Citrus Research and Development Foundation, Inc.

U.S. Citrus Research Project Inventory, August, 2016

CRDF, with assistance from industry, state and federal agencies, has assembled the attached summary of research projects dedicated to citrus in the United States. The inventory has drawn from sponsors as well as from performing institutions, and represents the majority of publically-funded research projects primarily focused on citrus. A table of acronyms used in the table also is provided.

The structure of the inventory provides details of the PI and institution, as well as title, objectives and other project details. These projects have been sorted by general categories of research that are meaningful to CRDF, including HLB research, research on other diseases, IPM, production, plant improvement, processing and post-harvest fresh fruit research.

CRDF intends to update this inventory on a 6-month basis with new projects that are added, as well as projects that have ended. Please contact projects@citrusrdf.org if you have questions about this inventory.

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1	**Project No#**	**Principal Investigator**	**Performing Institution**	**Project Title**	**Contract Total**	**Start Date**	**End Date**	**Total # of Years**	**Objectives**	**Information Provided By**	**Financial Sponsor or Project**	**Flow Through Sponsor**	**HLB Host/ Pathogen/ Vector -- Other**
2	15-8130-0486-CA	Dr. Reza Ehsani	University of Florida	A Compact, Mobile, and Improved Tree Steaming System for Thermal Therapy of Individual Medium-Sized Citrus Trees	$ 302,794	1/1/2015	12/1/2016	2	Provide a near-term solution in managing citrus groves already infected with HLB by enhancing thermotherapy technology, specifically by designing an improved wet steam based heat-treatment machine to prolong the productivity and life of citrus trees know to be infected with HLB. Build an improved compact & mobile steaming system to steam individual citrus trees under eight (8) feet tall. 1. Re-design steaming system based on improved goals. 2. Purchase and assemble materials for construction of improved system. 3. Conduct field trials and analyze field trial data. Make the steaming system available to use by growers and researchers. 4. Develop manuals and guidelines on the improved system. 5. Distribute and disseminate manuals and guidelines to growers and the scientific community.		HLB MAC		HLB Host
3	724	Gmitter, Fred	University of Florida	Accelerating Citrus Gene Discovery for HLB Tolerance/Resistance	$ 399,500	5/1/2013	4/30/2016	3	The overall goal of this project is to accelerate the discovery of HLB tolerance genes for engineering of cisgenic HLB tolerance/resistance in commercial sweet orange, grapefruit and mandarin cultivars. This project aims to screen ~1,200 PCGs using high throughput gene capture, massively parallel genotyping-by-sequencing, and genetic association and linkage analysis to find the most likely candidate gene(s) for HLB tolerance in Citrus and Poncirus. Specifically, this project is to: 1) Sequence the genome of rough lemon; 2) Design a target gene capture system based on Citrus and Poncirus genome sequences and the SureSelect technology; 3) Rapidly identify sequence polymorphisms within these PCGs and genotype Citrus and Poncirus comprising an association study panel; 4) Perform genetic association analysis to identify the most likely candidate genes; 5) Validate the association of these genes with HLB tolerance in segregating populations, and 6) Clone the mostly likely candidate gene(s) into transformation vectors for engineering HLB tolerance in commercial sweet oranges, grapefruit and mandarins.	CRDF	CRDF		HLB Host
4	AGR DTD 11-19-2013	Burks, Thomas Francis	University of Florida	ADVANCING OVER THE TOP CITRUS HARVESTING EQUIPMENT FOR JUICEMARKETS IN HIGH DENSITY GROVES	$ 128,716	9/1/2013	8/31/2016	3		UF	GEOSPIDER	US DEPT OF AG	HLB Host
