



GROWER RESEARCH REPORT

VOLUME 6, EDITION 1

AUGUST 2018

UPCOMING MEETINGS

September 18 - 21, 2018

International Citrus & Beverage Conference
Sheraton Sand Key Resort
1160 Gulfview Blvd., Clearwater Beach, FL
<http://conference.ifas.ufl.edu/citrus/location.html>

September 25, 2018

CRDF Board of Directors Meeting
Ben Hill Griffin, Room 103
Lake Alfred, FL

Board of Directors Approval of all 2018
Research and Product Delivery Projects

Followed By Grower Education Sessions

Dr. Fred Gmitter and Dr. Jude Grosser:
Includes lab and field tour

October 23, 2018

CRDF Board of Directors Meeting
Co-hosted by Peace River Valley CGA
Tentatively to be held at the
Turner Ag Center, Arcadia

December 11, 2018*

CRDF Board of Directors Meeting
Ben Hill Griffin, Room 103
Lake Alfred, FL

*Combined November/December BoD Meeting
due to Thanksgiving and Christmas
BoD Meetings start time is 10AM

*For more information on any of the above noticed
meetings, please contact Brandy Brown at 863-
956-8817 or brandy.brown@citrusrdf.org.*

CRDF Aims to Keep Growers Informed

by John Morgan, CRDF Business Manager

The Citrus Research and Development Foundation is pleased to announce the re-launch of the CRDF Research Report as a quarterly update with original content in each issue.

The new format will include summaries of research project presentations, dates and details of notable upcoming events, and facilitate navigation to CRDF funded "research snapshots." These snapshots will provide readers with perspective on research the CRDF has been funding and hopefully inspire new ideas throughout the industry.

It has long been a goal of the Foundation to offer the citrus industry current and pertinent information that provides significant insight to combat today's threats. CRDF wants to provide useable data, and not just contribute noise and distractions. Their intent is to provide something that is genuinely beneficial to the industry and they chose a

quarterly schedule to ensure that they are never overwhelming and that they deliver only truly relevant content.

As always, CRDF is delighted for their collaboration with Florida Citrus Mutual and their dedicated and innovative staff. Their partnership helps to shape and ultimately deliver the valuable information CRDF aims to spread far and wide throughout the industry. As with any new venture, they are taking the opportunity to experiment and try different configurations until they adopt the ideal form. CRDF aims to continually improve with each issue. Therefore, they welcome any feedback from their readers to meet readers' expectations. Through this relationship with the readers CRDF looks to gain more understanding, and hone their vision to produce exciting, effective content that they will pass along to growers, researchers, and the public.

For more information on the Citrus Research & Development Foundation, visit www.citrusrdf.org or call 863.956.8742.

The Mission of the Citrus Research and Development Foundation is to "Advance disease and production research and product development activities to ensure the survival and competitiveness of Florida's citrus growers through innovation"

Summary of Recent NAS Report on HLB Research

Contributed by Dr. Jim Syvertsen

From 2010–2017, CRDF awarded about \$124 million to 398 research projects, with 90 percent of those focused on HLB. At the request of CRDF, in April 2018 the National Academy of Sciences (NAS) completed a comprehensive review of the Foundation's research portfolio.

The review concludes that research supported by CRDF and other agencies has greatly expanded knowledge of every aspect of HLB—the CLas bacteria pathogen, the psyllid insect vector and the citrus tree responses. Yet, there has been no cure.

Obstacles include the inability to culture the bacteria pathogen in a laboratory, the complexity of the pathogen-insect-tree interactions and the lack of HLB resistance/tolerance in citrus. Although a single breakthrough discovery for curing HLB is unlikely, site-specific management approaches that can be combined in different ways and optimized should be supported.

Further, CRDF and other agencies must work together

to develop a systems approach for research leading to effective HLB management. We now have a knowledge base for grower management of tree nutrition and health programs to keep HLB trees as productive as possible.

Many growers are still profitable, so there is room for optimism even after recent hurricanes. There is currently a new round of CRDF research proposals coming from our best scientists, which may lead to optimum combinations of HLB management practices or to long-term solutions.

A Review of the Citrus Greening Research and Development Efforts Supported by the Citrus Research and Development Foundation – Fighting a Ravaging Disease

The National Academies of Sciences, Engineering, and Medicine

Read more: <https://citrusrdf.org/wp-content/uploads/2018/04/25026-Prepublication-copy-of-NAS-Study.pdf>

Two Research Projects Highlighted at CRDF Board Meeting

Contributed by Dr. Jim Syvertsen

As part of CRDF's continuing communication seminar series, there were two recent research updates on variety improvement and leaf nutrition work following the July 24th CRDF Board of Directors meeting.

