



# REPORT

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## Research progress creates further needs for development plans

As progress across the broad front of research is made, results are being considered for how they would ultimately be used to manage HLB and other diseases challenging the industry. In many cases, research findings are immediately integrated into grower decision processes, such as scouting for and treatment of psyllid populations. New information on products, rates, and timing are being integrated incrementally as results emerge.

In other cases, research results lead to “next-steps” which may involve further development or field testing, or may actually require regulatory consideration and perhaps commercial development. The result in this case might be a new “product” that has been approved for use and is commercially available for use by growers. Often third party participants will bring new products to market with no further assistance from CRDF past the research phase.

CRDF’s Commercial Product Development Committee was established to move research results forward. The goal is to develop and follow a plan for research progress to find its way to use, and to engage with regulatory agencies and with potential commercial partners. As with research, there are several parallel opportunities that are emerging, and the Committee is organizing these as “projects” similar to research projects. In this manner, we are able to map what will need to be done to achieve success, as well as to apply timelines and funding needs. Like the research projects that CRDF manages, commercial product development projects will be monitored, assessed and documented.

At the April meeting of the Commercial Product Development Committee, current project areas were reviewed. The following list identifies the primary areas involved in the current list of projects:

- 1) Psyllid Control - Neonicotinoid label modification to allow for additional applications per season. This will be particularly important for protection of new plantings from HLB infection.
- 2) Psyllid Control - RNAi, new molecule discovery challenge. Research to identify candidates which might provide intermediate range therapy against HLB is nearing completion.
- 3) Antibacterials - Small molecule therapeutics, new molecule discovery challenge. As above, screening of candidates will

### UPCOMING MEETINGS

#### MAY, 2012

18	Research Management Committee	CREC, Lake Alfred	
18	Commercial Product Development Committee	CREC, Lake Alfred	
22	Board of Directors	Teleconference	

#### JUNE, 2012

14	Box Tax Advisory Committee	Bonita Springs, FL	1:30 pm
14	Board of Directors	Bonita Springs, FL	1:45 pm

#### JULY, 2012

24	Board of Directors	CREC, Lake Alfred	
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identify next steps for testing and development.

- 4) Genetic Disease Resistance - Canker resistance trait and mature tissue transformation research areas are converging on the opportunity to advance canker resistance results.
- 5) Citrus Gene Therapy - CTV Vectors are being used to test ability of various antimicrobial genes to interrupt or prevent HLB disease.
- 6) Advanced Citrus Production Systems - High density plantings and related horticultural intensification may assist future plantings to reach production and profitability earlier in time, a major defense against the effects of HLB and other diseases.
- 7) Disease Detection – Progress in detection of citrus canker using canine “scouting” may have specific applications, and opportunities to use this technology are near-term.
- 8) Diaprepes Root Weevil Control - Pheromone development has advanced through research and is close to commercialization. While not directly related to HLB, root injury by weevils is part of the complex interaction that leads to tree health decline, and the impact is greater in presence of root insects and disease.

Each of these projects have specific requirements, timelines and vary in their potential to affect citrus health in the near to longer term. The Commercial Product Development Committee will continue to play a role in moving research to solutions on these and other fronts and to attract the most appropriate development partners for successful introduction of new products to mitigate loss from infectious disease.

## ANNUAL AND FINAL REPORTS

Following are the annual and final reports on CRDF-funded research projects which have been posted online since our last issue. The full report can be accessed from the 'link' button. These, and interim progress reports on all projects as well as projects funded by the California Research Board and Texas Citrus Producers Board can be found online at [www.citrusrdf.org](http://www.citrusrdf.org)>GROWERS>RESEARCH UPDATES.

LINK	TITLE	RESEARCHER	HEADLINE
	Characterization of canker resistance in citrus plants created by 'Somatic Cybridization' without citrus transformation	Graham	Cybrids inherit resistance via transfer of organelle genes
	Canker management in Florida citrus groves: chemical control on highly susceptible grapefruit and early orange varieties	Graham	Evaluation of chemicals for control of citrus canker
	Functional study of the putative effectors of 'Candidatus Liberibacter asiaticus' using Citrus tristeza virus vector	Gowda	Expression of putative effectors of HLB in citrus
	Maintaining the effectiveness of our current and most important psyllid management tools (insecticides) by preventing insecticide resistance	Stelinski	Managing pesticide resistance for ACP
	Improving psyllid management by optimizing 1) adjuvants for low volume sprays, 2) targeted border-row treatments, and 3) location of spray applications	Stelinski	Border row low volume treatments limited in effectiveness
	Characterizing the Roles of Callose and Phloem Proteins in HLB Symptom Development	Albrigo	Identification of virulence factors of C. Liberibacter asiaticus
	Insecticidal and antimicrobial peptides for management of Asian citrus psyllid	Pelz-Stelinski	Peptides for insect management in citrus
	Impact of insecticidal control of Asian citrus psyllid (ACP) on leafminers, mites, scales, thrips and their natural enemies in Florida	Qureshi	Determination of non target effects of sprays against ACP
	Sampling Plans to Guide Decision Making for Control of Asian Citrus Psyllid (ACP)	Qureshi	Evaluation, promotion and adoption of ACP sampling
	Control of Citrus Huanglongbing by disruption of the transmission of citrus greening pathogen by psyllids	Wang	Identification of potential inhibitors against SecA of Las
	Characterization of critical genes involved in spread of citrus canker pathogen Xanthomonas axonopodis pv. citri	Wang	Characterization of critical genes involved in spread of canker
	Characterization of the virulence mechanism of the citrus Huanglongbing pathogen Candidatus Liberibacter asiaticus	Wang	Host responses of different tissues to Las infection
	Identification and characterization of critical virulence and copper resistance genes of Xanthomonas axonopodis pv. citri & related species	Wang	genome sequence of Xanthomonas citri & related species
	Elimination of HLB infected trees without physical removal through application of herbicides	Singh	Changes in HLB management reduce tree killing machine need
	How the efficiency of HLB transmission by psyllids varies depending on the stage of infection and plant development	Folimonova	psyllid transmission from flushes at various stages of disease