5	15-8130-0487-CA	Peter Ravenna	AG Harvesters LLC	AG Harvesters Citrus Steam Machine	$ 963,887	12/9/2014	12/31/2016	2	Provide a solution to inhibit the impact of HLB infected citrus trees, and increase the health and yield of trees by developing a thermotherapy machine to treat citrus trees on a field scale. The goals are to build and test a continuous moving steaming system mounted to a towable trailer to treat a large block of citrus trees. Treated and untreated blocks of trees will be evaluated for fruit yield, fruit quality, canopy, leaf drop, and decline index scores. 1.Tunnel Construction / Factory Trials; 2. Field Construction; 3. Field Trials #1; 4. Field Trial #1 Review; 5. Field Trials #2 Process Refinement; 6. Design / Process Update; 7. Tunnel / Drive System Update; 8. Additional Field Trials . Process Optimization 9. Final Results Evaluation / Process Approval		HLB MAC		HLB Host
6	195	Ehsani, Reza	University of Florida	AG HARVESTERS CITRUS STEAM MACHINE	$ 73,388	12/9/2014	12/31/2016	2		UF	AG HARVESTERS LLC	US DEPT OF AG	HLB Host
7		Lint	AG Harvesters	AG Harvesters Citrus Steam Machine	$ 963,887				This private company will build a machine that will deliver a solution, thermotherapy, on a field scale instead of on an individual tree level	USDA/ARS			HLB Host
8	910	Powell, Chuck	University of Florida	An integrated approach for establishment of new citrus plantings faced with the HLB threat	$ 369,714	4/1/2014	3/31/2017	3	The objective of this project is to determine the optimum combination of chemotherapy, thermotherapy, and nutrient therapy that be registered for use in field citrus and control HLB. This will be broken to three stages: treatment of field trees, analysis of the effect of the treatment on trees, making conclusions about optimum HLB control strategies.	CRDF	CRDF		HLB Host
9	731	Graham, Jim	University of Florida	Calcium carbonate may reduce root health and exacerbate HLB expression	$ 198,214	4/1/2013	3/31/2016	3	1) To determine the effect of high carbonate irrigation water on tree health and HLB expression 2) To estimate the potential for high carbonates in the well water to exacerbate HLB root damage of trees on Swingle and Carrizo rootstocks 3) To evaluate whether conditioning high carbonate well water with acidification can ameliorate the impact on root and tree health and yield	CRDF	CRDF		HLB Host
10	752	Moore, Gloria	University of Florida	Cell Penetrating Peptides for Citrus Genetic Improvement and Disease Resistance	$ 136,251	5/1/2013	4/30/2016	3	Objective I: Determine if CPPs can be systemically transported in citrus. Objective II: Develop a CPP transformation protocol without Agrobacterium in citrus. Objective III: Evaluate the use of CPPs as delivery tools for disease therapies and study the role of defense genes. Our perceived results could have far reaching effects for the successful integration of disease resistant GMOs in global markets by limiting the perceived negative effect of bacterial vectors. Hopefully, this technique can be used to create transgenic lines with meaningful constructs to confer genetic resistance to citrus greening.	CRDF	CRDF		HLB Host
11	15-023	Schumann, Arnold	University of Florida	Citrus nutrition studies for improved survival of HLB-affected trees	$ 281,804	7/1/2015	6/30/2018	3	Our main goal is to find the reasons for inconsistent responses of HLB-affected citrus to EN programs and to develop feasible and economical remedies that can consistently replicate successful HLB mitigation with ENs in all Florida groves. Specific objectives are: 1) Establish nutrient sufficiency guidelines for leaf tissues of HLB-affected trees that have successfully responded to nutritional programs in order to help growers replicate the successes and achieve higher nutrient efficiencies. 2) Determine soil conditions that favor root hair and VAM proliferation of citrus roots, thus maximizing root-uptake of calcium and other deficient nutrients in HLB- affected citrus trees. 3) Establish testing protocols and remedial soil amendments that can be deployed to maximize root-uptake of calcium and other deficient nutrients in non-responsive HLB-affected groves. 4) Deliver results of the research project to the Florida citrus industry through extension / outreach to all stakeholders (growers, contractors, supporting industries).	CRDF	CRDF		HLB Host
