Tampa/St. Petersburg area with $9.5 billion and the Jacksonville area with $7.6 billion in total output impacts. A third tier of regions included the Sarasota-Bradenton area with $3.7 billion, the Tallahassee area with $2.6 billion, the Pensacola area with $2.4 billion and Southwest Florida with $2.1 billion in total output impacts. The 14 largest counties contain 67 percent of the state's population and account for most of the agricultural production.

"The total value-added impact of agriculture and natural resources in Florida was $1,929 per capita, and the total employment impact was 40 jobs per 1,000 residents," Hodges said. "Economic impacts on a per-capita basis and share of gross regional product indicated that the agriculture and natural resource

David Mulkey, left, Tom Spreen and Alan Hodges review economic data for the regional economic impact study. Spreen is chair of the UF/IFAS Department of Food and Resource Economics. (Thomas Wright)

(Photos below) In all eight regions of the state, Florida's livestock and meat products industry contributes more than $2.8 billion in output and $982 million in value-added impacts, supporting more than 31,000 jobs. The fruit and vegetable industry provides more than $13 billion in output and $6.8 billion in value-added impacts and accounts for more than 133,000 jobs. (Left, Eric Zamora; right, Thomas Wright)

industries were relatively more important in the Orlando, Jacksonville, Sarasota-Bradenton and Tallahassee regions than for the state as a whole."

In addition to measuring the economic impact in eight different regions, the study also looked at the total economic impact of various commodity categories statewide.

"The fruit, vegetable and ornamental plant industries are concentrated in the southern half of the state, where mostly frost-free winters provide a comparative advantage for production of cold-sensitive crops," Hodges said.

"The northern part of the state is dominated by industrial forestry plantations and traditional agronomic crops that can provide a reasonable return for lands that have very low native fertility," he said. "The interior portion of the peninsula has extensive beef and dairy cattle herds and large phosphate mining operations. The coastal areas have important natural fisheries and aquaculture businesses."

The impacts of 12 different industry groups – ranging from a high of $13 billion for fruits and vegetables to $800 million for field crops – are shown on page 9.

Fruit and vegetable production, which accounted for 21 percent of the total output impacts, generated more than 133,000 jobs and contributed more than $6.8 billion in value-added impacts.

Forest products, with a total economic impact of $8.6 billion statewide, comprised 14 percent of the total. The forestry industry employed 67,000 people

The environmental horticulture industry – which includes landscape plants, flowers, foliage and turfgrass – is the fastest growing segment of U.S. agriculture, and Florida is ranked as the second largest production state in the nation. The industry output totals more than $6.9 billion, including $4.4 billion in value-added impacts. (Eric Zamora)

and generated $4 billion in value-added impacts.

Other food and fiber manufacturing contributed $8.2 billion to the Florida economy, supporting 53,000 jobs and contributing more than $3.6 billion in value-added impacts.

Agricultural inputs, which include items such as farm chemicals and fertilizers, have a total economic value of $7 billion, or 11 percent of the total. The industry group supported 107,000 jobs and indirectly generated $3.3 billion in value-added impacts.

Environmental horticulture, which includes landscape plants, flowers, foliage, turfgrass and related landscape services, produced $6.9 billion in output impacts, employing 132,000 people and generating $4.4 billion in value-added impacts.

Smaller industry groups (those below $6 billion) accounted for nearly one-third of agriculture's total economic impact in the Florida economy. The categories include mining, sugar and confectionary products, tobacco, livestock and meat products, dairy, seafood and field crops such as peanuts, corn and soybeans. The categories generated a total of 152,000 jobs and yielded $8 billion in value-added impacts.

For the study, Mulkey and Hodges used the Implan Pro® software package to create economic models for each region and estimate total economic impacts of more than 100 industry sectors in agriculture, natural resources and associated value-added manufacturing.

"The Implan Pro® system consists of a database and software components, providing economic and socio-demographic profiles for all U.S. counties across 528 economic sectors," Hodges said. "Mutlipliers from Implan measure output, total value added, employment, employee compensation, personal income, other proprietary income and indirect business taxes."

The system was developed by the U.S. Department of Agriculture's Forest Service in 1979 and commercialized by the Minnesota Implan Group (MIG Inc.) in 1993.

The complete study, Regional Economic Impacts of Florida's Agricultural and Natural Resource Industries, is available at **http://economicimpact.ifas.ufl.edu.**

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Florida is No. 1

With this year's record orange crop expected to fill 303 million 90-pound boxes, it's easy to see why Florida leads the nation in citrus production. And Florida agriculture leads the way in the production of at least nine other crops. The state also leads in the number of seafood processing plants and golf courses. All of these commodity groups and industries benefit from the statewide research and education programs of the University of Florida's Institute of Food and Agricultural Sciences.

Here's how it all adds up, according to the Florida Agricultural Statistics Services and the October 2003 issue of *Florida Trend* magazine.

Oranges	(230 million boxes)
Grapefruit	(46.7 million boxes)
Temples	(1.55 million boxes)
Tangelos	(2.15 million boxes)
Tangerines	(6.6 million boxes)
Sugarcane for sugar	(16.8 million tons)
Snap beans	(147,000 tons)
Sweet corn	(282,050 tons)
Okra	(6,100 tons)
Radishes	(31,900 tons)
Tomatoes	(720,000 tons)
Watermelons	(379,500 tons)
Foliage for indoor and patio use	($459.7 million in sales)
Cut cultivated greens	($86.3 million in sales)

(Thomas Wright)

On the Upswing

Over the past two years, economic growth in the United States has generally been slow. This also holds true in Florida, although to a lesser degree, since the state's large service-based economy is less susceptible to economic cycles and recessions.

The following table, compiled by David Mulkey and Alan Hodges in the UF/IFAS Department of Food and Resource Economics, summarizes the changes in personal income for 22 major industry sectors of the Florida economy between the first quarter of 2001 and the first quarter of 2003.

"It is apparent that there is a wide divergence among industries in the degree of change, ranging from positive 27 percent to negative 7 percent," Hodges said.

Among the industries that have fared better over the past two years are management (+27 percent), farms (+26 percent), education (+23 percent), forestry and fisheries (+17 percent) and government enterprises (+17 percent), Hodges said.

Industries that have experienced a decline in personal earnings include manufacturing, mining and information. Some of the leading industries that have traditionally been drivers of the Florida economy have had only moderate growth, such as construction (+9 percent), real estate (+12 percent), and finance/insurance (+12 percent).

"Sectors related to tourism have been weak, including retail trade (+4 percent), accommodation and food service (+6 percent) and arts/entertainment/recreation (+2 percent)," Hodges said. "As a comparison, total personal income in Florida increased by 7.6 percent, compared to 4.8 percent for the entire United States during this period."

Industry Sector	Change 2001-03
Management of companies and enterprises	27.0%
Farms	26.2%
Educational services	23.0%
Forestry, fishing, related activities	17.4%
Government and government enterprises	17.1%
Health care and social assistance	15.0%
Real estate and rental and leasing	12.3%
Finance and insurance	11.9%
Construction	9.2%
Professional and technical services	7.4%
Accommodation and food services	5.9%
Other services, except public administration	4.8%
Administrative and waste services	4.4%
Retail trade	3.8%
Transportation and warehousing	2.7%
Arts, entertainment, and recreation	2.2%
Wholesale trade	2.0%
Utilities	0.4%
Manufacturing (durable goods)	0.3%
Mining	-4.6%
Information	-5.8%
Manufacturing (non-durable goods)	-6.9%
Florida Total Personal income	7.6%
U.S. Total Personal income	4.8%

Source: U.S. Department of Commerce, Regional Economic Information System

In addition to the direct impact of agricultural products and services, there are indirect economic benefits associated with the purchase of inputs such as equipment, fertilizer, fuel and pesticides, as well as services such as grove care, landscaping and logging contracts. The value of agricultural inputs and services exceeds $6.9 billion, and value-added impacts top $3.3 billion.

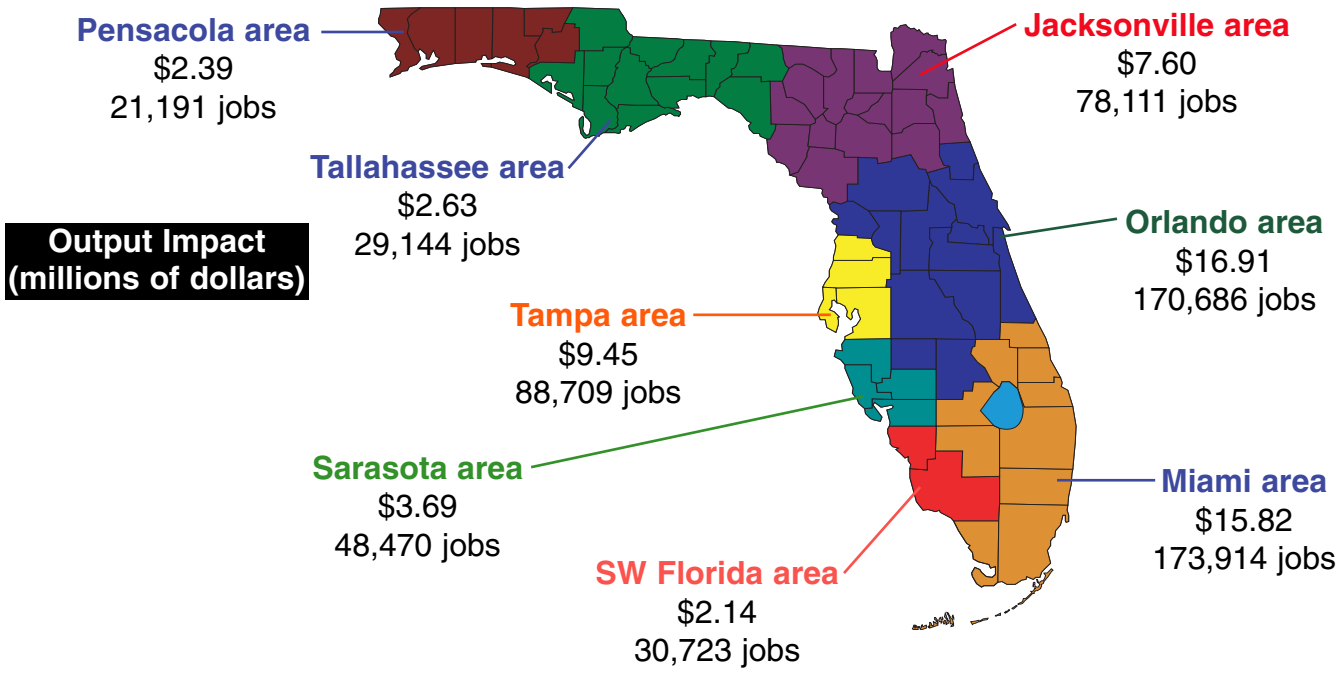
(Eric Zamora)