- “Advances in identifying and developing resistance and tolerance to HLB”
Dr. Ed Stover, USDA/ARS, Fort Pierce, FL
- “Citrus nutrition studies for improved survival of HLB-affected trees”
Dr. Arnold Schumann, UF/IFAS, Lake Alfred, FL

Dr. Stover (USDA/ARS, Fort Pierce) focused on breeding HLB resistant citrus varieties and said the goal of his team's research has been to identify existing and advanced citrus types that have some resistance to HLB. His presentation reviewed collaborative work with UC Riverside geneticists using new hybrids that present considerable resistance to HLB, including mandarin and Poncirus types. Dr Stover's group is making efforts

to understand the genetics of HLB tolerant genes in a rush towards solving HLB.

Dr. Schumann (UF/IFAS, CREC, Lake Alfred) discussed his research efforts on citrus nutrition and said his research team has used advanced management systems that include enhanced nutrition programs (ENP) to help growers maintain profitable HLB trees. They are addressing why there are so many inconsistent responses to ENPs throughout the State. Using leaf characteristics and leaf nutrient values from a broad range of locations around Florida, Dr. Schumann's group focuses on developing new threshold levels for all major and minor leaf nutrients in HLB-affected trees. They continue to study soil nutrient conditions that promote citrus root hairs and increase root health for better nutrient uptake.

The presentations were followed by questions and discussions with growers. Video summaries of both presentation can be seen at <https://citrusrdf.org/crdf-grower-education-session>

Citrus Research & Development Foundation

People Spotlight



Rick Dantzler
Chief Operating Officer



John Morgan,
Business Manager

As I begin my service as Chief Operating Officer of the Citrus Research and Development Foundation, I want our state's growers to know that I feel a heavy responsibility to do this job well because a lot is riding on our success. HLB has taken its toll, certainly, but there is no question in my mind that we are going to whip it.

As I meet with growers and the board members of the CRDF, I typically ask many of the same questions of each. Among them are:

1. What should be my guiding principles?
2. What is the first thing I should do?
3. How do we better receive the input of production managers to guide our research?
4. Has the mix of our science (short-term benefit vs. long-term benefit) been appropriate?
5. How can we better communicate our findings with growers?
6. Do you have an idea for research you'd like to share?

I'm sharing this because I'm asking the same thing of you. Those of you who grow citrus profitably have the best perspective of all and have much to share, so please don't be shy about contacting me with your thoughts and ideas.

We have been confronted with a terrible disease that seems intractable, but it isn't. Slowly but surely, we are gaining ground. And as unfortunate as it is that we are having to deal with it, our place in time has given us an opportunity to do something great, and we will.

Let's go make history!

Rick Dantzler
Chief Operating Officer

John Morgan was recently hired as the CRDF's Business Manager. In this position he manages daily operations and supports the Chief Operating Officer in financial management.

He attended the University of Florida, graduating with a double Master's in Management and International Business.

Before Graduate School, John served for three years in an Operations and Project Management capacity for a major US Military contractor operating throughout Iraq managing daily operations and overseeing projects to support mission essential functions.

Prior to his appointment at the Citrus Research and Development Foundation, he spent nearly seven years as a Project Manager and Facility Security Officer for a robotics company in Gainesville, FL designing and manufacturing unmanned aerial vehicles for military and commercial applications.

He relocated to Lakeland, FL in December 2017 with his family after his wife was awarded a Director position at Florida Southern College's forthcoming School of Physical Therapy.

John was an Army Brat who grew up mostly outside Kansas City, KS before attending Kansas State University. You can occasionally catch him caught up watching the 6 Nations Rugby cheering on the Welsh National team. And one day, he hopes his travels will take him to the annual International Isle of Man Tourist Trophy motorcycle race.



SNAPSHOT

From Science for Citrus Health Website

Using Interference RNA to Manage Asian Citrus Psyllids

Research by Drs. Lukasz Stelinski and Nabil Killiny, University of Florida

Article written by Elizabeth Grafton-Cardwell, Peggy G. Lemaux, & Lukasz Stelinski. Revised August 3, 2017
http://ucanr.edu/sites/scienceforcitrushealth/-_Established_Orchards/

What is the technique?

