

Unique Challenges for Florida Growers in Tomato and Pepper Production¹

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“The fact that Florida is the number one producer of fresh market pepper and tomato in the United States is quite remarkable given the unique challenges to growing vegetables in Florida and is a testimony to the resourcefulness and skill of the growers engaged in producing these crops.”

Unique Challenges for Florida Growers:

- Weather events (freezes, rainfall, and hurricanes)
- Poor soils (organic matter and pH)
- Pest and disease pressure (insects, diseases, nematodes, and weeds)
- Labor
- Development and urban sprawl
- Regulations

Weather Events

While Florida’s normally mild semitropical climate may seem ideal for the cultivation of warm season crops like peppers and tomatoes, producers have to deal with wide variations in temperature ranging from blazing hot to freezing cold. High temperatures can inhibit pollination and fruit set while all parts of extreme southern peninsular Florida can experience an occasional frost, and more rarely, a devastating freeze that can inflict millions of dollars in crop loss in a few short hours.

Florida receives bountiful precipitation; however, the majority of the annual rainfall (50 to 70 inches in the major production areas) occurs during the wet season, which typically extends from May–June through mid-October. During the long dry season, which coincides with the major part of the production cycle, it is not uncommon to go weeks and sometimes longer without a drop of rain. Given this reality and Florida’s sandy soils, it is impossible to successfully produce vegetables without irrigation.

Throughout the dry winter months, weather fronts passing across the state can result in uncharacteristic heavy rainfall as cold, dry Arctic air collides with moist tropical air masses. Tropical storms can drop as much as 5–10 inches (or more) of rainfall in a few hours or days (Figure 1). Thus, growers may spend nearly as much time and money pumping water off their fields as they do irrigating their crops. After the water recedes, the beds may lose their structural cohesion, leaving the drip tape and polyethylene mulch vulnerable to tearing or movement away from their original configurations (Figure 2).

This environment necessitates that growers provide for exquisite drainage by planting on raised beds and maintaining elaborate canal systems to remove excess water from the land. Intense rains can also result in leaching of fertilizer, depriving crops of needed nutrients, as well as resulting in non-point source pollution of ground water in some instances.

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Figure 1. Florida is the lightning capital of the United States. Lightning can blast crops, leaving circular patterns, and poses a formidable risk to field workers.
Credits: UF/IFAS



Figure 2. Polyethylene mulch on a tomato field after Hurricane Irma.
Credits: Monica Ozores-Hampton, UF/IFAS

During the winter months, much of peninsular Florida can be blanketed by dense protracted fogs and heavy night dews resulting from the interaction of cooler terrestrial air and warmer air masses moving in from the surrounding waters. These events can occur on a nearly daily basis for extended periods of time in some seasons and may endure until 9 or 10 AM before eventually dissipating. These events cause ideal conditions for the development of disease, which can be difficult to control until environmental conditions ameliorate.

Florida's geographical location makes it extremely vulnerable to direct hits from tropical weather systems and hurricanes originating in the Atlantic Ocean and/or Gulf of Mexico. Looking at a map of hurricane strikes over the last 100 years, it becomes readily apparent that no area of the state has been spared and most areas suffer a direct hit every couple of decades. These violent events can leave plantings in a shambles, resulting in enormous losses in a brief period of time (Figure 3).

"Climate is what you expect, weather is what you get..."



Figure 3. Hurricane Wilma damage and flooding.
Credits: Monica Ozores-Hampton, UF/IFAS

Poor Soils

Most of the soils used to produce peppers and tomatoes in Florida are some sort of sand, ranging from coarse "ball bearing" sands to fine "sugar" sands. In other pepper and tomato producing regions, most notably in the Homestead area, what passes for soil is basically pulverized limestone from ancient coral reefs (Figure 4). In either case, Florida's soil is merely a media to hold plants that provides little in terms of nutrients beyond what the grower supplies.