Total Economic Impacts[a] in Florida by Agricultural and Natural Resource Industry Groups, 2000

Industry Groups	Output ($M [b])	Employment (# jobs)	Value Added ($M)	Labor Income ($M)	Indirect Business Tax ($M)
Agricultural Inputs & Services	6,991	107,595	3,365	2,275	216
Dairy Products	1,558	8,791	611	472	24
Environmental Horticulture	6,902	131,748	4,496	2,882	214
Field Crops	814	13,297	497	332	38
Forest Products	8,613	67,153	4,074	2,583	277
Fruits & Vegetables	13,013	133,189	6,898	4,498	458
Livestock & Meat Products	2,859	31,383	982	763	52
Mining	4,255	32,739	2,252	1,161	185
Other Food & Fiber Manufacturing	8,251	52,730	3,642	2,090	409
Seafood Products	1,203	18,868	639	435	39
Sugar & Confectionary Products	3,676	27,581	1,625	1,010	119
Tobacco Products	3,437	19,599	1,751	776	725
Total All Groups	**61,572**	**644,673**	**30,832**	**19,276**	**2,757**

Source: Implan data for Florida, MIG, Inc., Stillwater, MN.
[a] Total impacts represent direct impacts plus indirect and induced multiplier effects of export sales (shipments outside region).
[b] Values expressed in year 2002 dollars based on US GDP Implicit Price Deflator.

Output and Employment Impacts of Agriculture and Natural Resources Industries in Economic Regions of Florida, 2000



The eight regions used for the impact analysis are based on the functional economic areas defined by the the U.S. Department of Commerce, Bureau of Economic Analysis (Survey of Current Business, Feb.1995, pp. 75-81). Each region is comprised of a core metropolitan area and a number of surrounding counties that are related by virtue of worker commuting patterns, newspaper readership and other indicators. Currently, there are a total of 172 such economic areas in the United States. The boundaries of the economic areas are periodically revised to reflect demographic trends measured by the U.S. Census of Population and Housing.

Urban Center, Agricultural Giant

Citrus – the state's signature crop – is the largest commodity in Florida's $62 billion agriculture and natural resources industry, and the booming 13-county Orlando region is the leader in citrus production, said David Mulkey, a professor with the University of Florida's Institute of Food and Agricultural Sciences (UF/IFAS).

"A lot of production has moved from the northern areas of the region to warmer groves south of Interstate 4, but citrus is still king in Central Florida," he said.

Mulkey said oranges and grapefruit are just part of the wide variety of agricultural commodities and services in the region, which produces everything from fruits and vegetables to environmental horticulture plants and thoroughbred horses. The total regional impact of these goods and services is $16.9 billion, generating more than 170,000 jobs.

The findings are in a new study on the regional economic impacts of Florida's agricultural and natural resources industries. Mulkey co-authored the research with Alan Hodges, an associate in the UF/IFAS food and resource economics department in Gainesville.

The Orlando region – where agricultural and natural resource industries have the largest economic impact in the eight-region study – includes Brevard, Citrus, Flagler, Hardee, Highlands, Lake, Marion, Orange, Osceola, Polk, Seminole, Sumter and Volusia counties.

While citrus is still the largest commodity in the region, the environmental horticulture industry – which includes landscape plants, flowers, foliage and turfgrass – is the second largest segment, with nearly a $2 billion economic impact. Now the fastest-growing segment of Florida agriculture, the industry generates more than 23,000 jobs in the region.

Ben Bolusky, executive vice president of the Florida Nurserymen and Growers Association in Orlando, said "the industry's unique partnership with UF/IFAS has helped make Florida's nursery and landscape business the nation's second largest."

He said major support for the industry comes from the UF/IFAS environmental horticulture department. In the Orlando region, scientists at the UF/IFAS Mid-Florida Research and Education Center in Apopka are working on various plant development, production and protection problems for the industry. Their work includes the development of environmentally friendly biocontrols that have reduced the need for pesticides.

Indoor foliage plant production is centered in the Apopka area, while shrubs, trees and other woody ornamental are grown throughout the region.

Scientists at the Apopka center also work with vegetable and fruit producers, including the area's $5 million grape industry.

The Orlando region is also home to the UF/IFAS Citrus Research and Education Center in Lake Alfred, the world's largest facility of its kind. In the 1940s, UF/IFAS researchers helped develop frozen juice concentrate, now a key part of the state's $9 billion citrus industry. UF/IFAS research has improved juice processing and led to the development of high-value not-from-concentrate products for the industry and consumers.

Researchers at the center have solved many citrus production problems in areas ranging from fertilization and irrigation to pest control and harvesting. UF/IFAS integrated pest management programs have drastically reduced the need for pesticides.

Lisa Rath, executive vice president of the Florida Citrus Processors' Association in Winter Haven, said the citrus industry "is heavily dependent on UF/IFAS for research on various production problems – we talk to their experts almost every day."

UF/IFAS researchers are using biotechnology to solve some of the citrus industry's toughest problems. They are working with scientists from the U.S. Department of Agriculture and other organizations to map the entire genome of the orange tree. The research could lead to new tree varieties that are resistant to citrus canker and citrus tristeza virus, two of the state's costliest diseases.

Lance Osborne, a professor of entomology at the UF/IFAS Mid-Florida Research and Education Center in Apopka, examines a leaf damaged by whiteflies. Indoor foliage plant production is centered in the Apopka area, while shrubs, trees and other woody ornamental are grown throughout the region. (Thomas Wright)

Once a common sight as far north as Marion County, citrus groves have been moved south because of disastrous freezes over the past few decades. Now, Marion County is the center of the thoroughbred horse industry that generates 10,000 jobs for the region. Statewide, the industry employs thousands more.

"We supply 12 percent of the foal crop for all of North America," said Richard Hancock, executive vice president of the Florida Thoroughbred Breeders' and Owners' Association in Ocala. "This area probably has more working horsemen than anywhere else in the world."

While other commodity groups are feeling the pinch from overseas competition, globalization seems to be working to the advantage of the Florida horse industry. Association officials are now talking with racetrack operators from South Korea and other Asian nations about sales of Marion County horses in the Far East.

When it comes to expert care and management for animals, the horse industry relies on the UF/IFAS animal sciences department and UF's Veterinary Medical Teaching Hospital, which includes IFAS faculty.

"Since these horses are athletes, we're working on research that will help produce sound, healthy and competitive horses," said Edgar Ott, a professor of animal sciences who oversees the operation of the UF/IFAS Horse Research Center in Ocala.

To disseminate the latest information on the care, feeding and breeding of horses, UF/IFAS hosts the annual Florida Equine Institute, a seminar and trade show that provides breeders and owners with current information on the management of these animals.

"This equine institute is geared toward the serious horse owner, someone who already knows the business and who wants to know more," said Mark Shuffitt, UF/IFAS Marion County livestock extension agent. "There are a lot of serious horse owners out there – it's our biggest industry."

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"America's Winter Salad Bowl"

Counties along Florida's southeastern rim are home to some of the nation's biggest and fastest-growing urban areas, but they're also the source of billions of dollars in farm production.

From the nearly frost-free citrus groves of Indian River County to the winter vegetable and sugarcane farms in the 505,000-acre Everglades Agricultural Area, Southeast Florida is one of the nation's hot spots for agriculture, providing the country with much of its winter supply of fruits and vegetables, as well as tropical crops that can't be grown anywhere else in the continental United States. The region is also home to big dairy and cattle farms.

In 2000, the agricultural and natural resource industries in the 10-county Miami region generated more than $15 billion in output and 173,000 jobs – more employment than any other region. Fruit and vegetable production exceeded $1.6 billion and so did sugar and confectionary products. Environmental horticulture production topped $1.4 billion, while dairy and livestock operations contributed more than $813 million to the economy.

These and other findings are in a new regional economic study by researchers in the University of Florida's Institute of Food and Agricultural Sciences (UF/IFAS). The Miami region includes Broward, Glades, Hendry, Indian River, Martin, Miami-Dade, Monroe, Okeechobee, St. Lucie and Palm Beach counties.