12	809	Albrigo, Gene	University of Florida	Citrus preharvest drop related to HLB disease-Nature and control	$ 240,000	4/1/2014	3/31/2017	3	The overall objectives of these studies are to improve tree health and performance in the face of HLB infection, particularly related to preharvest fruit retention when coupled with a SCRI Block Grant. The focus is to explore as many possible benefits from the use of PGRs from their known modes of action. The specific objectives are as follows: 1. Frequent low level applications of auxin and cytokinin will be tested to promote cambial activity and phloem regeneration 2. Tests of soil applied a) GA to stimulate root growth and b) an anti-gibberellin to prevent late summer flushing will be evaluated to overcome poor root development and prevent excessive vegetative growth	CRDF	CRDF		HLB Host
13	5100-155	Leveau, Johan	University of California, Davis	Citrus rhizobiomes and tree productivity in response to soil manipulations	$ 86,000	10/1/2015	9/30/2016	1	To increase citrus production efficiency by studying changes in rhizobiome (root microbial community) structure and function in response to various soil amendments (blackstrap molasses, polyphosphate and imidacloprid). Specific microbial signatures will be used to describe healthy roots, trees and practices.	CRB	CRB		HLB Host

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14	15-034C	Roberts, Pam	University of Florida	Continuation of diagnostic service for growers for detection of Huanglongbing in citrus and psyllids to aid in management decisions	$ 287,688	7/1/2015	6/30/2017	2	Service/Support	CRDF	CRDF		HLB Host
15	15-030C	Rogers, Michael	University of Florida	Continuing Field Trial Support for CRDF CPDC	$ 322,129	7/1/2015	6/30/2017	2	Field trial support	CRDF	CRDF		HLB Host
16	15-8130-0504-CA	Charles Powell	University of Florida	Control citrus HLB for new plantings in Florida with integrated management	$ 526,460	4/1/2015	3/31/2017	2	The long-term goal of this project will be to develop demonstrations and protocols for an integrated strategy to combat citrus HLB, which can be applied to citrus production by combining eco-friendly chemo- and/or thermotherapy coupled with site-specific nutrient management. The short-term goals are: 1) To determine the optimal combination of chemotherapy, thermotherapy, and nutritional therapy for the control of HLB. 2) To demonstrate the efficiency of the integrated disease management in alleviating citrus HLB under field conditions.		HLB MAC		HLB Host
17	15-028	Wang, Nian	University of Florida	Control citrus Huanglongbing (HLB) by counteracting the SA hydroxylase of Candidatus Liberibacter asiaticus	$ 430,697	7/1/2015	6/30/2018	3	The goal of this project is to develop management strategies which boost natural defense mechanisms to control Huanglongbing (HLB) disease by counteracting salicylic acid (SA) hydroxylase of Ca. Liberibacter asiaticus (Las). 1) Control HLB by optimization of application of SA and its analogs. Application of SA and its analogs have potential to neutralize the SA hydroxylase. Based on our previous study, foliar spray of SA and its analogs slowed down the increase of Las population in citrus and HLB disease severity whereas trunk injection of SA and its analogs significantly reduced Las population. The previous study suggest that we can improve the HLB management by optimizing the application methods of SA and its analogs. 2) Control HLB using a combination of SA, SA analogs or SA hydroxylase inhibitors. By combining SA or SA analogs with SA hydroxylase inhibitors, we could improve the efficacy of plant defense inducing to control HLB. SA hydroxylase inhibitors can directly counteract Las SA hydroxylase. We have identified six SA hydroxylase inhibitors in our previous studies. We will continue to optimize those SA hydroxylase inhibitors.	CRDF	CRDF		HLB Host
18	15-042	Wang, Nian	University of Florida	Control citrus Huanglongbing using endophytic microbes from survivor trees	$ 467,000	7/1/2015	6/30/2018	3	The goal of the proposed study is to characterize the effect of using endophytic microbes in controlling HLB. Our hypothesis is the outcome of the interaction among Las, psyllid and citrus is affected by the citrus phytobiome. In order to achieve the goal of this study, the following objectives will be conducted: Obj. 1. To characterize the phytobiomes and endophytic microbes from HLB survivor trees and HLB diseased trees. Obj. 2. To illustrate whether the endophytic microbes from survivor trees could efficiently manage citrus HLB.	CRDF	CRDF		HLB Host
