Note the good crop load and vigorous new shoot growth on this HLB-affected Bearss lemon tree in the Vero Beach area in April 2016.

Lemons in Florida: something new under the sun?

By Fred Gmitter, Bill Castle and Jude Grosser

King Solomon once pointed out that "there is nothing new under the sun," meaning that what has happened before will happen again. Although the idea of growing lemons in Florida is viewed by some these days as a new thing, Florida actually has a fairly long history of lemon production.

FLORIDA LEMON HISTORY

Lemons were a part of the Florida landscape in the late 1800s and were seen as a potentially competitive fresh fruit commodity against the newly developing California lemon business, because of proximity to the eastern U.S. marketplace. There were some production problems in the Florida environment, but there still was optimism that growers could make a go of it. It was a viable plan until Dec. 29, 1894, when the first of two "Great Freezes" struck the state. If there was any hope for lemons after the first freeze, a second even colder wave of Artic air came through Florida on Feb. 9, 1895. In less than five weeks, Florida's dream of growing lemons was put to rest for the next several decades, as the state's citrus industry learned that cold is a serious limiting factor for lemon production.

Lemons mostly languished as a fresh fruit option for Florida growers until the late 1950s and 1960s. In 1958, a series of articles was published, led by former Citrus Research and Education Center (CREC) Director Herman Reitz. He described the beginning of the latest craze in Florida citrus: planting lemons for processing into lemonade! L.C. Knorr of the University of Florida Institute of Food and Agricultural Sciences (UF/IFAS) Citrus Experiment Station (as CREC was called then) in Lake Alfred reported 3,000 acres of lemons in Florida. By 1972, Robert C.J. Koo, also from CREC, reported that there were some 8,760 acres of lemons in the state.

There was some effort to produce fresh lemons near West Palm Beach, on macrophylla rootstock, but costly tree maintenance requirements and a small and elusive window in the marketplace dominated by California meant profitability also was elusive. But major companies such as Minute Maid and Libby, McNeil and Libby were players in the processed lemon game.

Variety trials were planted that included up to 40 different selections in Avon Park and Indiantown. These trials served as sources of fruit for experiments and budwood for nursery propagations. Minute Maid planted substantial acreage of Bearss lemon on rough lemon rootstock in Indiantown, and Libby had lemons at several locations. But, once again, Artic air put a quick end to the lemon business in Florida with the multiple freezes of the 1980s. Aside from a few modest plantings targeting niche markets, lemons in Florida languished again.

Fast forward to 2014 and 2015, when the Florida citrus business was experiencing its greatest existential threat, huanglongbing (HLB). Production was declining precipitously everywhere in the state. Growers, many of them of multigenerational lineages, were dropping out of the business, like the Hamlin oranges were dropping off of the trees because of HLB. Grapefruit production from the Indian River area declined at an even faster rate than did orange and other specialty fresh fruit types.

Juice processing plants that formerly would run almost non-stop from late November through early June, now were closing for weeks at

a time. Truck yards that once were full of dozens and dozens of trailers waiting to dump their fruit loads, then go out and load up again, were now more empty than full of cargo. Simultaneously, contemporary consumers were turning away from orange juice as the signature breakfast drink of generations. Supply was down, demand was down, but the ever-resilient Florida citrus industry began to look for another way to survive and be profitable. And once again, lemons came back into the sun.

TODAY'S DIVERSE LEMON USES

Why lemons now? What hope do they provide? Haven't we learned from the perspective of historical cold events? Is there something new under the sun?

The lemon is a fruit with diverse uses. It can be grown for the fresh market, as it is in most places worldwide, or for processing into juice and various other products. Economists who monitor the marketplace tell us that one of the few types of citrus beverages for which consumer demand is increasing significantly is lemonade and similar drinks. The idle Florida juice processing facilities potentially could be more active, and therefore more profitable, if they had lemons as raw product for processing, especially given the lack of oranges for juicing.