Many South Florida producers say UF's research and education programs are essential for the continued success of agriculture in the region. In addition to extension offices in every county, the university has research and education centers in Belle Glade, Ft. Lauderdale, Ft. Pierce and Homestead that work on specialized production problems for local producers.

Mangoes and other tropical fruit grown in Miami-Dade County generate more than $137 million in economic impacts annually. (Eric Zamora)

In Palm Beach County, Rick Roth is one of many growers who have helped the county earn the reputation as the nation's capital of winter vegetable production. He has more than 5,000 acres planted in sugarcane, rice, sod and vegetables in the western half of the county.

Roth stays up-to-date on UF/IFAS research for every crop he plants, and he said that research has been particularly helpful in helping fight root-rot, a disease that kills turfgrass.

"We rely heavily on UF/IFAS research centers, particularly when it comes to sod production," Roth said. "Some big companies do their own research, but it's all proprietary. IFAS does basic research on just about every problem in agriculture, and we are glad to have that information."

David Basore, co-owner of Grower's Management, a new Belle Glade company that produces lettuce and other leafy vegetables, says UF/IFAS research and education centers have been a valuable asset to South Florida vegetable growers.

"We work closely with the people at the UF/IFAS Everglades Research and Education Center in Belle Glade, which has entomologists, plant pathologists and plant breeders working on problems we face every day."

South Florida growers are also turning to specialty crops, using the area's warm weather to give them an edge in niche markets.

Rick Roth, who has more than 5,000 acres planted in sugarcane, rice, sod and vegetables in Palm Beach County, relies on UF/IFAS research and education programs for valuable production information. He is one of many growers who farm in the rich muck soils of the region. (Eric Zamora)

"If you want to make money, you've got to follow trends in the market," said Darrin Parmenter, UF/IFAS Palm Beach County extension vegetable agent. "As a result, many growers are doing very well with niche-market crops such as Chinese vegetables."

Sometimes a niche product turns into something much bigger. A century ago, the grapefruit was a subtropical oddity that whetted the appetites of wealthy Northerners who wintered in Florida. Now it's a major part of Florida's $9 billion-a-year citrus industry. And Indian River and Martin counties are crucial in getting that fruit to consumers worldwide.

"The Indian River area is the biggest grapefruit production area on planet Earth," said Doug Bournique, executive vice president of the Indian River Citrus League in Vero Beach. The league represents citrus growers along the Indian River, which runs roughly parallel to 200 miles of South and Central Florida coastline.

The warm waters of the Atlantic Ocean help protect the Indian River coastline from the cold during the winter months. The river also offers protection to grapefruit and orange growers, allowing them to easily flood their groves – something that can add a few vital degrees of heat on the rare nights when the temperature drops below freezing.

But Indian River's grapefruit crop still faces many dangers. Many diseases that prey on the state's orange crop – diseases such as citrus canker and tristeza – are just as damaging to grapefruit. Bournique said grapefruit growers look to UF/IFAS for the expertise and well-researched information that can help them combat those threats.

"So far, we've managed to keep the Indian River area canker-free," said Bournique. "We've been lucky, but advice from UF/IFAS has probably played a role in that as well."

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Major International Market

In the mostly urban four-county Tampa region, agriculture and natural resource industries have an economic impact that rivals much larger regions of the state.

Name any major agricultural commodity, and chances are you'll find it being produced in the region that includes Hillsborough, Hernando, Pasco and Pinellas counties. Plus, because of its status as an international port and air gateway, the Tampa region has a number of unique industries, such as phosphate mining, strawberries and tropical fish. The region's total output is $9.5 billion, including $4.6 billion in value-added impacts, supporting more than 88,000 jobs, according to a new economic study by the University of Florida's Institute of Food and Agricultural Sciences (UF/IFAS).

Ornamental plants, strawberries and tropical fish are prime examples of high-value crops being produced on relatively small acreage in the region.

More than 20 years ago, when Marty Tanner started doing the books for a Tampa-area tropical fish store, he realized that raising fish could be more than a hobby. Today he is president of Aquatica Tropicals in Plant City, a company that earns millions of dollars supplying fish to aquarium hobbyists around the country. All of the fish are grown in tanks on three small farms with a combined area of about 60,000 square feet – a little bigger than your average supermarket.

Operations like Tanner's are common in Hillsborough County, the heart of Florida's tropical fish industry. Florida tropical fish farmers, most of them concentrated in the Tampa and Miami areas, raise 95 percent of the captive-bred aquarium fish sold in the United States. Those small fish can add up to big money; UF/IFAS researchers estimate that tropical fish farming was a $43 million business for Florida in 1999. It's all part of aquaculture, one of the fastest growing segments of Florida agriculture.

"The fish farms themselves are just part of the story," said Craig Watson, director the UF/IFAS Tropical Aquaculture Laboratory in Ruskin. "Every fish has to be bagged and boxed for shipping, then flown to retailers around the country. Tropical fish are the No. 1 air freight item shipped out of Tampa International Airport."

Researchers at the Ruskin lab are working on techniques that could help Tampa area fish farmers open still-broader markets for their products.

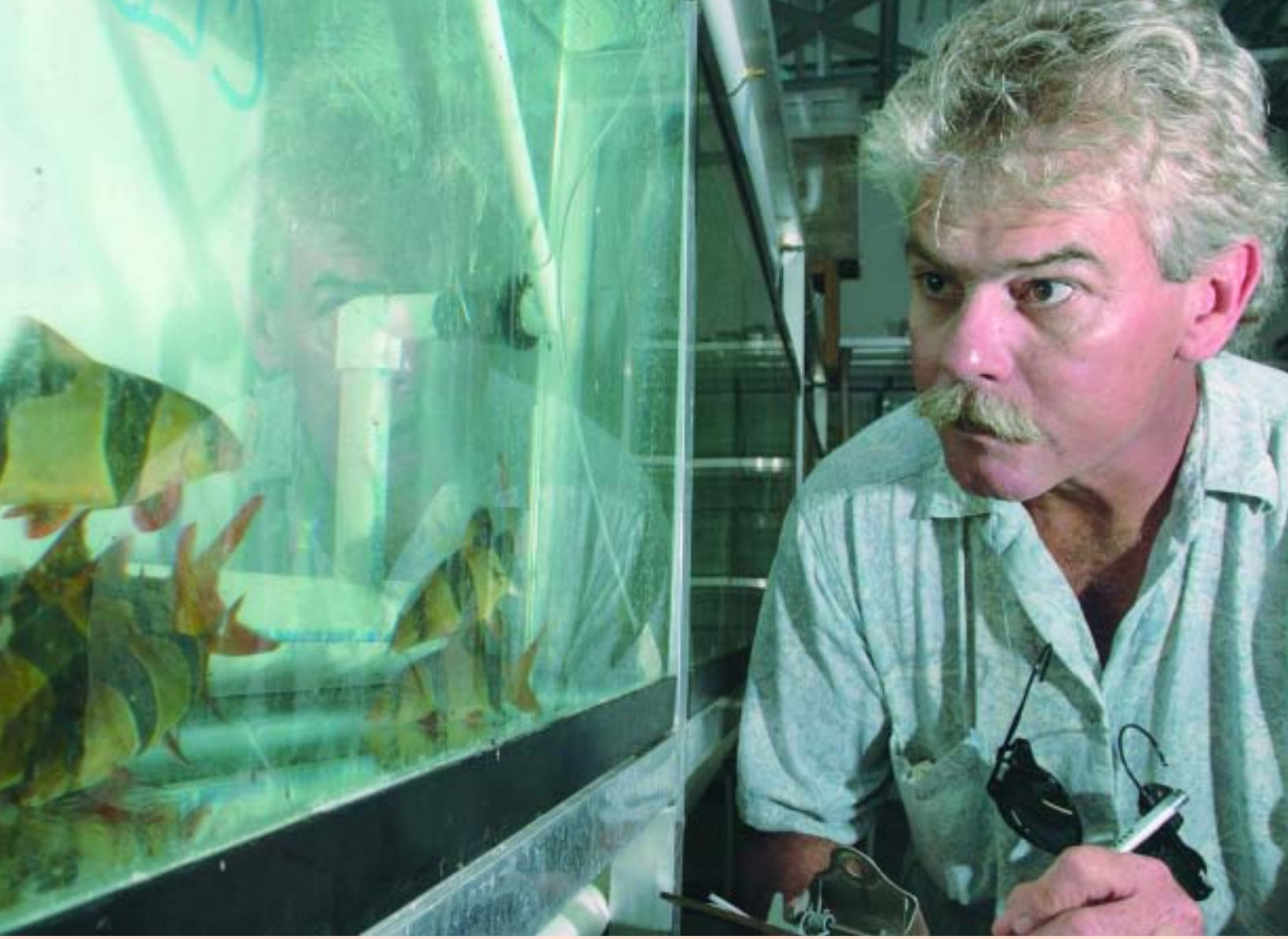
One example is their work with the clown loach, a colorful freshwater fish that is popular with aquarium hobbyists. Most clown loaches in the U.S. are imported from Sumatra and Borneo, where they can be found in the wild. Fish farmers have had difficulty breeding the fish in captivity, but researchers at the UF/IFAS lab have discovered how to spawn the clown loach, giving fish farmers a new foothold in the market.

"There's a multimillion-dollar market for this fish, and now Florida can get its share of that," Watson said.

Researchers at the Ruskin lab are also working on ways to cash in on the demand for another Florida product: water lilies. The plants are popular with gardeners in northern states, who put the plants out in spring only to see them die when cold weather returns. The result is a boom in demand for lilies every spring, with customers often demanding more plants than producers can deliver.

