Integrated Pest Management and Florida Tomatoes: A Success Story in Progress

Every day across our nation, Florida puts tomatoes on the table. Tomatoes first came to Florida in 1870, when farmers planted them in Alachua County. Now tomatoes are Florida's No. 1 vegetable crop.

Tomato management in Florida has grown quite sophisticated over the years. Management practices include: introducing broad-spectrum soil fumigants and herbicides into polyethylene mulched beds, precisely metering the application of fertilizer, lime and water, performing systematic biweekly scouting for pests, and judicious use of pesticides based on action thresholds.

These and other practices are part of a growing strategy known as Integrated Pest Management (IPM). Florida is a leader in fresh market tomato production because of a proactive approach to Integrated Pest Management.

Why Protect Tomatoes With IPM?

- Tomatoes are the **No. 1** vegetable crop in Florida. In 1996–97:
  - 37,300 acres were planted;
  - 1.4 billion pounds produced (36,700 pounds per acre); and
  - Tomatoes earned $462.5 million in on-farm revenues, or 28.9 percent of the value of all Florida vegetables.
- Florida produces only fresh-market tomato varieties that must be blemish-free to maintain their market value.
- Florida produces 40 percent of the fresh-market tomatoes in the United States.
- Production costs are high — $11,600 per acre or $.33 per pound in 1997–98.
- Currently, chemical inputs are high, with fertilizer, fumigants and pesticides accounting for 15 percent of total production costs.
- Twenty-seven arthropods, 29 diseases and 10 to 15 weeds are pests of tomatoes in Florida (see next page, "Key Pests of Tomatoes.")

Silverleaf whitefly adult and eggs

Key Pests of Tomatoes

Arthropods

- Silverleaf Whiteflies, vectors of:
  - Tomato Yellow Leaf Curl Virus
  - Tomato Mottle Virus
- Leafminers
- Tomato Pinworms
- Thrips, vectors of:
  - Tomato Spotted Wilt Virus

Other Invertebrates

- Root-knot Nematodes

Diseases

- Bacterial Spot
- Late Blight
- Bacterial Wilt
- Tomato Yellow Leaf Curl Virus
- Tomato Spotted Wilt Virus
- Tomato Mottle Virus

Weeds

- Purple and Yellow Nutsedge
- American Black Nightshade

IPM:

It's a Vital Tool for Growers

THE GOAL OF IPM is to insure production of abundant, high-quality food using environmentally and economically sound methods. To achieve this goal, IPM emphasizes minimizing crop loss from pests by using any and all means at the grower's disposal. Growers can use resistant and tolerant varieties, and efficient cultural and management practices. They can monitor crops regularly to determine if and when control measures are needed. And they can apply biological control wherever possible.

Tomato growers began to adopt IPM in 1976–77, following a severe outbreak of leafminers that caused significant economic loss. This outbreak, which required as many as 34 insecticide sprays in a single 90-day season, was attributed to a build-up of pesticide resistance in the leafminers and pesticide-induced mortality in the leafminer parasites — a phenomenon common to crops receiving high chemical inputs. The outbreak served as a wake-up call to set in motion pilot IPM programs in Dade County, Fla.

Tomato IPM Timeline

the good

1970
Plastic mulch first used in combination with soil fumigation.

1976–77
IPM pilot program launched in Dade County.

1978
IPM programs implemented in Manatee and Hillsborough counties.

1980
First tomato scouting guide was published by UF.

1980s
Scouting companies

Pheromones and dis developed at the Un

the bad

Target spot caused by fungus *Corynespora cassiicola*

1976
Severe outbreak of leafminers (*Liriomyza* spp.).

Relative Impact of Selected Management Practices on Tomato Production

	Parameter			Pest Problem			
	Overall Plant Quality	Ease of Harvest	Yields	Insects	Diseases	Weeds	Nematodes
Host Plant Resistance	$$$$*	$	$$$$		$$$$		$$
Optimal Fertilization	$$$		$$$$	$$$	$$$		$$$
Soil Fumigation	$$$		$$$$	$	$$$	$$$	$$$$
Beds and Plastic Mulch		$$	$$$$	$$	$$$	$$$	$$
Drip Irrigation	$$$		$$$$	$$	$$$$	$$$$	$$
Healthy Transplants	$$$		$$$$	$$$	$$$$	$	$$
Staking and Tying Plants		$$$$	$$	$	$$$	$	
Scouting Activities			$$$	$$$$	$$$$	$$$	$$
Field Sanitation		$$	$$	$$	$$$	$$$	
Crop Rotation				$$$	$$	$$	$$

