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EDITION  
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# Citrus Disease Research: *Searching for Innovative Solutions to Greening*

## **A Progress Report on Research Efforts to Date**

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### **IN THIS EDITION:**

This report covers the following topics:

1. Status of Research Contracts
2. Additional FCPRAC Proposal Recommendations
3. New FDOC Website [www.fdocgrower.com](http://www.fdocgrower.com)
4. Product Pipeline News
  - Sequencing a genome of CLa at USDA-ARS-USHRL
  - Progress on Transmission of Canker at USDA-ARS-USHRL
5. DSO – Florida Citrus Res. & Dev. Foundation, Inc.
6. List of Recently Approved Research Proposals
7. Consolidated Meeting Schedules, Timeline and Milestones

## Purpose of This Report

This report is the sixth edition of the brochure created by the Florida Department of Citrus to inform growers of the FDOC's engagement with the newly intensified production research initiative as well as provide a status report. Previous updates are available from the FDOC at your request, or can be attained by going to the FDOC's new website [www.fdocgrower.com](http://www.fdocgrower.com). Many activities are taking place concurrently, and it is the objective of this report to provide timely information to stakeholders.

## Citrus Research Kicks Off

After passing the review process by the National Academy of Sciences, the initial 83 contracts approved for funding by the Florida Citrus Production Research Advisory Council (FCPRAC) are 85% complete, and research is underway at 16 universities and organizations. The FDOC contracts were listed in Edition 5 of this brochure, and the 13 Research Proposals funded earlier this year by FDACS can be found at [www.florida-agriculture.com/fcrps.htm](http://www.florida-agriculture.com/fcrps.htm).

CATEGORY	FDACS CONTRACTS APPROVED & EXECUTED	FDACS NUMBER OF CONTRACTS	FDOC APPROVED CONTRACT AMOUNT	FDOC NUMBER OF CONTRACTS	TOTAL CONTRACTS AMOUNTS	TOTAL NUMBER OF CONTRACTS
HLB Proposals	\$2,661,780	12	\$8,801,872	55	\$11,463,652	67
Citrus Canker Proposals	0	0	\$1,225,759	10	1,254,759	10
Infrastructure (Non-Disease)	109,306	1	735,764	5	845,070	6
Other Disease	0	0	0	0	0	0
<b>TOTAL</b>	<b>\$2,2771,086</b>	<b>13</b>	<b>\$10,792,395</b>	<b>70</b>	<b>\$13,563,481</b>	<b>83</b>

## New Website

The new FDOC website, [www.fdocgrower.com](http://www.fdocgrower.com), is up and running. At this user-friendly site, you can access economic and market research data, scientific research efforts and progress, and vital grower information and industry links.



The [www.floridajuice.com](http://www.floridajuice.com) website - where you can access everything you want to know about the citrus industry from recipes, health and nutrition, and an area for teachers and students, to FDOC and FCC, news releases, and extensive information on research and economics - remains active at this time, and will be linked to the new website.

## FCPRAC Approves Additional Funding

At their meeting on March 13, 2009, FCPRAC approved additional funding by the Florida Department of Agriculture & Consumer Services (FDACS) and FDOC. FDACS will amend two previous proposals and two additional contracts, while FDOC will enter into an additional 17 contracts with the University of Florida and 4 with United States Department of Agriculture - Agricultural Research Services (USDA-ARS). A list of the funded projects can be found on the back cover.

## FCC Approves FDOC Contracts

At their meeting on March 18, 2009, the Florida Citrus Commission approved the proposal for FDOC to fund \$2.5 million in additional research contracts as recommended by FCPRAC.

*Your comments or contributions to this newsletter are welcome. Please send your email to [info@fdocgrower.com](mailto:info@fdocgrower.com).*

## Product Pipeline News



*Previously approved projects that the FL Citrus Growers have funded have resulted in significant progress. The progress on 2 of those projects is highlighted below.*

### USDA-ARS Scientists Closing In on Citrus Disease Threat

The Agricultural Research Service (ARS) scientists have sequenced the genome of the bacterium "Candidatus Liberibacter asiaticus" which lives in the plant's phloem tissues, affecting the passage of nutrients and eventually killing the plant. Plant Pathologist Yong-Ping Duan and research leader David Hall, at the ARS U.S. Horticultural Research Lab in Fort Pierce, Florida, have sequenced more than 95% and are currently sequencing the remaining 5%. They plan to publish a paper describing what the genome reveals about the bacterium's taxonomy, evolution and some of its enzymatic pathways. Sequencing the genome should allow scientists to decipher the bacteria's genetics code, study its biological features more closely and unlock mysteries about how it spreads disease, as well as identify genes that play roles in disease development to help design control strategies.

