



CITRUS RESEARCH & DEVELOPMENT FOUNDATION GROWER RESEARCH REPORT

Volume 4 Issue 5

January 2015

Investment of State Legislative Funding in Delivering HLB Solutions to the Florida Citrus Industry

The following summary was provided to state legislative leaders to update them on progress supported by legislative funding committed to Huanglongbing (HLB) solutions.

The Florida industry continues to struggle to cope with immediate impacts of the chronic infection of its trees with *Candidatus Liberibacter asiaticus* (CLAs), the pathogen which is responsible for citrus greening disease, or HLB. The Citrus Research and Development Foundation, Inc. (CRDF) has aggressive programs to develop basic understanding of the disease and to deliver remedies to the groves to dampen the impact of this disease. With a majority of the citrus tree population in Florida infected, the challenge is two-fold: 1) to stabilize or improve the declining productivity of trees in chronic decline from the disease; and 2) to enable citrus growers to successfully replant trees and groves to stop the steady decline of overall citrus production in the state. During 2014-2015, CRDF is managing approximately 100 research projects involving teams from across the country to develop short, intermediate and long-term solutions to this devastating disease. Of greatest priority are the projects that promise to deliver management tools in the near term. In addition to this competitively awarded research support, CRDF has evolved a Commercial Product Delivery Program, overseen by an aggressive Committee of Board members and engaged industry participants. This committee has the responsibility of translating research results into tools available to citrus growers. This latter focus has been the target for investment of state legislative funding over the past two years.

The CRDF annual operating budget for FY 2014-15 is just over \$18 million, and the \$3.5 million investment from the state legislature has provided important support for short-term research and delivery projects. Announcement of significant federal funding made available in late 2014 through the Federal Farm Bill will provide much-needed support for long-term objectives met through multi-year competitive grants managed through the United States Department of Agriculture (USDA), National Institute of Food and Agriculture (NIFA). Complementary Congressional commitment of "shovel-ready" project support for responding to citrus HLB nationwide also is providing support to the broader efforts. However, Florida citrus growers are at increased risk of further losses following three consecutive years of declining production, in part due to pre-harvest fruit drop losses in groves most impacted by HLB.

Upcoming Board and Committee Meetings

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|-----------------------------|---------------------|
| Jan 26th Finance and Audit | Lake Alfred 1:30 pm |
| Jan 27th Board of Directors | Lake Alfred 9:30 am |

A brief summary of the topical areas receiving attention in the current year follows. The 2014-15 state legislative funding has enabled considerable progress in these areas. Following this overview, a projection for investment of 2015-16 state funding is provided.

Asian Citrus Psyllid (ACP) Management and Citrus Health Management Areas (CHMAs)

Continuing progress in research on methods for suppression of the vector insect which spreads HLB has allowed the CRDF, working with product registrants, growers and with regulatory agencies, to increase the availability of tools to combat ACP populations. Several expansions of use for currently labelled insecticidal products have been achieved through these efforts, and several new products also have been registered for use on Florida citrus. While work continues on alternative strategies to manage the psyllids and prevent HLB spread, strategic chemical management remains a critical tool, especially for young trees within the first several years of their field life.

Complementing the effort to develop ACP tools, research has provided information on how insecticidal tools can be used during critical times of the season, such as bloom. Alliances between Florida Department of Agriculture and Consumer Services (FDACS), Florida Fruit and Vegetable Association, federal regulatory agencies, citrus growers and commercial beekeepers have allowed plans to proceed for use of ACP tools while protecting the health of honeybees foraging in citrus groves during bloom. Florida's efforts here are serving as a model for this issue in other crops and in other agricultural states.

Removal of HLB-Infected Citrus Groves

Elimination of ACP populations and pockets of CLAs bacteria residing in citrus groves which are no longer being managed for production has emerged as a growing challenge. In plant diseases moved by vector insects, the persistence of such inoculum sources generally prevents economical production in adjacent managed plots. Such appears to be the case with citrus and HLB, and CRDF has amassed information supportive of efforts to reduce this risk. Based on this information, FDACS has begun a program to strategically remove economically abandoned citrus groves, demonstrating the biological impacts of removing these insect and disease reservoirs on adjacent groves.

The CHMAs provide an ideal tool for planning, communication, and follow-up. It is the goal of this program to demonstrate the benefit of inoculum removal to citrus growers so that progressively, economically abandoned infected trees can be removed and replanted throughout the citrus industry.

