The potential of trunk injection for fresh market citrus

BY JOHN M. CHATER

Citrus tree trunk injection of antibiotics has been recently and widely used in Florida. The success of oxytetracycline (OTC) in sweet orange to mitigate huanglongbing (HLB or citrus greening) disease has been documented by the laboratory of Ute Albrecht, associate professor at the University of Florida. Some results suggest that OTC injection can improve Brix, ratio, fruit size, tree health, bacterial titer and yield. OTC injection has also been shown to reduce preharvest fruit drop, which is devastating to round orange and fresh market growers alike in Florida.

HLB disease affects both juice fruit and fresh fruit growers. Due to the effect of HLB on Brix and acidity, some round orange growers in Florida have considered selling their juice fruit to the packinghouse as fresh fruit. Examples of this shift in market strategy include the round orange cultivars N13-32 Hamlin, OLL-8, OLL-20 and Valquarius.

The requirements for a fresh market fruit to make packout in terms of Brix, titratable acidity and ratio are less stringent than those for sweet orange. This creates a special opportunity for juice orange growers that cannot reach the quality parameters required for Grade A juice in the HLB environment. These lower requirements allow growers a better chance to avoid fruit maturity test failure and haul rejection. In the Florida citrus industry in recent years, state Brix averages are coming in lower than 10, which does not meet the requirement for Grade A juice. If growers can harvest fruit earlier, losses from preharvest fruit drop seen later in the season in March and April can possibly be reduced.

Stakeholders have expressed a strong interest in OTC injection in fresh market citrus cultivars, and some growers have reported higher packout for Sugar Belle mandarin with trunk injections. Recently published University of Florida research indicates that OTC injection can significantly improve fruit quality of OLL-8 sweet orange scion in terms of solids to acid ratio, regardless of rootstock.

ORANGES

A recent HortScience article by Emily S. Worbington, a scientist at the University of Florida, reports that OTC-treated OLL-8 sweet orange trees had a solids to acid ratio of 11.08. Non-treated trees had a solids to acid ratio of 10.15. This finding demonstrates that OTC trunk injection can have significant effects not only in Valencia, but also in OLL-8. This may be good news for those growers who decided to give OLL-8 a try.

Based on a Chater Lab project funded by the Citrus Research and Development Foundation, OLL-8 appeared to be larger and healthier than conventional Valencia and other sweet orange budlines. The aforementioned OTC data was collected from a trial which was planted and conducted by a major processor, later to be taken over by the Chater Lab. The data seemed to indicate that OLL-8 trees could be a potential selection for growers. During the first several years of the trial conducted by the major processor and grower, it was determined that OLL-8 on UFR-4 rootstock was a top performer among dozens of combinations of early-, mid- and late-season cultivars.

During the OTC experiment, it appeared that OLL-8 on UFR-6 was also a top performer. UFR-6 grows off a smaller tree, which may be a benefit to those considering higher-density plantings.

The OLL-20 scion seemed to also respond well to OTC trunk injection, although those results are yet to be published. However, in the opinion of the author, OLL-8 is superior to

OLL-20 in terms of tree health. But the major processor liked OLL-20 for reasons associated with flavor components, thus the Citrus Research and Education Center Plant Improvement Team released this selection.

MANDARINS

In terms of mandarin varieties, OTC injection is being studied for Sugar Belle, Marathon, Bingo and other unreleased and yet to be released selections. The New Varieties Development and Management Corporation (NVDMC) encouraged the ongoing research.

Research by Joseph H. Volpe, a graduate student in the Chater Lab, indicates that OTC injection can increase Brix, solids to acid ratio, individual fruit weight and individual fruit size in terms of equatorial diameter. Interestingly, controlled release fertilizer (with polymer-coated micronutrients) increased fruit mass and diameter of Sugar Belle. Some growers have reported higher packout from their Sugar Belle trees under OTC trunk injection. It remains to be seen whether this will continue and improve after multiple injections. Perhaps coupling OTC with controlled release fertilizer may be a good research direction moving forward.

Preliminarily, trunk injection of OTC increased percent juice (juiciness), individual diameter and individual fruit weight of Bingo mandarin, which has not been planted recently due to fruit size. However, the flavor and HLB tolerance of Bingo is something to consider. One grower in North Florida reported success with Bingo in the gift fruit market. However, Bingo has been said to be too small for existing packinghouse infrastructure.

Research is continuing on trunk injection in these mandarin varieties and others. It appears OTC trunk injection may be a useful method for the fresh market, but more research is needed. If any stakeholder would like to see groves with these varieties, please contact the Chater Lab to arrange a visit.

John M. Chater (jchater@ufl.edu) is an assistant professor at the University of Florida Institute of Food and Agricultural Sciences Citrus Research and Education Center in Lake Alfred.

Conference Proves Beneficial

By Rick Dantzler, CRDF chief operating officer

The recent Florida Citrus Industry Annual Conference brought together citrus growers, organizations and researchers to celebrate the end of a fruit season and begin preparations for the next. It was a time to take stock, gather as members of a great industry, have fun and decide how best to move forward.

The Citrus Research and Development Foundation's (CRDF) first order of business at the conference was consideration of the tax rate for research funding that it recommends to the Florida Department of Agriculture and Consumer Services. I view this revenue source not as an entitlement, but as something to be earned each year. Consequently, we explain to growers how we spent their research dollars, where CRDF stands financially and how we intend to spend future funds. This year, the board chose to recommend leaving the rate at two pennies per box, which it has been for the last two years, down from three pennies per box previously.

Second was approval of CRDF's budget for the next fiscal year. We are grateful for the $4.5 million appropriated to CRDF by the Florida Legislature. This allows us to continue funding the 62 projects under contract and to budget $1.2 million for additional research projects for the new year. Following this was consideration of 18 research matters. Plant breeding and the use of antibacterials were the largest research categories.

At the educational session, CRDF sponsored nine outstanding presentations. Eight topics were in keeping with CRDF's research strategy of helping growers reduce *C*Las titer as much as possible to enable them to keep going until they have the "tree of the future," and one was on the Citrus Research and Field Trial programs. A grower told me afterward that he hadn't been this hopeful in years, which I took as a sign that the presentations were beneficial.

A few takeaways from the session:

- Charlie Messina (UF/IFAS) has created an inventory of GM and non-GM CRISPR edits, which will allow the development of a plan to move this work along as efficiently as possible.
- Yianni Lagos (Soilcea) shared the latest on gene-edited trees that might just be good enough.
- Lukasz Stelinski (UF/IFAS) has advanced work on trees with a *Bt* gene added that kills diaprepes larvae and psyllid nymphs.
- Ute Albrecht (UF/IFAS) explained fruit development and how to use oxytetracycline (OTC) to maximize fruit quality and size.
- Tara Wade (UF/IFAS) compiled data to help growers understand the economics of OTC therapy.
- Michelle Heck (USDA) and the Grove-First team have identified rotational partners for OTC which can be used now, if necessary.
- Nian Wang (UF/IFAS) has created a tree with a non-GM, CRISPR-edited scion that appears to be HLB resistant. This might just be what we have been waiting for. If so, it will then be up to the industry to make it available to growers as quickly as possible. More on this is coming in the near future.

CRDF Grower Dollars at work for you

Column sponsored by the Citrus Research and Development Foundation