### USDA-ARS Research Progresses on Transmission of Canker

The risk of fruit as a pathway for citrus canker movement: Numerous packinghouse and post packinghouse experiments were conducted relative to fresh fruit as a pathway for spread of citrus canker by a group of international researchers from Florida, California, Texas, Brazil, Argentina, and Spain headed by Dr. Tim Gottwald, USDA, ARS, USHRL Fort Pierce. The recovery of canker bacteria was minimal after passing contaminated but symptomless fruit through a packinghouse where they were treated with chlorine and SOPP. The bacterial populations were further reduced by reversing the chlorine and SOPP treatments normally used in Florida such that SOPP was applied first. This apparently removes more of the dirt and debris from the fruit surfaces, making the chlorine more effective at eliminating the canker bacteria on the fruit surfaces. This treatment reversal may be a future consideration for packinghouses to minimize canker bacteria survival. The risk of cull piles as a source of canker to nearby trees was studied in Fort Pierce,

Gainesville, and in Argentina during two seasons. The group was not able to demonstrate transmission of canker in any of the replicated studies even to nearby susceptible grapefruit trees only one meter (~3.3 ft) away. Survival of the bacteria was also studied in lesions on discarded fruit peels. The bacterial populations were found to decrease rapidly to nearly nondetectable levels within 72 hours after discarding peels under citrus trees. Canker bacteria were also found to decline in wounded fruit that were inoculated post packinghouse, indicating that the senescing tissues of the fruit when wounded in or after the packinghouse do not support continued multiplication or long term survival of the bacteria. These studies document that cankered fruit are not a potential pathway for citrus canker to become established in new disease free areas. USDA, APHIS has conducted a Pest Risk Assessment based on this study that has been accepted for publication in the Journal of Crop Protection. APHIS has also developed a revision to regulations governing the movement of fresh fruit based on this work and will release this revision for the required public comment period soon.

### University of Florida Forms New Direct-Support Organization (DSO)

In a press release issued by the UF on March 19, 2009, it was announced the University's Board of Directors has partnered with the FDOC, Florida Citrus Mutual, and the FDACS in the establishment of a direct-support organization, the Florida Citrus Research and Development Foundation, Inc. to manage and provide oversight for citrus producers' self-imposed taxes and other funds

collected to foster scientific research to aid the citrus industry. The FCRDF, a not-for-profit organization, will utilize the expertise of senior level individuals in the citrus industry who will direct research that is funded by this "box tax" to citrus greening, citrus canker and citrus tristeza virus. Although citrus growers are a resilient and dedicated group, they cannot battle citrus greening on their own any more. It is absolutely necessary for this partnership to focus the proper resources from the State, the University, other public and private institutions, and federal

and international research entities toward this disease. The FCRDF will pull these resources together and coordinate their activities for the benefit of Florida's \$1 billion-a-year citrus industry which has a \$9 billion economic impact including activities such as growing, packing, processing and distributing the fruit. The FCRDF Board will consist of 13 directors appointed from FDOC, FCM, FDACS and UF. The first organizational meeting of the FCRDF Board of Directors will be held within the next few weeks.