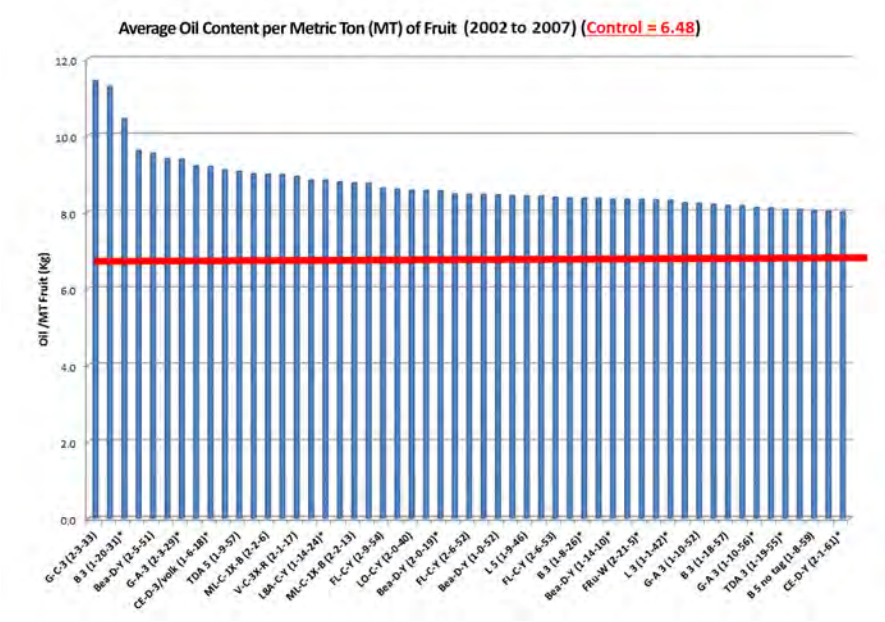
In addition to juice, lemon peel oil is a very valuable byproduct commodity. Many of the world's soft drink products are flavor-enhanced with a drop of some part of the essence of the lemon oil. Lemon oil is commonly used in many personal care and cleaning products, and lemon fragrances are also important to the food industry for flavoring a wide range of products. The white portion of the lemon peel, the albedo, is a rich and highly desired source of pectin that has many uses in the dairy, confectionary and healthcare industries. Thus, growing lemons is appealing because of its multiple uses and its noted greater tolerance of HLB.

PRODUCTION PROS AND CONS

However, growing lemons is a bit more challenging than growing other citrus varieties mostly because of the growth and fruiting habits. Lemon trees are vigorous and thorny. The latter is no small consideration because of harvesting and extra costs generated by special approaches associated with wiry, thorny trees.

Despite Florida's repeated experience with growing lemons, it has been hard to avoid the need to relearn the knowledge and tricks needed to produce this fruit. Nevertheless, there is excitement in the air about lemons because they are HLB-tolerant, fast-growing and precocious. Thus, commercial production begins early. If grown for the processing market, there are several options for use of the fruit, all with good income potential. Also, management of a juice-fruit grove is likely more forgiving when it comes to cultural and harvesting costs and practices.

But what of the cold sensitivity of the lemon trees that has spelled disaster many times before? Lemons can be quite cold tolerant, but only if they have the opportunity for good cold acclimation. Such conditions in the widely fluctuating Florida winter



Average peel oil content of advanced lemon selections grown in Florida. The red line is the control group mean value across the same time period.

climate do not really exist. We cannot say that the threat is not real, despite the increasing average annual temperatures. There still can and will be those few very cold nights. But there are some things to keep in mind about this threat as well.

The serious freeze events that killed lemon groves in the past generally took place before the widespread use of microirrigation systems to weather through the freezes. So, when there are severe cold events in the future, it may be possible for growers to keep at least the trunk and main scaffold limbs alive. If microirrigation succeeds, then the inherent vigor of the lemon tree can regrow new productive canopy faster than probably any other type of citrus tree. For example, the Argentine lemon industry in Tucuman suffered great losses just a few years ago to uncommonly severe freezing, only to see production quickly rebound a mere two seasons later. The lemon crop in Florida would be harvested generally before the coldest times of the year.

ADVANCES IN LEMON BREEDING

One of the lesser known aspects of the UF/IFAS CREC citrus breeding program has been a project to develop new true lemon cultivars that will produce greater quantities of the "liquid gold" that is lemon peel oil. Researchers planted more than 4,000 new lemon clones developed using the same approaches that were successfully used for sweet orange improvement. They measured peel oil production in the Florida environment annually. The goal was to find lemon varieties that had consistently high oil yields, exceeding 8 kilograms per metric ton.

They succeeded in finding more than a dozen that averaged well over this threshold across at least five seasons of data collection (see graph). These new varieties have been approved for release, and the top three soon will be made available to Florida citrus growers. In addition, a nearly seedless clone will also be released for Florida growers who have interest in the fresh option.

Lemons can be grown more cheaply in other parts of the world, and their concentrated juice can be shipped globally. But when the economic benefits and value of the peel oil are factored in, it begins to seem more plausible for this old crop to be grown profitably once again under the Florida sun. The UF/IFAS broadly targeted citrus breeding program may once again contribute to the suite of options available to the Florida citrus industry to continue to thrive.

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