Using tissue culture techniques, Mike Kane, a professor in the UF/IFAS environmental horticulture department in Gainesville, is developing a micropropogation system to produce water lilies 10 to 15 times faster than traditional propagation methods. He is using the same techniques on a variety of other aquatic plants that are in high demand by landscapers building ponds or environmental engineers trying to restore wetlands.

"We want to mass-produce these plants, which will be good news for people who like water lilies," said Kane. "It's also good news for people who do wetland restoration."



Craig Watson observes clown loaches at the UF/IFAS Tropical Aquaculture Laboratory in Ruskin. He said UF/IFAS researchers recently achieved a breakthrough in breeding the popular fish in captivity. (Eric Zamora)

While the Ruskin lab, established in 1998, is a relative newcomer to the Tampa area, researchers at the UF/IFAS Gulf Coast Research and Education Center have been helping growers in the Tampa Bay area for decades. New facilities for the UF/IFAS center are under construction in Balm, and they will consolidate programs from Bradenton and Dover. Spring 2005 is the planned completion date.

Since the days when farmers first began shipping produce by rail, Hillsborough County has been one of the country's leading producers of strawberries, growing 15 percent of the strawberries consumed in the nation.

"Florida supplies a significant portion of the strawberries sold in America, and most of Florida's crop is grown in the Plant City area," said Chip Hinton, executive director of the Florida Strawberry Growers' Association in Plant City, which represents more than 125 growers with 7,000 acres planted in strawberries. "This is a high-value crop, and relatively small acreage can make a huge economic impact."

Florida's early growing season allows Hillsborough County strawberry growers to dominate the winter market, and it's the reason growers refer to Plant City as the "winter strawberry capital of the world."

For more than half a century, UF/IFAS researchers have been breeding strawberry varieties tailored to the needs of Florida growers. Varieties such as "Sweet Charlie" – which became a favorite of Florida growers after its introduction in 1992 – gave winter growers higher fruit yields from December through February then other available varieties. Newer varieties such as "Carmine" and "Strawberry Festival" promise to improve further on Sweet Charlie.

"These cultivars have a nice size and shape, and are really firm, which results in longer shelf-life," said Craig Chandler, a professor of strawberry breeding at the UF/IFAS Gulf Coast Research and Education Center in Dover.

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"Tree-mendous" Economy

Across North Florida, fast-growing pine is the largest single crop and a key factor in the area's economy, producing more than $8 billion in annual output and supporting more than 78,000 jobs, according to a new regional economic impact study by the University of Florida's Institute of Food and Agricultural Sciences (UF/IFAS).

In the 16-county Jacksonville region, pine also dominates the agricultural landscape, generating more than $3 billion in annual output and supporting more than 25,000 jobs in the forest products industry.

The region includes Alachua, Baker, Bradford, Clay, Columbia, Duval, Dixie, Gilchrist, Hamilton, Lafayette, Levy, Nassau, Putnam, St. Johns, Suwannee and Union counties.

In addition to the forest products industry, the region includes thousands of traditional small farms from the outskirts of Jacksonville to the docks of Cedar Key. Here, you can still find farmers growing fruits, vegetables, peanuts, tobacco and watermelons on the same land their families have owned for generations. The region is also home to cattle and dairy farms, plus new enterprises such as greenhouse hydroponic crops, organic crops and sod for golf courses and urban areas.

But when it comes to economic impact, none of those commodities comes close to the income generated by forest products in the region.

"No matter how you add the numbers, forestry is one of the biggest industries in Florida, and one of every three wood- and paper-producing jobs in the state can be found in Northeast Florida," said Jeff Doran, executive vice president of the Florida Forestry Association in Tallahassee.

"When you add payroll receipts provided by healthy forests, the ripple impact on Florida's economy is much greater than most people realize," Doran said. "More than 30 percent of the industry's $1.3 billion payroll goes to Northeast Florida residents who work in wood and paper mills. If you paid the employees of just one North Florida mill with bark-colored currency and traced it through the local economy, you'd be astounded by the results."

Doran said the UF/IFAS School of Forest Resources and Conservation has been a key factor in the industry's growth and prosperity, providing professionally trained graduates and research on better forest management practices.

Fifty years ago, UF/IFAS and industry researchers founded the Cooperative Forest Genetics Research Program, a partnership that allows UF/IFAS researchers and the timber industry to pool their resources to develop better varieties of loblolly and slash pine.

"We're really just beginning to domesticate these plants," said Dudley Huber, co-director of the research partnership. "No one did significant breeding of these trees until the middle of the 20th century."

When you're dealing with a plant that takes decades to reach maturity, breeding work can be a slow process, but the partners in the cooperative have made significant improvements in the pines on Florida tree farms in a relatively short period of time, he said. Varieties developed by the research partnership make up more than 90 percent of the crops grown on Florida tree farms today, and those varieties yield anywhere from 15 to 35 percent more usable wood than non-improved varieties.

The cooperative program has also made significant advances in the fight against fusiform rust, a disease that can kill trees, stunt their growth or degrade the quality of their wood – costing timber companies and smaller landowners millions in profits every year.

And you don't have to be a major player in the timber business to see a benefit from the research, said Tim White, director of the forestry school, which is part of UF/IFAS.

Tim White, a professor of forest genetics and director of the UF/IFAS School of Forest Resources and Conservation, checks research plots at the UF/IFAS Austin Cary Memorial Forest near Gainesville. White, who joined the faculty of UF/IFAS in 1985, was named director of the school in October 2003. (UF/IFAS file photo)

"Small private landowners account for half the timberland in Florida, and when their property is harvested and replanted, it's almost always with varieties developed by our program," White said.

But it takes more than a genetically sound tree to make forestry a profitable and sustainable industry. That's why UF/IFAS formed another, similar cooperative in 1996 – one that takes an interdisciplinary approach to keeping tree farms and forests healthy and profitable.

The UF/IFAS Forest Biology Research Cooperative allows researchers from UF/IFAS and more than a dozen corporate partners to work together on trials of new tree varieties and new management techniques, in a search for the right combination of genetics, management and location.

"We're looking at what limits the productivity of timberland – whether it's genetics, fertilization, pesticides or any other factor – and hoping to find ways to manage the land so that it's more productive," said Jeff Wright, research manager for Rayonier Inc., one of the corporate partners in the project.

A giant in the global timber business, Rayonier is one of the largest private landowners in Florida. But even the large timber companies don't have the resources to do research on the scale of the studies routinely done by the UF/IFAS research cooperative, Wright said.

"With this cooperative, we can do a trial on a single site and get data from 19 other sites run by other cooperative partners," Wright said. "So we're getting 20 trials for the price of one."

That's not just money saved by the timber industry: increased yields from new tree varieties ultimately result in bigger profits for Northeast Florida landowners and owners of timber-related industries.

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Small Region, Big Impact

Florida's cities may be growing upward and outward, but that doesn't mean that agriculture gets crowded out of the picture.

Just take a look at the state's southwest coast, where burgeoning cities like Bradenton and Sarasota are next to rural areas that are home to major citrus and tomato industries.

The Sarasota-Bradenton region, perhaps best known as a haven for snowbirds and retirees, is also an important area for agriculture. According to a new study by researchers at the University of Florida's Institute of Food and Agricultural Sciences (UF/IFAS), agriculture and natural resource industries contribute almost $3.7 billion in output impact to the economy of four counties in the Sarasota-Bradenton region. The study also shows a 33 percent increase in the total impact of agriculture and natural resources on the local economy during the five-year period from 1995 to 2000 – making the region one of the most important in the state. The region includes Bradenton, Charlotte, DeSoto and Manatee counties.

Of course, it doesn't hurt to be home to one of the largest fruit juice companies. Tropicana Products Inc., producer of the world's best-selling brand of orange juice, has its headquarters and processing facilities in Bradenton.

"We are the largest private employer in Bradenton, with more than 3,000 employees," said Kristine Nickel, a spokesperson for Tropicana. "Our payroll is $160 million in Bradenton alone."

Farmers in the rural area outside Bradenton are still holding their own economically, despite the loss of farmland to urban development, said Phyillis Gilreath, UF/IFAS Manatee County extension agent.

(Eric Zamora)

"In citrus, we've lost some acreage to canker and some to development, but the vegetable industry is doing very well," Gilreath said.

Manatee county tomato growers – long the biggest force in agriculture – are going strong, contributing an estimated $200 million annually to the county's economy, Gilreath said. And revenues are rapidly rising for growers of some of the county's lesser-known crops, such as beef cattle, citrus, cabbage, cucumbers, peppers, potatoes and squash. For example, total revenue for potato growers jumped from $4 million in 2001 to $10 million in 2002, thanks to demands from potato-chip companies. Revenues for cucumber growers rose from $2 million to $10 million during the same period.

In neighboring DeSoto County, development pressures have yet to take a significant bite out of the area's citrus crop, which has been a major player in the county since the 1980s, when freezes drove much of Central Florida's orange production southward.

"In the past 10 or 15 years, we've seen a dramatic increase in the amount of citrus here," said Jim Selph, UF/IFAS DeSoto County extension director. "We've had some problems in recent years because of canker and tristeza, but the economic impact of citrus here is huge."

Canker and tristeza aren't the only woes southwest Florida farmers face in coming years. The phaseout of methyl bromide – a soil fumigant used to control a wide variety of insects, weeds and pathogens – could soon put the squeeze on Florida's fruit and vegetable growers.