19	20660	Wang, Nian	University of Florida	CONTROL HLB BY UNDERSTANDING MECHANISMS OF DEFOLIATION, DEFOLIATION, DIEBACK, & ROOT DECLINE	$ 189,450	12/23/2013	6/30/2016	3		UF	FL DEPT OF AG AND CONSUMER SER	US DEPT OF AG	HLB Host
20	15-8130-0504-CA	Powell, Charles A	University of Florida	CONTROL OF CITRUS HUANGLONGBING FOR NEW PLANTINGS IN FLORIDA WITH INTEGRATED MANAGEMENT	$ 526,460	4/1/2015	3/31/2017	2		UF	US DEPT OF AGANIMAL & PLANT HLTH INSPECTION		HLB Host
21	15-008	Etxeberria, Ed	University of Florida	Determination of CLas signal in HLB-affected citrus trees	$ 53,572	7/1/2015	6/30/2016	1	1. Elucidate the nature of the HLB signal(s) 2. Provide additional evidence on its transmission in terms of movement across tissues and between trees though underground organs. 3. Determine the progression of physical symptoms from its inception. 4. Examine the in-tree variation in CLas titer.	CRDF	CRDF		HLB Host
22	749	Li, Yi	University of Conneticut	Development of Technologies Important for Creation and Commercialization of Transgenic HLB Resistant Citrus	$ 229,683	5/1/2013	6/30/2016	3	Development of a transformation enhancing technology for mature citrus tissues: More specifically, we will co-express two distinct genes that each is highly effective in promoting shoot regeneration from transformed cells derived from mature citrus trees to enhance transformation efficiency. To avoid undesirable effects of leaky or continuous expression of any of the two genes, we will then eliminate them together with selection marker gene and other nontrait genes from transgenic shoots.	CRDF	CRDF		HLB Host
23	14-8130-0477-CA	Callie Walker	Florida Department of Agriculture and Consumer Services	Effect of Abandoned Grove Removal on Well-Managed Groves Including New Citrus Plantings (Florida)	$ 2,188,230	9/26/2014	9/25/2016	2	Demonstrate the positive effect of removing 2,500 acres of abandoned groves in select Citrus Health Management Areas to eliminate sources of HLB inoculum from unmanaged fields , reduce ACP populations, and ultimately prevent new HLB infection in and around newly planted citrus groves. By reducing ACP populations, citrus production costs may be lowered and treatment needing to control ACP would be reduced. 1. Grove Selection based on ACP population reporting. 2. Obtain property owner contacts and permission for removal. 3. Prepare contracts, solicit and award bids to perform the destruction of the abandoned groves. 4. Destruction of abandoned groves. 5. ACP counts and general tree health evaluations.		HLB MAC		HLB Host
24	838	Morgan, Kelly	University of Florida	Effect of selected concentrations of calcium bicarbonate on expression of HLB in the greenhouse and grove	$ 349,491	5/1/2014	4/30/2017	3	1. To determine the effects of HLB, calcium bicarbonate and their interaction on water use, nutrient uptake and root health of potted trees under greenhouse conditions. 2. Provide recommendations for irrigation scheduling of HLB affected trees with irrigation water of good quality and/or high in bicarbonates. 3. To evaluate of acid injection treatments that reduce calcium bicarbonate in soil and irrigation water for their effects on tree health, nutrient status, water use and productivity in groves under bicarbonate stress. 4. To evaluate the efficacy of mass water treatment and non-acid injection technologies on soil pH and bicarbonate concentrations, and tree nutrient uptake, yields and root density.	CRDF	CRDF		HLB Host
25	903	Boman, Brian	University of Florida	Establishing citrus nutrition trials for young & mature trees in the Indian River Region to promote plant growth, mitigate HLB, decrease fruit drop, and improve postharvest fruit storage properties	$ 360,000	7/1/2014	6/30/2017	3	1: Field trial – newly planted trees-- A newly-planted block of red grapefruit at the IRREC in Fort Pierce has already been established in November 2013. These trees will be used to evaluate supplemental fertilizer application, and the subsequent consequences for HLB symptom severity, on tree growth and health, CLas presence, and adult ACP abundance. Trees subjected to supplemental fertilizers will be monitored for HLB progression as they mature. 