Figure 4. Calcareous soil in Homestead, FL.
Credits: Monica Ozores-Hampton, UF/IFAS

Low Organic Matter Content

As a result of the high average temperature and abundant annual rainfall, the soil organic matter (SOM) content of many agricultural soils is extremely low, often a fraction of a percent at best. Due to both low SOM and the porous nature of these sands, Florida's soils have very low water holding and cation exchange capacity. Some soils can literally go from a flood to a drought condition in less than two weeks if rain does not occur or irrigation is not provided.

Poor Fertility

Low native fertility and low cation exchange capacity dictate that growers use high rates of fertilizer to supply all the essential nutrients that their crops require to produce. This situation makes leaching, especially under high rainfall or poor irrigation management, a distinct possibility; a factor that can contribute to non-point source nutrient loading of surface water, adversely affecting environmental sensitive areas nearby. In some instances, on some of Florida's uncoated sands, the exchange capacity is so low because there is nothing to bind minerals to what are basically miniature glass beads so that even some nutrients such as phosphorus, which are typically considered to be immobile elements, become mobile, moving with ground water (Figure 5).



Figure 5. Tomatoes growing in sandy soil near Duette, FL.
Credits: Monica Ozores-Hampton, UF/IFAS

pH Problems

The pH of Florida soils can vary widely as well, ranging from very acid, as low as 4.2 on native Pine Flatwoods fine sands, to quite alkaline, as high as 7.8–8 on the Rockdale soils and marls of Miami-Dade. Since much of the irrigation water used in agriculture is extracted from the limestone underlying the state, the pH of many originally acid soils can increase dramatically over time, moving from

an acidic to an alkaline condition in response to sustained irrigation, which can add the equivalent of a ton of lime per acre on a yearly basis. These extremes of pH can induce either nutrient toxicities at the lower end of the pH scale or nutrient deficiencies as pH increases above 7, which a successful grower must learn to anticipate, diagnose, and rectify.

Pest and Disease Pressure

Given the state's humid subtropical environment and warm average annual temperatures, insect, weed and disease pressure is constant and can be intense at times. Unlike other more temperate pepper and tomato producing areas, most of the state's growing regions do not experience hard freezes that so effectively reduce pest pressure. Pest control costs for Florida growers surpass those encountered in many other growing regions of the United States.

Per acre production costs for pepper and tomato in Florida often exceeds \$10,000 per acre, in large part due to the high cost of pest control.

Exotic and Invasive Species

Florida's environment is also favorable for the introduction, survival, and establishment of exotic pests entering the state from other countries. It is estimated that at least one new introduced pest or disease enters the state each year.

In 1997, *Tomato yellow leaf curl virus*—infected whiteflies blew into the state by hurricane winds, most likely from the Dominican Republic (Figure 6).



Figure 6. A tomato plant infected with *Tomato yellow leaf curl virus*, left, stands next to a disease-resistant plant developed by UF/IFAS. Once infected with the disease, tomato plants no longer grow normally and no longer produce marketable fruit.
Credits: Ernest Hiebert, UF/IFAS

In 2005, chilli thrips were detected in the state and since have been found in at least 16 counties across Florida. This pest has the potential to become a major pest of peppers and other vegetables and ornamental plants.

More recently, in 2010, *Groundnut ringspot virus* was detected on tomatoes in South Florida. In 2012, *Tomato chlorotic spot virus* was first reported in Florida. Its detection in the state may have been delayed by several years due to the fact that its symptoms in tomato are similar to those of GRSV (Polston et al. 2013).

Labor

Successful tomato and pepper production depends on an adequate supply of labor to plant, nurture, harvest, and pack the crop. Florida's vegetable industry is heavily reliant on migrant labor. Unfortunately, many of these laborers enter the US illegally and have attracted the attention and ire of many citizens and legislators who seek to curb the flow of undocumented workers into the country.

Increased security at the border and competition for labor from the construction, fast food, hotel, landscape, and other industries could negatively impact the supply of labor and force wage increases.

Development and Urban Sprawl

Rapid development has gobbled up much of the prime agricultural land previously used for tomato and pepper production in eastern Palm Beach, Homestead, and more recently, in southwest and west central Florida.

Development has also raised real estate prices to levels that prohibit the purchase of land for agricultural use in most areas of the state. In some areas, land sells for in excess of \$100,000 per acre, and it is almost impossible to find any land for less than \$8–10,000 an acre suited for crop production anywhere in south Florida (Figure 7).

