
FACTORS AFFECTING TRENDS IN CITRUS PRODUCTION IN FLORIDA

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The Florida citrus industry has faced several disruptive challenges and crises in the 1980's. Problems in a wide variety of areas have had a major impact on shaping present trends and will continue to do so in the long-term future. For example, in the 1980's we have had four severe freezes, the scare of aldicarb in the groundwater, banning of EDB as a soil and fruit fumigant, rootweevil, medfly, citrus canker, increased citrus blight and citrus tristeza, chronic urbanization, environmental threats, government regulations, and international competition. The Florida citrus grower has been resilient and optimistic in the face of these threats. Although Florida citrus is rebounding from these adversities, all of these factors have caused a change in the way the grower will do things in the future.

The factors affecting citrus production have become increasingly complex and far-reaching.

The dominance of Brazil in the world citrus market, extensive new citrus acreage being planted in Southwest Florida, and the replanting of the Northern Ridge will have impacts on the Florida citrus industry (1). Freezes in Florida, combined with expansion in Brazil, have made Brazil the world's largest producer of oranges with one-third of the world production.

Freezes. Between 1981 and 1985, four freezes in Florida caused a loss of over 223,000 acres of citrus. Total acreage dropped by 26% with orange production down to roughly half the pre-freeze production level. Estimated losses from the 1983 and 1985 freezes were $2 billion and $472 million, respectively (6). In the past, Florida citrus growers relied on traditional grove heaters or wind machines for frost protection. Microsprinklers were first used in Florida, in 1977 freeze, it was observed that microsprinklers might provide frost protection, with considerable debate as to their effectiveness (4). Subsequent work in later freezes showed that microsprinklers did give partial protection to both mature and young trees, depending on volume of water applied (5). Microsprinkler irrigation has now become the most common form of citrus frost protection used in Florida. Nevertheless, additional research is needed to devise ways to protect citrus trees from low temperature damage.

Citrus acreage is rapidly developing in Southwest Florida, partially because of the freezes, water management improvements, and other factors. Has Florida's climate permanently changed and what is the long-range forecast? Chen and Gerber (3) pointed out that the number of advective freezes almost doubled between 1955-85, compared to the period before 1955. Significant downward temperature trends were found in Jacksonville, Clermont and Arcadia. Although a long-term warming trend is expected in the future, minimum temperatures may still be lower than the mild conditions of the last century.

Economic losses have been very high, with some citrus growers forced out of business. The tax base of several counties has been influenced. Some productive citrus land is now converted to RV parks. The freezes have also accelerated Brazil's dominance in the world citrus market. No doubt, the urbanization trend that started before the freezes accelerated the rate of conversion to housing and commercialization. Citrus growers in the northern areas have been optimistic that production in non-freeze years outweighs losses from freeze years. Alternative agricultural crops appear not to be profitable. Site selection (especially air drainage and water availability) has become an essential criterion in the replanting process. It will probably take more than a decade to recover from the impacts of the past four freezes.

Variety Improvement. Many of the problems facing the Florida citrus industry are variety and rootstock related. Factors such as citrus blight, tristeza, foot rot, nematodes and cold tolerance necessitate the development of new rootstocks that are adaptable to adverse conditions and improved tree performance. The same is true for scion varieties with the need for high color, early ripening varieties with better yield and quality.

Planting Systems. Large trees at wide spacings are becoming obsolete. Small trees planted at high densities offer the potential for improved productivity and fruit quality, possible low-temperature tolerance and more efficient use of water, energy, pesticides and labor (9). New planting systems offer a means of increasing the pounds of soluble solids per acre and a faster return on investment.

Water Management. Florida is dependent on rainfall and the Floridian or Biscayne aquifers for its water supply. Water supply is a major concern to Florida's agriculture now and will be critical in the next century. It is a factor which limits citrus production; hence, water must be used judiciously. Large population growth and below normal rainfall in the past 20 years have created greater pressure on Florida's limited water supply. In fact, the misconceptions about the volume of water used by agriculture have been misleading and need to be addressed.