Methyl bromide is routinely used on more than 100 different crops – including tomatoes, ornamental plants and other major Florida crops – and is valued by growers for its ability to kill a broad spectrum of

Joe Noling, a professor of entomology and nematology with UF/IFAS, examines tomatoes being grown with an experimental treatment that could replace the widely-used methyl bromide fumigant. Noling heads a statewide research team searching for a replacement. (Eric Zamora)

plant pests. But it is also believed to be a significant factor in the depletion of the ozone layer.

As a result, methyl bromide is being phased out by the federal Environmental Protection Agency and is expected to be banned in America by 2005. However, its use will continue in other countries such as Mexico, which competes with Florida in global fruit and vegetable markets. To help Florida farmers remain competitive, UF/IFAS researchers are racing against the clock to perfect alternatives to the widely used fumigant.

"There's nothing that works as well against the broad spectrum of diseases and pests that methyl bromide reaches," said Joe Noling, a professor of entomology and nematology at the UF/IFAS Citrus Research and Education Center in Lake Alfred and head of a statewide research team searching for alternatives to the fumigant.

Noling's team has crafted one solution to the problem – an integrated pest management system that involves use of a "chemical cocktail" of pesticides to kill plant pests now controlled with methyl bromide. The cocktail has one major drawback: it includes chemicals that, according to federal regulations, can only be applied by workers wearing protective gear. Federal regulations may also restrict use of the chemical cocktail near urban areas, which could spell problems for farmers in rapidly urbanizing areas like those in Southwest Florida.

But UF/IFAS researchers are also looking at other alternatives to chemicals in the cocktail. And while they search, a handful of the state's tomato growers are already testing the new management system on their fields.

"This will be a major change to the way they operate, but we've seen some encouraging signs that the industry is able to adapt," said Noling. "When the supply of methyl bromide runs out, I think Florida will be ready."

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Big Bend Agriculture

In the rural counties of the eastern Panhandle, also known as Florida's Big Bend, farmers are the backbone of the economy.

A new economic study by the University of Florida's Institute of Food and Agricultural Sciences (UF/IFAS) shows that agriculture and natural resource industries generate more than $2.6 billion in output impact in the 12-county Tallahassee region. Forest products contributed more than $1.6 billion in output impact. Other major contributors include agronomic crops such as cotton, peanuts and tobacco, ornamental crops, vegetables and seafood.

The region covers Bay, Calhoun, Franklin, Gadsden, Gulf, Jackson, Jefferson, Leon, Liberty, Madison, Taylor and Wakulla counties.

In Jackson County, where agriculture is the No. 1 industry, the university is helping farmers coax more profit out of their land by encouraging them to change their crop rotation practices. In the early 1990s, lower peanut yields were attributed in part to the lack of crop rotation, which encouraged growth of root-damaging nematodes in the soil.

Doug Mayo, UF/IFAS Jackson County extension cattle agent, said researchers at the UF/IFAS North Florida Research and Education Center in Quincy found that planting a field in bahiagrass helps keep nematode populations down. As a result, extension agents have been encouraging farmers to add bahiagrass, a popular forage for cattle, to their rotation. And when a field is planted in bahiagrass, it only makes sense to raise cattle on it.

"Peanuts have been the cash crop here, but we're seeing more and more row crop farmers who want to get bahiagrass and cattle into the rotation," Mayo said.

He said UF/IFAS has also given a boost to purebred cattle producers in the Panhandle and around the state with the creation three years ago of a bull-testing facility at the UF/IFAS North Florida Research and Education Center in Marianna.

The facility – the only one of its kind in the state – allows breeders to get an independent assessment of the quality of the young bulls they produce. Cattle producers send bulls between the age of 6 and 11 months to the facility, where their weight, growth rate and other qualities are assessed over a 112-day period. It's a vital tool for breeders, who need independent assessments of the quality of their cattle in order to see whether their breeding programs are successful. A bull that scores high in the tests will typically fetch a good price.

"Last year, the bulls that completed the test sold for an average of about $1,600 a head, which is pretty good," said Ronnie Hartzog, coordinator for the facility.

Fishing and seafood-related industries are also a big part of the Big Bend economy. "Franklin County is historically and culturally tied to the seafood industry," said Anita Grove, executive director of the Apalachicola Bay Chamber of Commerce. "We have more than 1,000 people working in the oyster industry alone."

More than 90 percent of the oysters harvested in Florida – about 10 percent of the total United States harvest – come from the Apalachicola Bay area. The fishing industry also brings in blue crabs, shrimp, grouper and other seafood by the hundreds of thousands of pounds each year.

But the area's livelihood has been threatened in recent years by competition from foreign markets, red tide blooms and concerns about *Vibrio vulnificus*, an organism present in raw shellfish that causes illness in some people.

Thanks to research by UF/IFAS scientists, Apalachicola's seafood industry is using new methods to help predict levels of *Vibrio*. The research helped the state establish harvesting criteria to reduce the risk of infection with the bacterium.

Researchers are also studying freezing as a method of killing the bacterium, as well as trying to discover which strains of *Vibrio* are responsible for the illness.

Doug Mayo, left, discusses beef cattle production with Mack Glass, owner of Cherokee Ranch in Marianna. In the 12-county Tallahassee region, the livestock industry generated more than $97 million in output impact and $44 million in value-added impacts. (Eric Zamora)

New federal regulations will require oysters to be treated for the bacterium, and the UF/IFAS research could save Gulf Coast oyster producers millions of dollars.

"High-pressure pasteurization is already available, but the pasteurization equipment can cost hundreds of thousands of dollars," said Anita Wright, an assistant professor in the UF/IFAS food science and human nutrition department in Gainesville. "Many of our oyster producers are mom-and-pop operations that can't afford that kind of expense, but they do have freezers. Currently, we are working with Steve Otwell and Gary Rodrick, professors in the department, and others to validate freezing as a practical, cost-effective method for producing a safer product."

UF/IFAS extension agents are also working with the area's fledgling clam aquaculture industry, which could grab a bigger share of the national market.

"Our clams grow fast, our water is clean, and unlike a lot of Northern communities, we don't have to worry about getting frozen over and not being able to harvest," said Bill Mahan, UF/IFAS Franklin County extension director. "People say this is oyster country, but there's no reason why it can't be clam country, too."

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Dynamic Duo

When it comes to rapid economic growth in agriculture and natural resources, Collier and Lee counties could be called the dynamic duo.

A new study by the University of Florida's Institute of Food and Agricultural Sciences (UF/IFAS) shows the two-county Southwest region was the fastest growing in the state over the five years from 1995-2000. Employment in agriculture and related industries exceeded 30,000.

Driven largely by a whopping 75 percent increase in environmental horticulture – especially the ornamental plant landscaping business – this segment of agriculture generated more than $442 million in output, plus another $300 million in value-added income. It was nearly equal to the $444 million output and $315 million in value-added impact for the area's fruit and vegetable industries.

"Conventional wisdom holds that agriculture ends where residential development begins, with new neighborhoods growing on land formerly tilled by farmers," and Stephen Brown, UF/IFAS Lee County extension horticulture agent. "But Southwest Florida residents are finding that development often means trading one kind of agriculture for another. Landscaping ordinances for residential and commercial properties, along with golf courses and environmental concerns, have created a huge demand for these professional services.

"Landscaping is the agriculture of the future," Brown said. "It enhances the urban environment and creates lot of jobs – more than 9,000 in these two counties alone."

He said the boom in environmental horticulture is also stimulating demand for UF/IFAS research and education programs in the region, particularly as residents and professional landscapers come to the UF extension service for information on topics ranging from irrigation and fertilization to pest control and water conservation.

Brown offers a certification class for landscapers through the Lee County Extension Service in Ft. Myers, and he says there's strong demand for the classes – even though state law doesn't require landscapers to be certified.

"Legally, they have no need to be certified, but there's a hunger out there for the information we have," Brown said.

With its balmy climate, Southwest Florida has traditionally been an exporter of ornamental plants to customers north of the peninsula. But residential development has put a dent in those exports as a growing number of ornamental plants are sold to homeowners and landscapers in Southwest Florida. Local producers still export $142 million in environmental horticulture products and services to out-of state customers.

While the shift toward environmental horticulture is strong in Lee County, neighboring Collier County remains a major producer of fruits and vegetables. The shift of citrus production to the warm areas of Southwest Florida has dramatically increased production in the region.

(Eric Zamora)

"Tomato production is also a big enterprise in Florida, but it's Collier County that drives the ship," said Reggie Brown, manager of the Florida Tomato Committee in Orlando, a federal marketing committee that sets standards for Florida tomatoes shipped across state lines.

Florida produces between 45 percent and 50 percent of all fresh market tomatoes grown in the United States, according to the committee. Together, Lee and Collier counties produced $249 million worth of vegetables in 2000 alone, according to the UF/IFAS economic impact study. Tomatoes accounted for most of that production.

Brown says recent fluctuations in the economy have not put a dent in America's demand for tomatoes.

"Consumption of tomatoes has generally trended upward in the past several years," Brown said. "And we

Stephen Brown, right, examines a king sago (Cycas revoluta) with Phil Wells, left, owner of PCL Landscape Management Inc. in Ft. Myers, and Joseph Green, an employee of the firm. (Eric Zamora)

expect that trend to continue as the baby boomers get older; recent findings about the health benefits of lycopene in tomatoes are also stimulating interest in tomatoes."

He said there's another trend to watch out for. Future federal regulations will require country-of-origin labeling on all tomatoes sold in stores, a change that could give Florida tomatoes an edge when competing with imported tomatoes on the domestic market.

