



## Citrus production in Argentina

By Stephen H. Futch and Ronald P. Muraro

*A roadside fruit stand in Argentina*

In June, Ron Muraro and Steve Futch with the University of Florida spent 10 days in Argentina and Uruguay to gain a greater understanding of their citrus production systems and market challenges for fresh citrus exports to the European Union. Since these countries have citrus canker, black spot and sweet orange scab, their production and phytosanitary packing programs have implications for the Florida citrus grower, as we also have these diseases and face similar export marketing issues. While citrus black spot is currently limited to South Florida, the disease will trigger additional regulations for export of citrus in the future.

In the 2009-10 marketing season, Argentina ranked as the seventh largest citrus-producing country in the world with 2,559,000 metric tons of citrus production. The world's largest citrus-producing country is China followed by Brazil, the United States, Mexico, Spain and Italy. Argentina's citrus production is approximately 43.5 percent lemon, 32.6 percent orange, 16.5 percent mandarin and 7.4 percent grapefruit.

Of the citrus produced, approximately 48 percent is used for processing, 29 percent for the domestic market and 23 percent is exported as various forms of fresh citrus. Seventy percent of the total exports are sent to Russia, the Netherlands, Spain and Italy. Since Argentina is located in the Southern Hemisphere, its marketing season fills a market void of the Northern Hemisphere citrus-producing countries. In fact, it produces 36 percent of the world's lemons and 90 percent of the Southern Hemisphere's lemon production.

The Argentine citrus industry is comprised of approximately 5,300 growers, 554 citrus packinghouses and 20 processing plants with a total direct estimated labor force of more than 100,000. The northwestern citrus-producing provinces of Tucuman, Salta, Jujuy and Catamarca comprise 56 percent of the acreage, and the northeast area of Entre Rios, Corrientes, Misiones and Buenos Aires has 43 percent.

Growers indicated their costs are increasing as many

inputs and services are priced in American dollars. As the dollar has been devalued in recent years in relationship to many European currencies, this exchange relationship has greatly impacted their industry by increasing costs.

### REGULATION

Their regulatory agency, SENASA, which is very similar to USDA-APHIS, works closely with the growers to register each block that is intended to be harvested for export. SENASA will make at least two grove inspections per year to ensure the block is free of citrus canker and black spot. If blocks are found to be free of canker and black spot within 30 days before harvest, the block or blocks will be issued a harvesting permit number that is good for a 40-day period. If the block is not harvested within the 40-day period, it must be re-inspected. SENASA can also inspect fruit in the port prior to export. When the fruit is harvested, each fruit bin



*Argentine packed fruit*

will have a sticker affixed to the bin indicating block, date of harvest and certification number for traceability. If any fruit is found infected with citrus canker or black spot in the packed carton, fruit from the entire block will be prohibited from being shipped for the export market. In addition to the pre-harvest inspections, fruit must be

treated with a chlorine solution prior to the initial washing of the fruit when it enters the packinghouse.

### MINIMIZING CANKER

Windbreaks are used extensively in groves to minimize the spread of citrus canker, which was introduced in the 1970s. These windbreaks con-

sist of eucalyptus, casuarina or pine trees. The vigor of eucalyptus suppresses citrus tree growth and yields in one or two rows adjacent to the windbreak. Suppression in growth or yield appears to be less next to casuarina. Windbreaks also reduce fruit-color development in trees immediately adjacent to the perimeter, compared to fruit more interior to the block. Windbreaks surround areas of about 10 acres, and while mainly used for reduction of citrus canker, they also reduce wind scarring of fruit surfaces.

To control citrus canker, applications of copper, as well as aggressive control of citrus leafminer, are used to reduce the severity of canker.

Alternaria brown spot is also a significant production issue on certain mandarin cultivars. In fact, several growers stated that Alternaria is a greater control issue than citrus canker. However, most mandarins are less susceptible to canker than oranges.

In many areas, trifoliolate rootstock is used extensively, as it provides good yields and induces winter dormancy to minimize tree injury due to freezes.

All mandarin fruit harvested for fresh market is hand-clipped at harvest.



*A windbreak in an Argentine grove*

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Since most of the mandarin fruit is marketed fresh both domestically and internationally, the number of seeds in the fruit significantly impacts pricing and marketing.

The cultivar called W Murcott (Afourer) is marketed as Clemengold if the fruit has one to three seeds, Nordorcott if it has four to six seeds. If it has seven or more seeds, it is sold as common mandarin. It was also observed that the first six trees or so near the windbreak have more seeds than fruit from trees more interior in the block. This phenomenon may be the result of bees remaining longer in this area (near windbreaks) due to the obstruction of their movement out of the block. The seed number also impacts fruit size as larger fruit generally have more seeds. Additionally, larger fruit tends to have coarser peel texture. Also noted is that W Murcott does not respond well to degreening in the packinghouse; thus proper color development in the field is beneficial.



*Afourer on trifoliolate planted in 2006*

Growers are also looking into covering the trees with netting during the bloom period to exclude bees from blossoms to reduce seed numbers. This covering of the trees with netting has also been used successfully in some areas in California to reduce seed number. Other mandarin cultivars produced included Ellendale, Delta, Midnight, Satsuma and Nova (Clemenvilla).

