CITRUS GROWERS’ INSTITUTE
APRIL 9, 2024

Rick Dantzler
Citrus Research and Development Foundation
700 Experiment Station Road
Lake Alfred, FL 33850
Research Strategy: 3-Legged Research Stool

1. Maximize efficacy of OTC
   A. Getting more product into the phloem
   B. Combining it with other compounds, molecules or production practices

2. Finding molecules or compounds to replace OTC if necessary
   A. CLas resistance
   B. Phytotoxicity to low pH or multiple injections

3. Developing the “tree of the future”
   A. Molecular breeding
      1) CRISPR: non-GMO and GMO
      2) GMO
   B. Conventional breeding
Research Under Contract: 63 Projects

Research to implement the Research Strategy

A. Maximize efficacy of OTC: 13 projects underway.
   Examples:

1) pH neutral OTC formulation
2) Combine OTC with Elemental Enzymes peptide product
3) Using OTC in combination with GA or 2,4-D
4) Effects on psyllid from OTC usage
5) Injecting dozens of experimental rootstocks and scions to see if there is a difference
6) Different dosages of OTC
7) Injecting in larger branches instead of the trunk
8) Leaving the mixture in the tank for up to 3 days – Don’t do it
9) Combine it with Kphite, Prophyt (Phos acids), and Magna Bond (copper sulfate)
B. Finding substitutes for OTC: Six projects underway. Examples:

1) Drs. Scully, Heck, and Niedz
   a) CRDF’s involvement
      i. Paying Scully
      ii. Compensating grower-cooperators

2) Dr. Kranthi Mandadi’s top five from the hairy root assay

3) Dr. Ozgur Batuman – five antimicrobials, plus streptomycin in combination with OTC

4) Dr. Yu Wang – up to 100 natural molecules with antimicrobial effects
C. Developing the “tree of the future”: Nine projects underway. Examples

1) Molecular breeding

   a) Drs. Mou and Dutt: Crossing the best GMO rootstocks with the best GMO and non-GMO scions which were created for resistance

   b) Dr. Charlie Messina: UF/IFAS Crop Transformation Center – 5 new gene constructs that convey tolerance or resistance

   c) Dr. Nian Wang: Creating non-GMO Valencia and Hamlin trees that are resistant/tolerant through gene editing. Continuation of the work that led to the licensing by Soilceca of the best created to date

   d) Drs. Deng, Gmitter, and Dutt: Evaluate their CRISPR-edited Duncan grapefruit mutants for resistance to HLB. If resistance is confirmed, the data will lead to the identification of target genes that can be edited in other varieties.
2) Conventional plant breeding: Five projects underway. Examples:

a) Process to date

b) Research funded

(1) Inventorying project – funded
(2) Plan for 127 acres of CREC property – funded
(3) Coca Cola project – funded
(4) Three-year Grand Plan – in negotiation

c) Other projects of note (3-legged research stool doesn’t preclude other serious issues of unique opportunities)

(1) Heck - symbiont
(2) Diaprepes
(3) Nutrition
(4) Citrus Fix
(5) Blackspot
3. Is the injection of OTC working? Yes, but results are mixed.

A. Context

1) Severe freeze in January of 2022
2) Hurricane Ian in September of 2022
3) Mild freeze in December of 2022
4) Severe drought until May of 2023

B. OTC approval: January of 2023

1) Learning curve
2) Injection began in late spring
3) Without weather events, what could we expect?