Root System Impacts from HLB

CRDF-funded research has identified the significant impacts of early invasion of citrus root systems following *CLAs* infection. This new knowledge is being expanded to determine how this varies among citrus varieties and how this can be offset with cultural practices. The knowledge of this phenomenon has allowed researchers to begin field trials of treatments that will at the same time favor vigorous root growth and also will assist in reducing other citrus root stresses due to soil fungi, insects and other stress conditions. Managing roots in a holistic manner will support the retention of tree health and productivity of HLB-infected trees, perhaps prolonging their productive lives.

Treatments to Correct Soil and Irrigation Water Conditions Unfavorable to Citrus Health

Research also has focused on the citrus tree's change in response to irrigation water and soil chemistry that is brought on with HLB infection. The acidity (pH) and dissolved solids in soil and irrigation water impacts citrus roots, and when these roots are compromised, tree health is impacted. Field trials testing various methods to adjust imbalanced chemistry in soil and irrigation water already are showing results, and this promises to provide another immediate tool for managing HLB.

Evaluation of Plant Growth Regulators for their Role in Preventing Pre-Harvest Fruit Drop

Since fall of 2013, a series of field trials have been conducted across Florida citrus groves to determine if timely treatments of one or more plant growth regulators can reduce the pre-harvest fruit drop impacting the industry. Cooperative trials with growers have evaluated the timing and rates of these PGRs, followed by evaluation of how much fruit drop was reduced. Several of these trials are continuing through the 2014 Valencia fruit harvest season. Limited benefit has been observed, and additional strategies are being evaluated. Results of ongoing trials will strengthen our understanding of this opportunity.

Chemical Therapy to Slow/Reverse the Decline of HLB-Infected Trees

A wide range of antimicrobial candidates have been under investigation in recent years, in a search to develop methods to lower the bacterial populations in HLB-infected trees. This project area bridges from fundamental research projects to commercial delivery, and is increasingly moving to field trials of top performing candidates in different groups of chemistries. The details of material, dose, plant toxicity, application methods and timing, and regulatory considerations are proceeding simultaneously. Due to the importance of having tools to reverse the health of infected trees, therapy for infected trees has become a high priority for CRDF attention and investment.

Thermal Therapy to Slow/Reverse the Decline of HLB-Infected Trees

In a similar manner, research in recent years has identified that heat applied to citrus trees can impact bacterial levels. Researchers have characterized how solar energy can be captured in temporary tree enclosures to reduce *CLAs* levels while not injuring the tree, and results are promising. Similarly, the addition of supplemental heat via steam or other sources offers the potential to more rapidly treat larger numbers of trees of greater size. Current efforts in the field are addressing scale-up of these methods to make them commercially available and economically viable. The Federal MAC funding has recently approved support for this scale-up effort, complementing current investments through CRDF.

Deployment of Tolerant Rootstocks to Defend Against HLB

The citrus breeding programs of University of Florida (UF) and USDA, Agricultural Research Service (ARS) have yielded information on new rootstocks which appear to perform better than conventional rootstocks when infected with HLB. These rootstocks are not fully evaluated for all horticultural characteristics, but Florida citrus growers are willing to assume some risk in untested tools due to the critical situation. With this in mind, UF and ARS have made early releases of some of the leading rootstocks, and CRDF has facilitated the translation of the best of class of these rootstocks into grower trials. Arrangements for propagation of sufficient numbers of orange trees on these rootstocks have been made, and the commercial-scale replicated trials of these rootstocks will be planted in the next few months. The combination of encouraging early release of these rootstocks so that growers can purchase them, with the support of three commercial scale field trials in the three citrus growing regions of Florida will allow rapid adoption of those rootstocks that hold up under full field pressure.

Support for New Plantings and Model New Groves

Numerous projects are underway to integrate emerging information and tools into new citrus plantings so that growers regain the confidence to replant. Horticultural inputs, psyllid management and other aspects of establishing new groves are being integrated. In addition, information emerging from field research on HLB enabled the CRDF, in concert with industry groups, to work with USDA to receive approval of the Tree Assistance Program to cost-share the planting of new trees in groves made uneconomical by HLB infection.

All of the near-term field activities were made possible with partial or total support from 2013-14 and 2014-15 state legislative support. As the summary above indicates, there are continuing trials that require support in FY 2015-16. In addition, CRDF is analyzing results of 81 of our 130-project portfolio that will end by June 30, 2015, to determine the next steps in moving these results to field use. The delivery of results of these projects will be paramount in our priorities for funding in 2015-16. Those projects which can compete in the peer reviewed developmental grant programs funded by the Farm Bill are being encouraged in that direction, while CRDF is focused on transitioning real-time results to grower tools.