*Improvement: minor $, notable $$, substantial $$$, significant $$$$

IPM Benefits Tomatoes, and Florida, in Many Ways

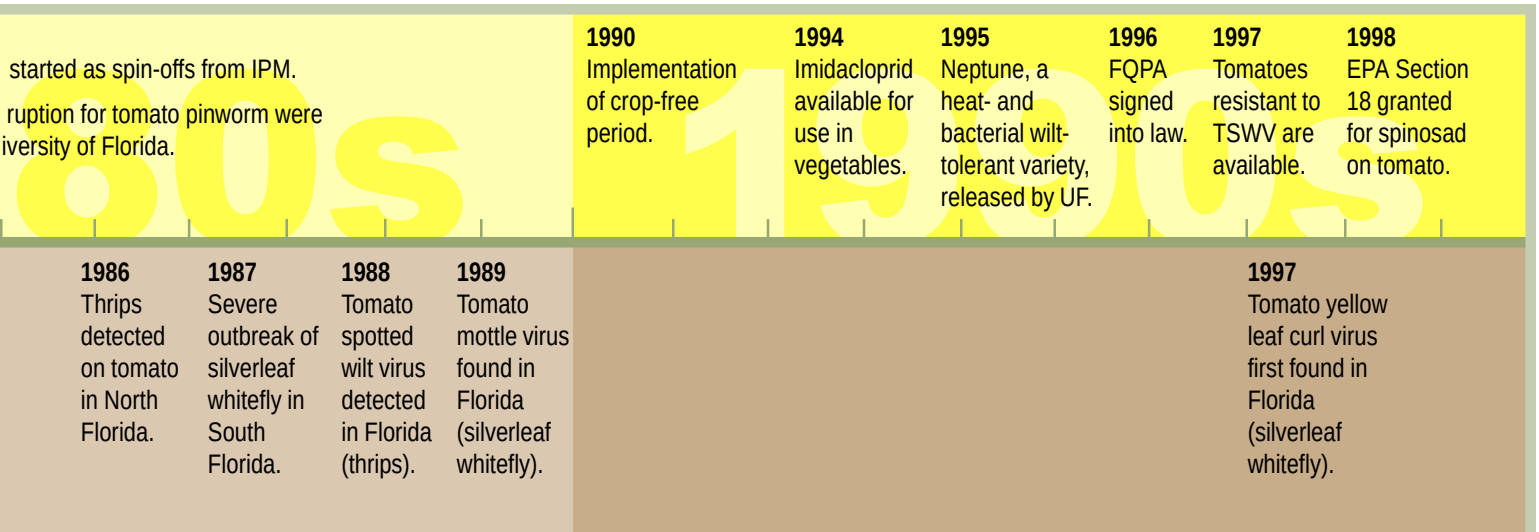
Growers and the general public have reaped the rewards thanks to IPM. Here's a look at some results of nearly 25 years of tomato IPM in Florida:

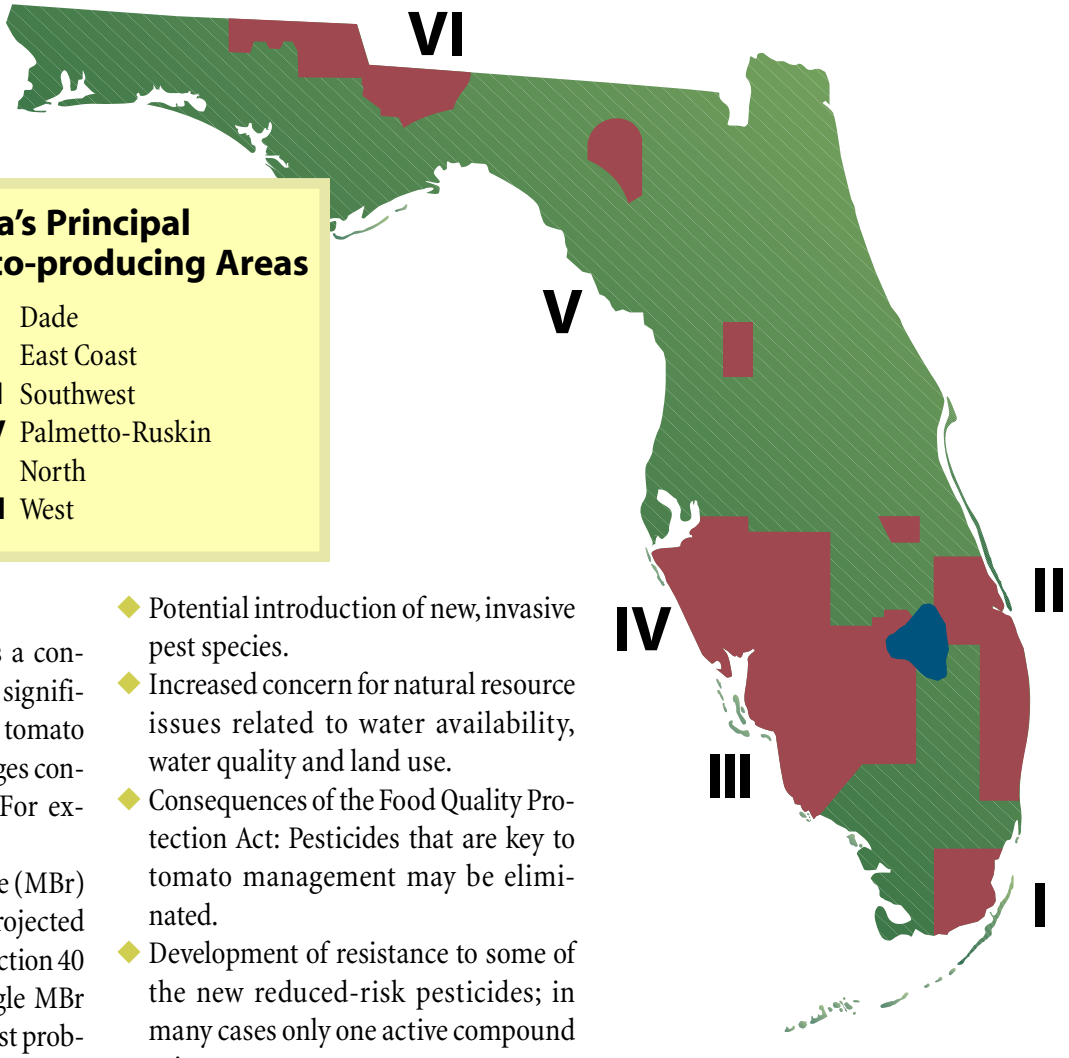
- **Yields have risen dramatically** from 29,000 to 36,700 pounds per acre in only 8 years (1988–89 to 1996–97).
- **Fifty percent of growers routinely scout** for pests.
- Growers using IPM report **82 percent reduction in overall pesticide use**.
- **Insecticide use has been significantly reduced** from an average of 8.9 pounds per acre in 1994–95, to 3.5 pounds per acre in 1996–97.
- A **shift toward using reduced-risk pesticides** is evident throughout Florida.
- **New scouting companies** with highly trained personnel have developed.
- Scouting actions have **detected outbreaks** of new and unusual diseases, enabling early intervention.

Why We Need Research

From the start, Florida IPM programs for tomatoes have been interdisciplinary, with components of horticulture, entomology, plant pathology and nematology. University of Florida scientists have made key contributions to the development and implementation of tomato IPM. For example, UF researchers have:

- developed sampling methodologies for scouting of all tomato pests in Florida;
- developed action thresholds for tomato pests in Florida;
- provided data on pesticides that conserve natural enemies;
- provided data on timing of pesticide application to conserve natural enemies;
- developed monitoring and mating disruption for tomato pinworm;
- studied effects of reflective mulches on pest presence/dynamics, including virus transmission; and
- developed several disease-resistant tomato varieties.





Florida's Principal Tomato-producing Areas

- **I** Dade
- **II** East Coast
- **III** Southwest
- **IV** Palmetto-Ruskin
- **V** North
- **VI** West

Future Challenges

Pest management in tomatoes is a constantly moving target. Although significant advances have been made in tomato IPM, new pests and other challenges continually need to be dealt with. For example:

- The removal of methyl bromide (MBr) as a soil fumigant by 2005 is projected to reduce Florida tomato production 40 to 69 percent. To date, no single MBr alternative controls as many pest problems as MBr fumigation.
- Potential introduction of new, invasive pest species.
- Increased concern for natural resource issues related to water availability, water quality and land use.
- Consequences of the Food Quality Protection Act: Pesticides that are key to tomato management may be eliminated.
- Development of resistance to some of the new reduced-risk pesticides; in many cases only one active compound exists.

Professor Philip Stansly, University of Florida, looks for insect pests.

The Research Team

- University of Florida, Departments of Entomology and Nematology, Horticultural Sciences, Plant Pathology, and Agronomy.
- UF Research and Education Centers at Belle Glade, Bradenton, Immokalee, Homestead, Leesburg, Quincy and Suwanee Valley.
- UF Cooperative Extension Service.

Agriculture is the foundation on which America was built. The strong partnership between Land Grant universities and the USDA Cooperative State Research, Education and Extension Service (CSREES) generates new knowledge (through research, teaching and extension) and communicates this knowledge to those who need it. Thus, this partnership provides solutions to problems faced by Americans every day. Water quality, food safety, and management of pests are just a few of the areas in which the Land Grant–USDA partnership is making a difference.

UNIVERSITY OF FLORIDA
Cooperative Extension Service
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