In many areas, growers selectively remove branches to increase light penetration into the tree canopy to promote fruit set. Light penetration also increases color development of fruit for the fresh market.

In the province of Tucuman, the main citrus variety produced is lemons, accounting for almost 89,000 acres of the province total of 91,400 citrus acres. This area is one of the few major lemon production areas in the world that does not have a Mediterranean climate. This area receives between 40 and 60 inches of rain per year. Generally, lemon trees bloom three times per year, necessitating frequent harvests for color or size during the year.

While HLB or greening has not been found in Argentina, groves and residential properties are aggressively surveyed to detect the disease as early as possible. The production of disease-free trees in enclosed structures to exclude citrus psyllids will be a requirement by the end of this year. Nursery tree cost is similar to that in Florida at about \$5 to \$8 U.S. dollars per tree.

As noted earlier, growers use a lot of trifoliolate rootstock and two years is required to produce a tree in the greenhouse due to the slow growth of the rootstock, thus impacting costs. Trees are grown in the nursery with a central leader, which is cut at about 24 inches high prior to delivery and allowed to branch in the field. Trees are planted with a sprout guard similar to those used in Florida to minimize herbicide injury and sprouting.

Throughout our visit, growers

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Nursery trees in Argentina

frequently mentioned the use of less vigorous rootstocks to control tree size and increase the tree planting density to enhance yields. Rootstocks they considered to be vigorous or moderately vigorous include Carrizo, Cleo and Swingle. Slower growing rootstocks included Flying Dragon trifoliolate and C79 citrange.

Common spacing for plantings on less vigorous rootstocks is in the range of 20 feet between rows and 8 feet between trees in the row, resulting in approximately 270 trees per acre with a few blocks planted as close as 16 feet x 8 feet, or 340 trees per acre. These closely spaced groves are expected to produce early yields and returns. However, closely spaced groves on vigorous rootstocks may result in poor fruit yield.

Overall, Argentina has a productive and well-managed citrus industry. Its horticultural technology, cultivars and rootstocks appear to be well-founded by current citrus research knowledge.

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## CRDF Discusses Research Questions Relating to Citrus Nutrition

By Tom Turpen



With both fruit prices and the incidence of HLB disease on the rise, the topic of optimizing citrus nutrition is of great interest to Florida growers. The Research Management Committee (RMC) of the CRDF invited its Scientific Advisory Board Chair, Dr. George Bruening, and citrus stress physiology expert, Dr. Jim Syvertsen, to join it for a committee meeting and public hearing to assess field trials on citrus nutritional supplements in Lake Alfred on Aug. 24. More than 60 growers and other members of the public heard results from 10 field experiments and the panel noted several important open questions for future research emphasis. Answers to some of these questions will have important immediate applications, such as: What is the basis for adjusting nutrient levels? How much is too much? Other questions seek to better understand the phenomena of disease progression and tree decline such as: Are there disease specific nutritional effects? What is the susceptibility of HLB-infected trees to other stress?

The field trials presented varied in experimental design under different disease and environmental conditions. Some experiments look at yields and pound solids from demonstration plots using various commercially available materials in large blocks while others subtract individual components in an attempt to measure effects of macro- and micro-nutrient deficiencies in relatively small but randomized and controlled plots.

Optimizing citrus nutrition is subject to enormous variability in yield that is both site- and season-dependent. Additionally, the rate of decline of HLB-infected groves is highly dependent on the age of the trees at the time of infection and overall condition of the grove, including genotype, environmental interactions, soil, salinity, root disease and the overall level of abiotic and biotic stress already imposed on a specific site. Many groves may not be at an optimal level of nutritional support and foliar sprays are recommended in such conditions:

“(Foliar sprays) are useful when soil or environmental conditions are unfavorable for nutrient uptake by roots...because it is the most rapid way to effect nutrient uptake by citrus trees.” Nutrition of Florida Citrus Trees, 2nd ed., Obr-eza and Morgan, eds., IFAS Extension publication SL253 p. 47.

There will be a great deal of risk and continued uncertainty for some time. Therefore, it is prudent for production managers to maintain stringent psyllid control and to monitor nutritional status with accurate tissue and soil sampling to look at the effects of staying toward the high side of the traditionally recommended ranges for nutritional supplements in their groves, especially if they choose not to remove infected trees.

In other actions, the RMC made several recommendations. An additional field trial proposal from Dr. Phil Stansly will be funded to compare the effects of nutritional supplements and psyllid control in a young planting at a single site. Dr. Ron Brlansky has presented interesting images of phloem structure and the uptake of fluorescent dye by citrus leaves. It was recommended that he pursue this observation in an attempt to develop a useful and validated assay of phloem-health and that this research objective be amended to an existing project with Dr. Bob Rouse as a collaborator. Furthermore, the Foundation and IFAS will explore the feasibility of developing a system to collect and pool data from grower experience within Citrus Health Management Areas. This is perhaps the most valuable and relevant information.

*Tom Turpen is Research Program Manager of the CRDF.*



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