But the toughest competition for Florida tomato growers has always come from the backyards of America, Brown said.

"People have an emotional attachment to tomatoes that you don't find with any other kind of produce," he said. "It's the most common vegetable in private gardens. Everybody has memories of tomatoes they've grown themselves, or tomatoes that came from their grandmother's garden. No matter how good your product is, it's hard to convince people that a store-bought tomato is just as good. It's hard to compete with a memory."

At the UF/IFAS Southwest Florida Research and Education Center in Immokalee and other UF/IFAS facilities, scientists are using a combination of genetic engineering and conventional breeding techniques to produce new tomato varieties that offer better taste, more firmness, or a longer shelf life.

"The varieties we're growing now are better than the varieties we had 10 years ago," Brown said. "And we expect they'll be even better 10 years from now, thanks to UF/IFAS."

At the UF/IFAS Immokalee center, Fritz Roka, an associate professor of food and resource economics, is helping citrus growers in the area evaluate the cost-effectiveness of various mechanical harvesting systems. To compete with low-cost producers such as Brazil, Florida growers need to reduce their production costs, and machine harvesting can help them realize that goal, he said.

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Panhandle Prosperity

There's more to Florida's Emerald Coast than first meets the eye.

Go north of the world-class beaches, past the urban areas and military bases, and you'll see the other face of Florida's Panhandle, where the economy still depends on people who work with the land.

Agriculture and natural resource industries are major contributors to the overall economy of the Pensacola region, generating more than $1 billion in output and value-added services in the state's six westernmost counties, according to a new economic impact study by the University of Florida's Institute of Food and Agricultural Sciences (UF/IFAS).

"From cotton, peanuts and soybeans to thousands of acres planted in loblolly and slash pine, agriculture here has a Deep South feel," said Lamar Christenberry, UF/IFAS Escambia County extension director in Pensacola.

And while agronomic crops and forest products have been produced in the region for generations, new agricultural enterprises such as catfish farming, sod production and ornamental crops are important contributors to the economy.

The recent boom in the region's catfish aquaculture industry is a prime example, Christenberry said. Ten years ago, catfish farming was almost unheard of in the western Panhandle. Now the region has 35 catfish farmers operating on more than 1,000 acres and producing millions of pounds of fish. He said none of them would have turned to aquaculture without the help of Max Griggs, a UF/IFAS Escambia County extension agent who recently retired.

"Here's an industry that grew up from nothing all because of the efforts of an extension agent," Christenberry said. "It's a perfect example of what the extension service is all about."

In another example of how UF/IFAS helps agriculture, Ken Barton, president of the Florida Peanut Producers Association in Marianna, said peanut growers could not survive in today's competitive world markets without the university's research and education programs.

"For decades, UF/IFAS has been at the forefront in developing new high-yielding peanut varieties that are resistant to common diseases such as tomato spotted-wilt virus," he said. "If these new varieties weren't available, damage from this one disease alone would be enough to drive many peanut farmers out of business."

Scientists at the UF/IFAS West Florida's Research and Education Center in Jay and Milton are developing a variety of best management practices to help Panhandle farmers boost profits and protect the environment.

Shibu Jose, an assistant professor of forest ecology at the UF/IFAS West Florida center, is developing new agroforestry management practices that allow farmers to grow row crops or graze livestock on land that's also used to grow trees.

Little known in the United States, agroforestry is relatively common in developing countries where farmers can't afford fertilizers and other production inputs. Farmers usually plant rows of crops between trees, making use of the trees' natural nitrogen-fixing abilities and reducing the need for fertilizers.

Jose said agroforestry is ideal for the Florida Panhandle, particularly for crops such as cotton and peanuts that grow in partial shade. The practice can help Florida row crop and cattle farmers boost their income by harvesting timber on a regular basis. It also reduces fertilizer runoff and leaching into groundwater supplies.

Rick Williams, an associate professor and extension forestry specialist at the UF/IFAS West Florida center's Milton campus, is helping developers and new residents manage timberland that has been converted to residential or commercial use.

He offers the new landowners advice on "natural management" – techniques that allow them to turn a profit while changing rows of planted pine into a more natural-looking forest. Natural management involves harvesting only small portions of a property and

Jeff Mullahey, left, and Greg Kimmons, a senior agricultural assistant at the UF/IFAS West Florida Research and Education Center, check peanut plants in Jay, Fla. The center also has facilities in Milton. (Eric Zamora)

allowing the trees there to re-seed naturally in lieu of planting new trees.

Jeff Mullahey, director of the UF/IFAS West Florida center, says Williams' work will grow increasingly important – in both economic and environmental terms – as the Panhandle population continues to move to land now used for forestry.

"This is a trend that's going to change the landscape forever," Mullahey said. "If we can reach these new landowners and teach them how to manage their land, it will have a long-lasting impact."

Bryan Unruh, an associate professor at the UF/IFAS West Florida center, said urban development and new golf courses are driving the rapid growth of the turfgrass industry in all areas of the state. As a result, many row crop farmers in the West Florida region are diversifying their operations with sod farming.

According to the UF/IFAS economic impact study, the environmental horticulture industry – which includes turfgrass and other landscaping plants – grew by 68 percent in the western Panhandle during the five-year period ending in 2000, adding more than $91 million in annual revenue to the area.

"At the UF/IFAS West Florida center, which is one of the largest turfgrass research facilities in the Southeast, we are developing new environmentally friendly management practices and varieties for commercial and residential applications," Unruh said

"One of our most promising new varieties is seashore paspalum, a saltwater-hardy coastal grass that could be used on Florida golf courses," he said. "Because of its high tolerance to seawater and treated wastewater, the grass could help reduce use of other water resources to keep Florida golf courses green. It's also a great-looking grass that golfers like to play on."

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New Center for Organic Agriculture Takes Root

What used to be a niche market in the nation's annual $460 billion food industry has become mainstream as more consumers look for locally grown foods that are produced in environmentally safe ways. For some, this means organic foods.

In fact, sales of organically grown fruits and vegetables have increased 20 percent a year for the past 10 years, and almost three-quarters of all supermarkets in the United States now carry organic foods. The U.S. organic market is expected to reach $20 billion by 2005.

And the boom in organics isn't limited to the U.S. In the United Kingdom, organic food sales are expected to increase by 75 percent over the next five years. In China, farmers are getting 30 percent to 50 percent more for their organic food exports.

"People associate organic foods with freshness, better health and food safety, and they're willing to pay a premium price for organic produce – especially for produce that is grown locally," said Mickie Swisher, an associate professor in the University of Florida's Institute of Food and Agricultural Sciences (UF/IFAS).

(Eric Zamora)

Making certain the production of locally grown organic foods will meet growing demand is one goal of the new Center for Organic Agriculture, a private-public partnership between UF/IFAS and organic farmers. Swisher, an expert on sustainable agriculture and small farms, said certified organic land at the UF/IFAS Pine Acres Experimental Station will be used for research. UF is one of the first land-grant universities in the nation to start a center for organic research and education; one of the goals is to create a minor in organic agriculture and a certificate in organic agriculture, to be offered through UF's College of Agricultural and Life Sciences.

Rose Koenig, owner of Rosie's Organic Farm in Gainesville and co-director of the center, said agricultural research and education have always been the key to increasing food production in traditional, large-scale farming operations. "We need to apply the same science-based approach to solving the problems that organic producers face," she said.

"Of course, before we initiate any research on organic farming, we have to make certain that no prohibited substances, such as synthetic fertilizers or pesticides, have been used on the land within the past three years," said Koenig.

She said discussions with UF/IFAS about creating the center date back to 1997. "The need for organic farming research was confirmed in 2002 when the U.S. Department of Agriculture established national standards for certifying organically grown food. The

Rose Koenig, left, examines locally grown organic produce at a farmers' market in Gainesville with Mickie Swisher. (Thomas Wright)

USDA action stimulated consumer interest in organic products.

"The establishment of USDA standards, which was a key event in the history of this nascent industry, really validated the value of organic products," Koenig said. "The USDA standards help assure consumers that the organic products they buy are really organic."

She said the USDA standards for organic produce also pointed to the need for research, "bringing organic producers and researchers to the same table so that cooperative projects could be developed for the benefit of growers and consumers."

The research at the UF/IFAS center will lead to improved production practices that will help all organic producers.

Florida's organic farmers are concerned about three major production problems: insect pest and disease management; controlling weeds and managing soil fertility, she said.

"There are many exciting opportunities for research. For example, some people feel that organically produced foods offer health benefits. But no one knows if this is true or not – there is no scientific evidence for this one way or another," Koenig said. "At UF/IFAS, we have experts in many areas, ranging from agronomy and soil science to food science and human nutrition. This gives us a great opportunity to answer complex questions like this one."

Koenig said organic farming is environmentally friendly. "It doesn't just protect the soil, but actually improves the quality of soil."

Marty Mesh, executive director of Florida Organic Growers and Consumers in Gainesville, said there are 2.23 million acres of organic farmland in the U.S., including about 12,059 acres in Florida. He said the new UF/IFAS center will be an asset to both growers and consumers.

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Florida 4-H: Lifetime Investments

When it comes to return on investment, the Florida 4-H Youth Development Program keeps on giving.

"Considering the fact that more than 241,000 youth are now enrolled in our statewide 4-H programs and we have nearly 12,000 adults who volunteer thousands of hours to help these young people realize their full potential, the return on investment is excellent," said Marilyn Lesmeister, an assistant professor with the University of Florida's Institute of Food and Agricultural Sciences (UF/IFAS).