Although development has slowed somewhat and land prices are falling in recent years due to the economic downturn, historical trends indicate this is temporary at best.

As housing encroaches on agricultural areas, neighbors may object to pesticide spraying, the movement of heavy equipment on roadways, and other operations associated with agriculture.



Figure 7. Rapid development and increasing land values throughout Florida are prohibitive for agricultural development.
Credits: Jeff HansPetersen, UF/IFAS

Regulatory Issues

Successfully negotiating the regulatory environment can be a daunting task. The acronyms for the rules and the names of the agencies that administer them present a veritable alphabet soup for the typical grower.

- BMP: Best Management Practices
- FWC: Florida Fish and Wildlife Conservation Commission
- FDACS: Florida Department of Agriculture and Consumer Services
- FDEP: Florida Department of Environmental Protection
- EPA: US Environmental Protection Agency
- SWFWMD: Southwest Florida Water Management District
- WPS: Worker Protection Standard

Layered on top of legislative regulations may be buyer-mandated programs such as food safety or fair wage programs, which have begun to emerge in recent years. In 2010, President Obama signed into law the FDA Food Safety Modernization Act (FSMA). This legislation will affect every aspect of the US food system, from farmers to manufacturers to importers, and places significant responsibilities on farmers and food processors to prevent contamination, a departure from past food safety regulations, which relied on government inspectors to catch tainted food after the fact. All of these programs cost money to implement and in most cases do not provide any increased return.

Surveys of vegetable producers in southwest Florida indicate that growers spend from 6% to over 30% of their time and energy trying to comply with and maintain documentation required by various regulations.

Offshore Competition

Competition from offshore producers has also emerged as a factor affecting vegetable producers in Florida. Beginning with the North America Free Trade Initiative in the early 1990s, production of many crops has emerged in many lower cost producing areas, most notably Mexico. In addition to lower cost of land and labor, many of the areas currently in competition with Florida's growers are not bound by the regulatory tangle that vegetable producers in Florida must negotiate.

Imports have made up a large portion of US fresh tomato consumption for many years. Imported tomatoes account for about one-third of US tomato consumption, up from one-fifth in the early 1990s. US net imports of fresh tomatoes now approach 2.4 billion pounds per annum. Canada and Mexico, US trading partners under NAFTA, are the main sources, and the Netherlands follows as the third largest source. After implementation of NAFTA in 1994, some tariffs were phased out in the five years between 1994 and 1998, while others were eliminated over a ten-year period ending in 2003.

Although Mexico was a substantial partner in trade prior to NAFTA, the total value of imports from Mexico increased 736 percent between 1993 and 2016. According to MIT's Observatory of Economic Complexity, Mexico supplied 86 percent of U.S. fresh tomato imports in 2015, valued at \$1.76 billion (Simoes and Hidalgo, 2011). U.S. fresh tomato imports from Canada substantially increased as well. From 1989, the year the Canadian-US Trade Agreement (CUSTA) was implemented, to 2015, fresh tomato imports from Canada into the United States rose 975 percent, from \$2.8 million in 1989 to \$273 million in 2015. In 2015, Mexico and Canada combined accounted for roughly 99 percent of the \$2.06 billion US fresh tomato import market.

Because US field-grown fresh tomato production is seasonal, Mexico is the predominant importer to the United States in the spring, fall, and winter, with Canada providing the bulk of imports during summer months.

In 2010 Mexico alone contributed about twice the volume of fresh vegetables to the US as all other countries combined, accounting for 65% of the 4.3 billion worth of fresh vegetables that the US imported. Fresh tomatoes led the

way with a value of \$1.1 billion exported to the US accounting for 40% of Mexico's vegetables exports to the US had already surpassed \$1 billion or 39% compared to the same period last year.

In response to many of the factors discussed above, pepper and tomato production in Florida is now primarily controlled by a relatively small number of large corporate agribusinesses that have the ability to spread risk between multiple production centers and the resources to endure the adversity of a poor market year or years.

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