2: Field trial – mature trees-- Supplemental fertilizer trials utilizing mature red grapefruit trees in commercial citrus groves in the Indian River Region have been established with a CRDF-sponsored extension to project #179. These field trials are at two separate locations: one is located in Indian River County, and the other is located in Saint Lucie County. The aim of this objective is to further the understanding of what, if any, nutrients are influential in HLB progression, tree health and growth, adult ACP abundance, and fruit yield and drop. 3: Fruit postharvest handling and storage trials-- Grapefruits collected from Objective One will be subjected to simulated postharvest and storage environments. The goal of this objective will be to determine how the supplemental fertilizer treatments from Objective One influence fresh grapefruit quality retention after packing and storage.	CRDF	CRDF		HLB Host

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26	6.0563.00	Academia	University of Florida	Evaluating the physiological effects of thermotherapy in citrus	125,000	FY16		1	The purpose of this project is to evaluate the physiological effects of thermotherapy on HLB-affected trees as well as other pretreatment parameters that affect the overall tree response. Information gained from this study will be readily applicable and will help in efficient and assured use of thermotherapy for rejuvenating HLB-affected citrus trees.	Farm Bill Section 10007	Farm Bill Section 10007		HLB Host
27	5200-147	Ramadugu, Chandrika	University of California, Riverside	Evaluation of hybrids of citrus and citrus relatives for huanglongbing (HLB) tolerance or resistance	$ 146,664	10/1/2014	9/30/2016	2	The objective is to develop HLB resistant citrus by conducting intergeneric crosses between citrus and citrus relatives such as Eremocitrus and Microcitrus. These hybrids will be tested for resistance to HLB and the mechanism of resistance will be studied. Developing resistant citrus cultivars is the ultimate goal.	CRB	CRB		HLB Host
28		Browning	CRDF	Evaluation of results of MAC funded thermotherapy projects; determination of ability of ACP to acquire HLB after thermotherapy	$ 374,150				This project will 1) evaluate the results of the MAC funded thermotherapy projects in a coordinated manner, 2) determine the ability of the ACP to acquire HLB from thermotherapy treated trees, and 3) serve as a model template for evaluating nearly any HLB treatment so that results could be compared across treatments.	USDA/ARS			HLB Host
29	736	Grosser, Jude	University of Florida	Expedited Indian River Evaluation of Tetrazyg Rootstocks Surviving the HLB-Gauntlet	$ 96,538	4/1/2013	3/31/2016	3	The overarching goal of this proposal is to refine and expand efforts to expedite propagation and evaluation of promising, complex rootstocks with increased tolerance to HLB. In order to achieve this overarching goal, we have identified three objectives which will need to be addressed. Objective 1: Modification of Greenhouse and Rootstock Propagation via Rooted-Cuttings In order to refine and expand upon efforts to expedite propagation of promising citrus rootstocks that show increased tolerance to HLB, a secure, FDACS-DPI-approved facility will need to be established. Objective 2: Budding Rootstock Candidates with Superior Scion Candidates. Objective 3: Establishing Field Trials with Grafted Young Trees	CRDF	CRDF		HLB Host
30	929.2C	Rucks, Phil	Phillip Rucks Citrus Nursery, Inc.	Field Trial of HLB Tolerant RootstockPRCN Contract #2659 deposit on orange trees paid March 2014; delivery in Spring 2015. Trees are tagged, inspection by appointment only.	$ 124,740	3/25/2014	5/31/2016	1	Contract to provide rootstocks for grower field trials.	CRDF	CRDF		HLB Host
31	928.1C	Sutherland, Dudley	Glades Crop Care, Inc	Field Trial of Naturally Occuring Microbes	$ 100,788	4/11/2014	3/31/2017	3	Objectives of the Project: Test 5 soil-applied products, with mulch subplots, plus an untreated control (6 treatment plots) on health and HLB status of orange trees over 3 years.	CRDF	CRDF		HLB Host