"From the standpoint of public support, we know that 4-H is cost effective, but the program also has a positive, long-term impact on the lives of young people that's difficult to measure in dollars and cents," she said. "Florida 4-H really is a lifetime investment in the future of our youth."

Lesmeister said a recent study found that young people who participate in the 4-H youth development program for a year or more fared better than their peers, including those participating in other after-school activities.

The research shows that youth development is closely linked to how kids spend their time out of school, she said. Those who are not involved in constructive out-of-school youth development programs such as 4-H are more likely to experience problems in school, get lower grades, cheat on tests and experiment with drugs.

"After all, a lot can happen in the out-of-school hours. 4-H makes sure it's positive," she said.

Lesmeister, who works with adults who volunteer their time to 4-H, said the survey also indicates 4-H members also are more likely to give money or time to charity, help the poor, sick or others, get better grades, and serve as role models for other kids.

"4-H volunteers working one-on-one with young people understand how to contribute to young people's self-esteem, confidence and leadership skills," Lesmeister said. "This helps them find ways to succeed in society outside of the traditional school environment and adapt their skills to better succeed in the public school system."

Marylin Lesmeister, right, confers with Maria Valladares, who has been a 4-H club volunteer in Alachua County for 18 years. (Tara Piasio)

She said 4-H is a "welcoming place" for today's youth, including at-risk youth. The Florida 4-H program now involves youth in 67 counties and the Seminole Tribes – encouraging young people statewide to make a positive contribution to their communities.

In today's rapidly changing society, she said the statistics for at-risk youth point to the need and long-term value of programs such as the Florida 4-H program, which is administered by UF/IFAS.

At a time when state and local governments are spending an average of $7,400 per child attending public schools each year, there are more than 26,000 school dropouts in Florida alone. The cost of incarcerating a youth in a juvenile detention facility for one year averages approximately

Mary Williams, left, UF/IFAS Nassau County extension director and 4-H agent, visits with 4-H'ers during the annual State 4-H Congress at the University of Florida in Gainesville in July 2003. Williams is president-elect of the National Association of Extension 4-H Agents, an organization of youth development professionals that integrates scholarship, research and practice. (Eric Zamora)

$20,000. And the detention facility's population consists mostly of dropouts finding trouble to fill the time they should be spending in classrooms.

"Essential to the program are nearly 12,000 volunteers who donate time and energy worth an estimated value of more than $2 billion nationally each year," Lesmeister said. "Recent research indicates youth involved in 4-H programs develop into competent, caring, compassionate and confident youth who make contributions rather than cause trouble."

She said it's the lasting impact and influence of volunteers that really matter, not the estimated monetary value of their volunteer efforts.

"Volunteers of all ages – who want to use their skills to help youth in their communities – work as individuals and on committees," Lesmeister said. "They plan, coordinate, teach, manage, mentor, market and advocate. Research shows us that volunteers bring added credibility to the 4-H program, because they are trusted. They have influence with friends, neighbors and decision-makers."

In Apopka, Fla., Doug Meyers, the national director of outcomes for HealthSouth Corp., tracks patient care for physical and occupational therapy. He also volunteers as the Wrangler 4-H Club organizational leader and agrees with Lesmeister: "Measuring the value of the 4-H program is a lot more complicated than looking at dollars and cents," he said.

Meyers, a 4-H alumnus from Ohio, is a 4-H parent and volunteer leader to a club that expanded from eight young people to 80 in just five years. He strives to reach out and make a difference in the lives of at-risk youth in his Orange County community.

Every year, students enrolled in public education leave the system because they are not able to meet the educational and FCAT (Florida Comprehensive Assessment Test) goals of their school. Meyers said these kids may not be able to reach their full potential because they have difficulty learning in a structured school environment.

"The 'learn-by-doing' motto is what makes the 4-H program so successful," Meyers said. "Some kids just

Sandra Smith, right, an educator from the Jacksonville Museum of Science and History, answers questions from students at a 4-H workforce preparation program for inner-city youth. (Thomas Wright)

aren't textbook learners, and the experiential learning process encourages the students to learn not only the content, but the thought processes and reasoning behind the topics.

"By reaching out to these at-risk youth and enhancing their education through other processes, the 4-H program is reducing the risk of creating a two-level society in the future: those individuals who are 'book-wise' and those who are left to flounder in minimum-wage jobs," he said.

"4-H provides the opportunity for these youth to become caring, competent adults," Meyers said. "The activities and experiences keep youth out of trouble, encourage creative and critical thinking, and help them explore future career possibilities through interesting projects and mentors."

Meyers said the long-term impact of the 4-H program is the development of life skills in youth that improves their economic futures. By developing a better understanding of the nation's economy and the demands of the job market, these youth can become leaders in their communities and have a positive effect on the overall economy.

"Many of the 4-H'ers in my club discovered their future careers while completing their 4-H projects," Meyers said. "Pledging their 'hands to larger service,' 4-H youth work with adult volunteers to improve their local communities through various service projects and programs."

In Santa Rosa County, for example, 4-H'ers, parents and volunteers joined together to salvage bleachers, wood, garbage cans and other items from a horse arena scheduled to be demolished. They transported the items to a new recreation facility, saving the county several thousand dollars.

"It's difficult to estimate the value of their efforts," said Vickie Mullins, UF/IFAS Santa Rosa County 4-H agent in Milton, Fla. "Salvaging the materials

benefited the whole community, and the county was able to use the money that they saved for other projects that benefit the community."

She said a new 4-H program in Santa Rosa County seeks to rehabilitate young women residing at the Juvenile Justice Facility in Milton. Members of the Milton Girls of America 4-H Club will spend from five and a half months to one year in the facility, and Patty Hooper, a recreational therapist at the facility, hopes they stay out of trouble when they're released.

Mullins said the program began in August 2003 and appears to be successful; eight girls submitted projects to compete in the North Florida Fair. While no participants have been released yet, the goal is to include 4-H participation as part of their release plan.

"We want the girls to go back into the community and stay out of trouble," Mullins said. "Ideally, we'd like them to contact their 4-H offices and continue their involvement in this excellent program."

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Vickie Mullins encourages 4-H'ers to practice their riding skills. (Eric Zamora)

Ready for a Changing Economy

Florida's $62 billion agricultural and natural resource industries depend on educated professionals in highly technical disciplines, and the University of Florida's College of Agricultural and Life Sciences fills that need with "society-ready" graduates.

Current enrollment in the college, which includes the UF/IFAS School of Forest Resources and Conservation, exceeds 3,900 students – up more than 150 percent during the past decade. Ten years ago, there were few female and minority students. Now, women are the majority at the undergraduate level, and there is a high percentage of minority students.

"No matter where you go in the United States and many other nations, chances are you'll find graduates from the UF/IFAS college in a variety of important government and business positions," said Jimmy Cheek, dean of the college, which is part of UF's Institute of Food and Agricultural Sciences (UF/IFAS).

He said some graduates work for large multinational organizations, while others use their college skills to build their own businesses. And some graduates go on to other professional programs in areas such as medicine or law.

"It may be difficult to measure the dollar value of our teaching programs, but we know they are essential for agriculture and related industries," Cheek said.

"Our graduates are among the movers and shakers in every agriculture-related business in Florida," he said. "They own and run family farms. They teach school and develop new technologies. They manage giant agribusiness companies. And they work in the government institutions that keep our food safe and our environment clean.

"We pride ourselves on giving our graduates broad-based education and experience," he said. "We want them to be professionally and technically competent – but we also want students who have the agility to adapt to the needs of a changing society and economy."

Less than a decade ago, Nyree Washington was a student at UF, searching for a career path that would allow her to have an impact on society. After taking a survey class on agricultural careers in the UF/IFAS college, she was hooked.

When she graduated from the college in 1997, it didn't take her long to find a teaching position at one of the state's most innovative magnet schools. As an agriscience teacher at Miami's Coral Reef Senior High School, Washington is helping kids from one of America's urban centers get ready for jobs in agriculture and the sciences.

"In a big city, it can be difficult to get people interested in agriculture," she said. "But if you start talking about agricultural biotechnology, you get a different reaction. You get students and parents who understand that there are a lot of career opportunities in this field."

Stories like Washington's are common among graduates of the college, which prides itself on producing alumni who are ready to enter the real world and make an impact on society the minute they have their degrees in hand.

"I love my work," said Alissa Blank, an assistant general counsel for enforcement at the Florida Department of Environmental Protection in Tallahassee. "I feel a sense of purpose in what I do, and I get to put my undergraduate education to work every day in my job."

Blank is in charge of the agency's efforts to ensure that landowners comply with state regulations on restoring damaged mangrove swamps and other

Nyree Washington, right, discusses the propagation of poinsettias in her science class at Coral Reef Senior High School in Miami with Justin Kotlowski, center, and Alexander Crawford. (Eric Zamora)

wetland areas. She has closed several cases for the agency, including one long-standing case that resulted in a corporation giving a large cash and land donation to preserve the Florida Keys. In addition to the donation, the corporation has planted 1.4 million mangrove seedlings to help restore the damaged mangrove fringe.

Blank says she has always been interested in environmental policy issues, but wasn't able to get hands-on experience in the field until her undergraduate classes in the UF/IFAS School of Forest Resources and Conservation.

"Being from Miami, I'd never even been in a forest before I started taking classes at UF/IFAS," she said. "On my first day in the field, I showed up wearing Ralph Lauren boots to visit a cypress swamp. I didn't have a clue about what it was really like out there."