Different water regimes are necessary for cost efficiency and tree performance. Low-volume irrigation systems can be used as nutrient (fertigation) and herbicidal (herbigation) delivery methods as well as for freeze protection.

Recycling of waste water, including processing waste water and municipal effluent, is another issue which will be more crucial in the next decade. The success of the joint Conserve II project between the City of Orlando and

Orange County will indeed be a model system for the rest of the country.

Labor. Availability and the cost of labor are factors which will influence citrus production in the future and will direct more emphasis to mechanization. Labor is the highest single production cost to the grower. Increased efficiency in harvesting, handling and packing fruit through mechanization will be a key factor in the future competitiveness of Florida's citrus industry. The citrus crop must be harvested on a timely and economic basis. Mechanical harvesting, mechanical aids and robotics may offer solutions to potential future labor oriented problems that relate to work rate, reliability, cost effectiveness and reduced human drudgery associated with the present day labor situation.

Citrus Blight. Citrus blight is a chronic decline which has affected citrus in Florida for over 100 years. It is widespread with estimates that approximately 1/2 million trees are lost annually which causes losses of over $60 million. Loss rates in individual groves may range from 1% to as high as 20% per year. Losses appear to be greatest in the southernmost growing areas of Florida. The causal agent of citrus blight is still unknown but recent research has demonstrated that the disease is root graft transmissible (8), possibly implicating a virus, viroid, or mycoplasma as the infectious agent. The only control measure presently available is to replace affected trees with trees on resistant or tolerant rootstocks. Scientists have made recent progress on citrus blight, but continued research effort is required to solve this important problem.

Citrus Tristeza Virus (CTV). Another disease that is of urgent concern to Florida citrus growers is CTV. This virus has long been present in Florida and nearly all sweet orange trees and grapefruit trees are infected. Until recently, however, little CTV-induced decline was observed in Florida citrus groves. Most strains of CTV were mild and the quick decline symptom caused by severe strains was observed only in a few groves, mostly on the Ridge. More recently, severe CTV has appeared in other areas, particularly near Ft. Pierce, LaBelle and on the Southern Ridge (2). There are three reasons for concern: 1) The Sour Orange rootstock is highly susceptible to quick decline and is widely used for new plantings because of its tolerance to blight. 2) The more efficient aphid vector (Toxoptera citricida) presently in South and Central America could reach Florida and cause more rapid spread of the severe strains of the virus. The existing vectors in Florida are inefficient and spread the disease slowly. 3) The demand for trees on Sour Orange has exceeded the supply of budwood available from severe CTV strain-free source trees which could create major problems if propagation from other resources is unchecked. There are also strains of CTV that cause stem pitting of grapefruit irrespective of the rootstock. These strains do not occur in Florida at present but, if introduced, they could present a serious problem for grapefruit production, particularly if the more efficient aphid vector reaches Florida.

Citrus Bacterial Spot Disease. Over the past three years the citrus industry has focused much of its attention to “citrus canker”, a disease which was thought to be absent from Florida. In August, 1984, the bacterial spot disease caused by Xanthomonas campestris pv. citri was discovered in a Florida citrus nursery and labeled as citrus canker (7).

The disease has since appeared in over 20 citrus nurseries but not in groves. Later in 1986, the Asian strain was discovered on bearing trees at four locations on the Gulf Coast. Although the disease is still under the State's eradication/risk assessment program, its economic impact has been felt throughout the industry and has done much to shape policies in the industry, i.e., nursery tree and fruit movement, and added costs to implement regulatory and control policies.

Various exotic diseases and insects not now present in Florida could cause serious problems to the Florida citrus industry. Precautionary procedures must be taken to ensure that diseases such as greening, stem pitting forms of CTV, scab, etc., are prevented from entry into the U.S.