32	927C	Rogers, Michael	University of Florida	Field Trial Support for CRDF CPDC	$ 331,466	3/1/2014	6/30/2015	1	A Coordinator of Research Programs/Services will be hired to liaise between the CPDC Committee and public researchers and/or private contractors. Duties will include familiarization with field trial design, data requirements, establishing roles and responsibilities, assisting with trial implementation and data collection when needed and documenting major trial activities. Two additional Agricultural Assistants will be hired to collect data in the field with appropriate trials (i.e., tolerant rootstock trials), where more extensive field data collection is expected.	CRDF	CRDF		HLB Host
33	928.4C	Wang, Nian	University of Florida	Field Trials of Naturally occuring microbes to combat HLB	$ 99,156	4/1/2014	3/31/2017	3	Objectives of the Project: Test 5 soil-applied products, with mulch subplots, plus an untreated control (6 treatment plots) on health and HLB status of orange trees over 3 years.	CRDF	HLB MAC		HLB Host
34	942.2C	Yonce, Henry	KAC Agricultural Research, Inc.	Field Trials of Plant Growth Regulators	$ 15,000	12/19/2014	6/30/2015	1	This study is being conducted to determine the feasibility of applications of 2,4-D to control pre-harvest fruit drop in citrus due to HLB infection. The purpose of the study is the control of premature fruit drop in citrus fruit infected with HLB. The center four trees of each treatment will be evaluated for fruit drop. It will be necessary to have the grove floor clean prior to evaluations. The grove floor under the center four trees on each treatment and replication will be raked clean of old fruit and debris. The dropped fruit will be counted approximately every two weeks to determine the severity of drop and any differences between treatments. In addition to periodic fruit drop counts, the number of fruit on each tree will be counted at application and at the end of the trial (final pre-harvest fruit count). The results will be tabulated and summarized soon after harvest to allow planning of trial work for the 2015 spring Valencia crop.	CRDF	CRDF		HLB Host
35	928.2C	Booker, Brad	Florida Ag Research	Field Trials of Soil Microbials to combat HLB Ridge Site crop Consultant	$ 81,146	4/1/2014	3/31/2017	3	Objectives of the Project: Test 5 soil-applied products, with mulch subplots, plus an untreated control (6 treatment plots) on health and HLB status of orange trees over 3 years.	CRDF	HLB MAC		HLB Host
36	928.3C	Yonce, Henry	KAC Agricultural Research, Inc.	Field Trials of Soil Microbials to combat HLB Southwest FL Site crop Consultant	$ 187,296	4/1/2014	3/31/2017	3	Objectives of the Project: Test 5 soil-applied products, with mulch subplots, plus an untreated control (6 treatment plots) on health and HLB status of orange trees over 3 years.	CRDF	HLB MAC		HLB Host
37	Joint funding with DHS	James Lainz	Applied Research Associates, Inc.	Field-Scale Hydro-Solar Thermotherapy Alternatives to Treat HLB-Diseased Citrus Trees	$ 962,729				In collaboration with the U.S. Department of Homeland Security (DHS) Directorate of Science and Technology, this project was selected to develop and deploy a field-scale thermotherapy system to treat HLB-infected citrus trees over a large acreage simultaneously by circulating solar heated water through plastic coils around tree trunks. Phase I: Parameter studies to test optimal temperature and duration of hot water application. Design, build, and test HLB hot water treatment system for simultaneous treatment of 50-75 trees. Preliminary system scaling and commercialization based on test results- compile plans for construction of the final configuration to be developed during phase II. Phase II: Parameter studies to test optimal temperature and duration of hot/cold cycling application. Design, build, and test HLB hot/cold treatment system for simultaneous treatment of 50-75 trees. Final system scaling and commercialization based on results- construct two additional units for use in grove demonstrations.		HLB MAC		HLB Host
38	776C	Albrigo, Gene	University of Florida	Frequent Low Rate Application of 2-4,D and Cytokinin to study plant symptom reduction in HLB affected trees	$ 132,660	1/1/2014	6/30/2016	2	We are proposing here to arrange sufficient replicated grower tests and provide data collection in order to supplement our proposed CRDF detailed trial (809) with these grower tests to determine quickly at several sites if the combined products provide any symptom relief for trees with HLB. Low rate, high frequency application of 2,4-D and the cytokinin would be evaluated for impacts on plant health and fruit quality.	CRDF	CRDF		HLB Host