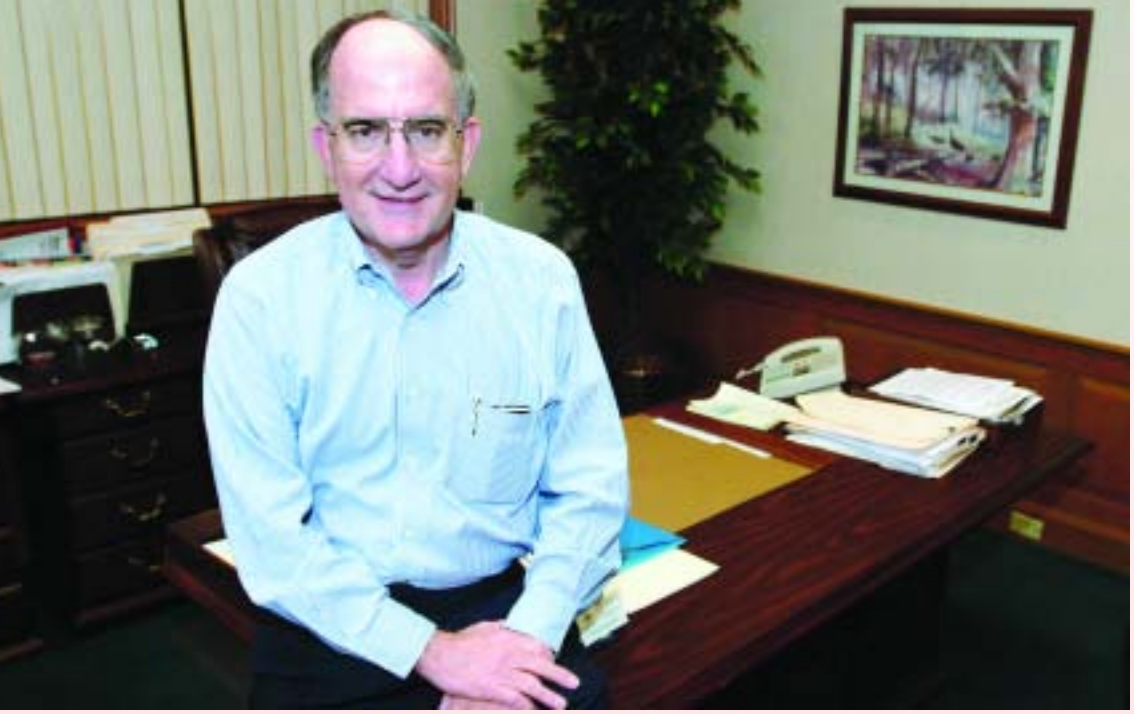
She graduated in 2000 with a degree in natural resources conservation – and a desire to use her degree to help save the environment. After finishing law school in 2003, she joined the staff at the Florida environmental agency. She says her background in forestry is a key to her success in the job.

Graduates of the UF/IFAS college are also crucial to the development of new businesses that provide jobs for Floridians. Just ask Patrick Schirard, a 1982 graduate and president of Fort Pierce-based Freshco Ltd., the company that makes Indian River Select orange and grapefruit juice.

In 1992, Schirard joined Groveco Inc., a citrus and cattle operation in Martin County. In 1995, the company expanded its operations to include citrus juice processing and packaging. Their new venture, Freshco Ltd., began building the Indian River Select brand of premium juices in the supermarkets of the southeastern United States.

"There was plenty of recognition of the Indian River name, but at the time it was mostly associated with fresh fruit," Schirard said. "We thought there was enough recognition to support a not-from-concentrate juice brand."

The idea appears to have caught on: the brand is now carried by a dozen major grocery store chains in the Southeast. "We've grown from a startup to a million cases a year," he said.



Bernie Lester, who graduated from UF/IFAS college in 1961, was an economic researcher for the Florida Citrus Commission before he joined Alico Inc. in 1986. He became president of the LaBelle-based company in 1997. (Thomas Wright)

(Photo below left) Students examine cassava plants in a crop science laboratory offered by the UF/IFAS Department of Agronomy. (Tara Piasio)

(Photo below right) Students learn about laboratory techniques in a course offered by the UF/IFAS Department of Microbiology and Cell Science. (UF/IFAS file photo)

Son of a long line of Florida graduates and citrus producers, Schirard knew from the beginning that he was headed for a career in citrus. And he knew there was only one place to go for his education.

"There was never any question, really," he said. "The University of Florida's College of Agricultural and Life Sciences is the most reputable agricultural school in the South."

Bernie Lester agrees. Growing up on a shade tobacco farm near the Gadsden County town of Havana, Lester learned that UF/IFAS was the best place to go for a career in agriculture.

He graduated from the college in 1961 and went on to earn his doctoral degree from Texas A&M University. Then he returned to Florida to work as an economic researcher for the Florida Citrus Commission. In 1986 he joined Alico Inc., an agribusiness company that owns more than 140,000 acres in Central and Southwest Florida. He became president of the LaBelle-based company in 1997.

Lester said he could not have made it without the start he got in the UF college.

"They offered a good balance of technical training and field work," he said. "It's a great place to get an education."

That balance is one of the college's greatest strengths, Cheek said.

"When we talk about the curriculum in this college, we're not just talking about students attending classes and taking notes," Cheek said. "We encourage students to get involved with internships, international experiences and research, and we give them opportunities to do so. We have professional clubs associated with every major in the college. If you look at the quality of our student body, the careers they enter, and the graduate and professional schools they enroll in at graduation, we can effectively compete with any institution like ours in the United States."

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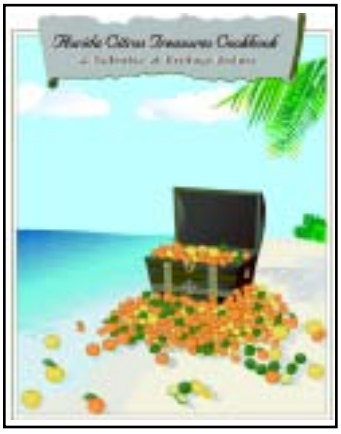
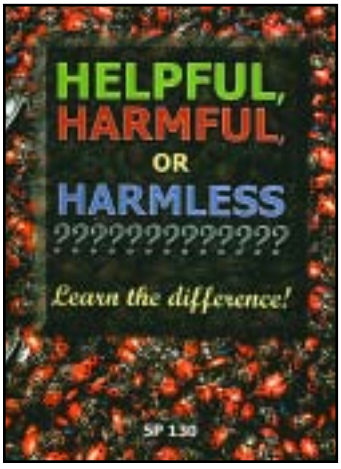
Educational Resources

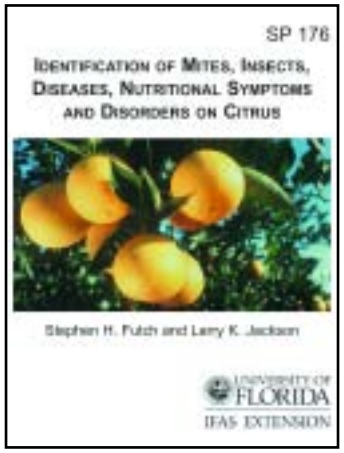
The UF/IFAS Extension Bookstore has hundreds of useful and interesting books, videos and software CDs available at low prices. Whether you're a farmer, natural resource manager, community educator, gardener, wildlife watcher or homeowner, we have the resource for you! The products below are just a sampling of what we have to offer – from gardening manuals and wildlife guides to essential information for agriculture professionals.



Florida Citrus Treasures Cookbook: A Collection of Heritage Recipes contains 250 unique recipes treasured by pioneers and educators throughout the years. The selections include categories from appetizers to main dishes, desserts, jams, jellies and pickles. These easy-to-make recipes use ingredients such as citrus pulp, peel and juice to create unusual dishes such as bitter orange beverages, grapefruit pies and lime cookies. Proceeds from the sale of the cookbook will be used to endow a professorship in the UF/IFAS Department of Family, Youth and Community Sciences. **SP 338,** $15.00.



Your home landscape hosts a diverse ecosystem of insects and other tiny life forms. Some survive by eating your prized plantings, but many others help by eating the "bad bugs." Some are simply harmless. Learn which bugs to keep and which ones to control with this updated version of a favorite ID deck: *Helpful, Harmful or Harmless?* Each colorful photo is clearly marked to eliminate the guesswork. Fresh information, new photos, and a convenient new format complete this exciting revision. **SP 130,** $10.00.



The newly revised *Citrus Disorders ID Deck* features 65 identification flash cards with 106 color photographs of the enemies of citrus and the damage they can cause. This pocket-sized set of laminated cards is convenient for field use and includes a handy measurement conversion guide. A useful information source for both citrus industry professionals and backyard citrus enthusiasts. **SP 176,** $10.00.

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Visit the UF/IFAS Extension Bookstore in Building 440 on Mowry Road on the UF campus in Gainesville, or order online at **http://www.ifasbooks.com.**
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Keeping Florida Green

Debbie Miller, left, an associate professor of wildlife ecology, and Shibu Jose, an assistant professor of forest ecology, use an infrared gas-analyzer to measure photosynthesis of young longleaf pines at the UF/IFAS West Florida Research and Education Center in Milton. Jose said photosynthesis removes carbon dioxide from the atmosphere, and the instrument shows how much carbon is being absorbed or sequestered by the trees, thereby reducing global warming. He said North Florida pine forests – part of the state's $8 billion renewable forest products industry – perform a vital role in protecting the environment and maintaining valuable green space in an urbanizing state. (Thomas Wright)

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