Insecticides are one of the main tools used to manage the Asian citrus psyllid. Their overuse has led to the evolution of insecticide resistance in some populations of Asian citrus psyllids, rendering them less susceptible to insecticide treatment. This is particularly concerning for the neonicotinoid class of insecticides, since these are the main tools currently being used to protect young trees from psyllids carrying CLas, the bacteria that causes huanglongbing. If this problem is not properly managed, insecticides could become less effective in killing psyllids in the field. Researchers are developing a way to render field populations of psyllids more susceptible to insecticides, using a technique called RNA interference, or RNAi. RNAi can be used to precisely target and shut down important genes in Asian citrus psyllids to manage the insect's response to insecticides.

Using RNAi to prevent insecticide degradation

Insecticide resistance to the group of pesticides called neonicotinoids happens when insects increase certain enzymes (encoded by CYP4 genes) that break down the pesticide. RNAi can be used to shut down the making of gene products, like the enzymes that degrade insecticides, and so make insecticides more effective against Asian citrus psyllids and so reverse insecticide resistance. Silencing the above-mentioned CYP4 genes, by feeding newly emerged Asian citrus psyllids with dsRNA (double stranded RNA) molecules, inhibits expression of

the Cyp4 gene rendered them more susceptible to insecticides. In the laboratory, they were able to completely reverse insecticide resistance of psyllids collected from farms whose psyllids were showing resistance. Killiny's group also used RNAi to combat Asian citrus psyllids directly. First, they identified several key genes important in the life history of Asian citrus psyllid, such as those responsible for normally functioning wings and flight muscles. They developed specific dsRNAs, which when fed to immature psyllids, resulted in adults that emerged with malformed wings and were incapable of flight (see above). Thus the resulting psyllids cannot transmit the bacteria causing huanglongbing.

Who is working on the Project?

Lukasz Stelinski, an associate professor at the University of Florida, is leading efforts on insecticide resistance research for Asian citrus psyllid in Florida. Nabil Killiny, an assistant professor with University of Florida, is leading the efforts to develop RNAi-based management tools for Asian citrus psyllid.



Dr. Lukasz Stelinski



Dr. Nabil Killiny

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What are the challenges and opportunities?

An important challenge for the practical use of dsRNA for pest control is to figure a way to get the dsRNAs into the insect in the field. Killiny and others are working on inserting dsRNAs into citrus plants, so the Asian citrus psyllid would ingest them during feeding. Delivery of dsRNA through transgenic plants has been achieved with other insect pests and thus should be possible to do for Asian citrus psyllid.

Another potentially feasible way to deliver dsRNA is to incorporate dsRNA into transgenic bacteria that are not harmful to humans and then spraying the transgenic bacteria onto citrus trees. However, a practical limitation

of the RNAi approach is that large quantities of dsRNA are needed and are expensive to produce. Also, research is needed to develop formulations that prevent breakdown of dsRNA under field conditions.

Funding source: This project is funded by the Citrus Research and Development Foundation.

The Science for Citrus Health project is funded by two grants from United States Department of Agriculture's National Institute of Food and Agriculture. Designed by Barbara Alonso, University of California, Berkeley

Contributed by Science for Citrus Health
<http://ucanr.edu/sites/scienceforcitrushealth/>

For more information on the Citrus Research & Development Foundation, please visit www.citrusrdf.org

New CRDF Funding Cycle Nets More than 110 Pre-Proposals

Contributed by Dr. Jim Graham and Audrey Nowicki

In April, the Citrus Research and Development Foundation (CRDF) announced the RFP's RMC-18 and CPD-18 for the new project funding cycle for fiscal year 2018/19.

This funding cycle CRDF received more than 110 research and commercial product delivery pre-proposals from 22 university, government and private firm research departments from around the United States and Brazil. After receiving the reviews and recommendations of the Scientific Advisory Boards (SABs), CRDF's Research Management Committee (RMC) and Commercial Product Delivery Committee (CPDC) were tasked with selecting the most promising proposals. A total of 63 projects were invited for full proposal submission.

All proposals are subject to at least three Ad Hoc reviews. The reviewers' feedback is then provided to the SABs to consider during their discussion, ranking and subsequent recommendation to RMC and CPDC, which occurs in August. In September the RMC and CPDC will

receive the SAB recommendations and, after further discussion among the committee members, the committees will narrow the list full proposals down further to a final list of projects recommended for funding. The Finance and Audit Committee will review for financial considerations and ultimately the recommendations will be presented to the Board of Directors on September 25th for consideration and funding approval.

The final list of proposals approved for funding will be posted to citrusrdf.org following the Board meeting, with contracting to begin shortly after.

The CRDF is most appreciative of the extensive interest shown in resolving citrus greening at this critical time and is thankful for all the pre-proposals received for consideration, and encourages those researchers who are unsuccessful during this RFP to please submit during the next funding cycle.