Pesticides. Chemical control is currently the primary means to combat insects, mites, nematodes, diseases and weeds in citrus groves. The industry is moving away from large, high volume applications to low volume and aerial application technology. Energy costs, environmental toxicology, effect on natural enemies and non-target organisms, and economics and production efficiency must be considered in developing new application systems. The fate and persistence of pesticides in the citrus agro-ecosystem, particularly as related to groundwater contamination and worker exposure, has become of major concern to the public and the agricultural community. Proposed changes by EPA to protect endangered plants and animals could severely curtail the use of pesticides in Florida. These factors and the lack of availability of chemicals or alternate strategies may play a major role in shaping citrus production in the next 100 years.

Conclusions. These factors and trends underscore the need for reducing costs and increasing efficiency in citrus production to maintain Florida as a viable and competitive industry. Enhancing fruit quality will be a key to success and must not be compromised. The final factor which will affect citrus production is the essential need to keep research and extension programs strong. These programs in IFAS and USDA must receive highest priority support, for it has been the contributions made by scientists that have helped make citrus growing in Florida competitive and profitable. It will take even a greater investment in research contributions to continue in the future.

The Florida citrus industry has always responded to crises and adapted to change. With a strong foundation and with markets expanding, signals indicate a strong recovery and a highly competitive industry in the future.

Literature Cited

CURRENT AND FUTURE TRENDS IN NEW CITRUS PLANTINGS

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Abstract. A thirteen county region of south Florida, lying below the ridge is fast becoming the new center of the State's citrus production. In 1965-66 this area produced just 22 percent of the State's citrus on 27 percent of the total acreage. A decade and a half later, in 1979-80 when the State harvested its largest crop, production in this area had increased to 33 percent of the State's total on 38 percent of the acreage.

In 1985-86, following several years of severe freezes, the area's acreage was 60 percent of the State's total and the production constituted 66 percent of the total. During the 6 year span in the early 80's, more than 60 percent of all recorded newly set trees were set in these southern counties.

Production managers have proven that the potential for expansion in this flatwoods area is nearly unlimited. There is certainly sufficient land in the area to expand the current acreage by several fold. The principal limiting factor is the economics and water availability. As long as owners see the likelihood of a profit the expansion should continue.

Southern migration of citrus in Florida isn't new. Since the introduction of citrus by the Spanish at St. Augustine, there has been a long standing movement to the south. Even though the recent shift in the production belt can be associated with a series of freezes, it had its beginning several decades ago. The shift began with the development of modern farm machinery and the need to locate large tracts of land where it could be used more efficiently, and of course with less threat from cold. The recent freezes only accelerated the move. That is what I would like to address, the emergence of a 13 county area as the State's leading production region. The counties included are Broward, Charlotte, Collier, DeSoto, Glades, Hendry, Highlands, Indian River, Lee, Martin, Okeechobee, Palm Beach, and St. Lucie (Fig. 1).

An Analysis of the 13 County Area

In 1966 the commercial citrus tree inventory showed this 13 county region had 225,265 acres of commercial citrus. By Jan. 1968 that had increased quite sharply to 277,613 acres, but then leveled off for the next decade (Table 1). It wasn't until the decade of the 80's that expansion started again. As of Jan. 1986 there were 364,387 acres in the region. However, acreage alone doesn't tell the complete story. This gain came about at a time when the production in the remainder of the State was declining from the series of severe freezes. A better description of the growth in the 13 county area, is a comparison of its percentage of the State's total acreage. In 1966, the acreage was just 26.6 percent of the State's total, but in 1986 this had increased tremendously to the level of 59.2 percent of the State total.

While acreage was increasing, production was tracking along a similar course. In the 1965-66 season, the region produced 30,440,000 boxes of fruit which was only 21.6 percent of the State's total (Table 2). However, the volume in this southern area continued to increase. In the 1979-80 season, when the State produced its largest crop, this area accounted for 93,525,000 million boxes, one-third of the State's total production. After that record season, production in this area decreased somewhat due to freeze losses. However, the percentage of State total increased sharply. By the 1985-86 season their production increased to 113,758,000 boxes, 65.6 percent of the State's total citrus production.

Oranges are the dominant fruit type in the area, constituting 70 percent of the total acreage. Grapefruit only accounts for 25 percent of the area's total acreage. How-