



Century Of Scientific Progress

Congratulations to *Florida Grower* on its 100th anniversary! At the beginning of the 20th century when *Florida Grower* magazine was started, the Florida citrus industry was recovering from major freezes that had occurred in 1894–1895 and 1899. Production did not reach the 5-million-box level again until 1910. Since then, orange production has expanded to a predicted 168 million boxes for 2007–2008, and the industry has a \$9.3 billion impact on the state's economy.

Scientific research has played a major role in the success of Florida citrus. The industry would not be where it is today without the research that was carried out by the Institute of Food and Agricultural Sciences (IFAS), USDA, and other scientists. Much of this research was done at the University of Florida's Citrus Research and Education Center (CREC), which celebrated its 90th anniversary in November.

It would be impossible to cover all the research milestones of the past century in a one-page article. Hence, the goal of this article is to touch on some of the research highlights.

Probably the most significant development for the Florida industry was the invention of frozen concentrated orange juice (FCOJ). E.L. Moore, L.G. MacDowell, and C.D. Atkins patented the process in 1948. FCOJ tasted better than earlier canned juice products, and it transformed a small fresh fruit industry into the large juice industry that it is today. CREC scientists have continued to make improvements in juice processing technology, flavor, food safety, citrus nutritional benefits, and by-products.



A shot from the Citrus Research and Education Center lab in Lake Alfred, circa the 1920s.

BMPs

Other research has focused on horticulture, pathology, pests, genetics, and molecular biology. In the area of plant nutrition, IFAS and USDA scientists have carried out a number of studies that have eliminated mineral deficiency problems and developed fertilizer recommendations. Yellow spot, a problem over 50 years ago, was found to be caused by a mineral deficiency, and it could be corrected with the application of molybdenum. In the 1980s, nitrates in the groundwater became an issue, and IFAS scientists developed Best Management Practices to minimize nitrate leaching. CREC scientists are now using new technology and precision agriculture with GPS satellites to refine fertilizer placement and pinpoint disease locations.

Conserving Water

Sixty years ago, irrigation was not considered economically viable in rainy Florida. Work from the 1950s onward showed that irrigation could increase yield significantly. Microsprinkler irrigation was introduced, and research has shown it to be effective in meeting tree water needs while conserving water.

Microsprinkler irrigation also proved

useful in mitigating freeze damage. Based on the disastrous experience with overhead sprinklers in the 1962 freeze, growers felt that irrigation during a freeze would kill their trees. This thinking changed during the major freezes of the 1980s when IFAS scientists showed that microsprinklers were effective in providing some frost protection. Because of the dual advantages of irrigation and frost protection, microsprinkler irrigation has now become the

most commonly used form of irrigation in Florida citrus.

IFAS scientists have developed control strategies to deal with a number of pest, disease, and weed problems. They have developed effective control measures to deal with important diseases such as greasy spot and *Alternaria* brown spot. They also developed control practices for spreading decline, caused by the burrowing nematode.

One of the biggest challenges now facing the industry is a bacterial disease called greening. IFAS scientists are actively pursuing a number of avenues including short-term and long-term approaches. Recommendations on controlling the psyllid vector and reducing the inoculum level have been developed. CREC scientists are working on methods to culture the bacteria. If the bacteria can be cultured, progress should come more quickly. In the long term, resistance may be found through breeding and genetic research.

The Florida citrus industry has faced numerous challenges in the past, and scientific research has found solutions to those problems. With adequate support, research will continue to solve problems and develop ways to meet the challenges of the future. 