PI	ENTITY	TITLE	DISEASE	FUNDING
Dawson, W.	CREC-UF	Identify and Deliver Antibacterial Peptides and/or Proteins for Control of Citrus Greening (Huanglongbing or HLB)	HLB	FDOC
Ehsani, E. R.	CREC-UF	Detecting Citrus greening (HLB) using multiple sensors and sensor fusion approach	HLB	FDOC
Stover, E.	USDA-ARS	Production of Transgenic Commercial Cultivars Resistant to HLB and Canker	HLB	FDOC
Graham, J.	CREC-UF	Characterization of canker resistance in citrus plants created by 'Somatic Cybridization' without citrus transformation.	canker	FDOC
Lapointe, S.	USDA-ARS	A push-pull strategy for control of the Asian citrus psyllid	HLB	FDOC
Rogers, M.	CREC-UF	Direct Grower Assistance: Development & evaluation of citrus grower psyllid mgmt. programs	extension	FDOC
Hall, D.	USDA-ARS	Efficacy of Seasonal Insecticide Programs for Suppressing HLB in New Citrus Plantings	HLB	FDOC
Stover, E.	USDA-ARS	A secure site for testing transgenic and conventional citrus for HLB and psyllid resistance	HLB	FDOC
Grosser, J.	CREC-UF	Increasing the Capacity of the University of Florida's CREC Core Citrus Transformation Facility	HLB	FDOC
Gmitter, F.	CREC-UF	Identification and Characterization of HLB Survivors	HLB	FDOC
Qureshi, J.	UF	Sampling Plans to Guide Decision Making for Control Asian Citrus Psyllid	HLB	FDOC
Ritenour, M.	UF	Grove Practices that Increase Fresh Fruit Quality & Reduce the Development of Peel Disorders	HLB	FDOC
Singh, M.	CREC-UF	Elimination of HLB infected trees without physical removal through application of herbicides	HLB	FDOC
Gmitter, F.	CREC-UF	Development of transformation techniques for Murraya, to engineer a deadly trap plant	HLB	FDOC
Futch, S.	CREC-UF	Treatment of Citrus Stumps With Herbicides To Minimize Sprout Formation	HLB	FDOC
Rogers, M.	CREC-UF	Huanglongbing: Understanding the vector-pathogen interaction for disease management	HLB	FDOC
Stansly, P.	UF	Enhanced Biological Control of Asian Citrus Psyllid in Florida through Introduction and Mass Rearing of Natural Enemies	HLB	FDOC
Stelinski, L.	CREC-UF	Development of attractants for Tamarixia radiata, a parasitoid of Asian citrus psyllid (ACP), for improved biological control of ACP	HLB	FDOC
Stelinski, L.	CREC-UF	Development of effective citrus leafminer control with pheromone mating disruption	other	FDOC
Stansly, P.	UF	Ultralow Volume and Aerial Application of Insecticides and Horticultural Mineral Oil to Control Asian Citrus Psyllid in Commercial Orchards	HLB	FDOC
Stansly, P.	UF	Development and Delivery of Comprehensive Management Plans for Asian Citrus Psyllid Control in Florida Citrus	HLB	FDOC
Irey, M.	US Sugar	Support for the Southern Gardens Diagnostic Laboratory	infrastr.	FDACS
Roberts, P.	UF	Diagnostic Services for growers for detection of HLB to aid in management decisions	HLB	FDACS
Muraro, R.	CREC-UF	Economic Evaluation of Alternative Replanting Production Systems	HLB	FDACS
Bournique, D.	IRCL	Validation of Area-Wide Management of Asian Citrus Psyllid	HLB	FDACS

## GREENING AND CANKER RESEARCH CONSOLIDATED TIMELINE AND MILESTONES (updated 3/27/09)

2009	DATE	STATUS
FCATP program manager to negotiate project contracts with individual researchers	Dec 17 - Jan 16	Completed
FDACS executes 13 contracts to fund projects	Jan - Feb	Completed
FDOC completing 70 contracts to fund projects (81% complete)	Jan - Mar	In Process
FCPRAC approves 23 new projects and additional funding on 2 current projects; also authorized Program Manager to pursue additional funding sources for 2 projects.	Mar 13	Complete
Formation of FCRDF, Inc. (DSO) approved by the University of Florida	Mar 16	Complete
UF/IFAS-SWFREC, Immokalee - Citrus Canker and Greening Field Day	April 2	Upcoming
UF/IFAS, FCPRAC, Greening Research Task Force - Citrus Greening Symposium, Stuart Conf. Center, Bartow	April 7	Upcoming
Organizational meeting for Board of Directors scheduled for FCRDF	April	Pending
Initial research projects progress reports available	July	Pending