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39		Bowman Kim D; Stover Eddie W; Niedz Randall P	USDA, ARS - Southeast Area, U.S. Horticultural Research Laboratory, Subtropical Insects And Horticulture Research, Fort Pierce, Florida	Genetic Improvement Of Citrus For Enhanced Resistance To Biotic And Abiotic Stresses					1. Create new genetic combinations of citrus germplasm via conventional breeding, mutation, and transformation, to include rootstock and scion development and evaluation for essential traits of disease resistance and horticultural qualities. 1.A. Use sexual hybridization to create new germplasm from diverse parental types with useful horticultural characteristics. 1.B. Create new scions with useful traits through mutation. 1.C. Create new scions and rootstocks with potential resistance to huanglongbing and citrus bacterial canker by genetic transformation. 2. Develop and evaluate methods to improve citrus transformation, including the use of proliferating in vitro shoot cultures, as a novel source for genetic transformation and germplasm preservation. 2.A. Develop methods to produce proliferating in vitro shoot cultures of rootstock and scion types. 2.B. Determine the transformation efficiency of in vitro shoot cultures. 3. Develop and evaluate new methods to efficiently screen germplasm for important traits, improve the process of citrus variety development, and apply appropriate methods to select superior individuals. 3.A. Refine and evaluate methods to assess huanglongbing tolerance/resistance, and apply appropriate methods to select superior individuals. 3.B. Develop and apply methods to test selections for abiotic stress, including high pH. 4. Evaluate field performance and other traits for rootstock and scion selections and release new cultivars as appropriate.	USDA/ARS	USDA/ARS		HLB Host
40	15-8130-0491-CA	Michael Rogers	University of Florida	High intensity management of a small newly planted citrus grove utilizing ACP control, clean plant material, scouting, inoculum removal, and the tenets of area-wide management.	$ 615,208	1/15/2015	12/31/2016	2	Establish a 50-acre grove utilizing all available techniques to bring the grove into economically viable production in the presence of HLB. The model grove will serve as a demonstration site to facilitate grower adoption of new management practices for successful grove establishment. 1. Prepare the land for grove establishment. 2. Contract with a Nursery to propagate plant material. 3. Install windbreak of trees. 4. Develop planting scheme (grove layout) 5. Develop and continue refinement of comprehensive young tree management plan. 6. Planting of grove. 7. Implement comprehensive management plan. 8. Host first UF-IFAS Model grove field day on site.		HLB MAC		HLB Host
41	15-016C	Hall, David	USDA	High-Throughput Inoculation of Transgenic Citrus for HLB Resistance	$ 375,000	8/1/2015	7/31/2018	3	Citrus plants transformed to express AMPs must be inoculated in order to evaluate HLB resistance. A start-up inoculation program was established in 2011 using funds from the Citrus Research and Development Foundation (CRDF) (Hall-502, ends July 2015). Colonies of ACP are maintained in cages on potted citrus plants infected by CLas and showing HLB symptoms. A two-step inoculation program is used. First, individual plants are subjected to a 2-week no-choice infestation by ACP from these colonies; and second, the plants are held for 6 months in a greenhouse with an open infestation of ACP coming from CLas-infected source plants. Over 7,000 transformed scion or rootstock plants have passed through this program and are currently being evaluated for resistance. Meanwhile, the citrus breeders continue developing new transformed germplasm. This proposal asks CRDF for renewed/expanded support for inoculations. To maintain the inoculation program, funding is needed for labor (we request funds for two technicians 100% dedicated to the project), insect cages, materials and supplies notably for qPCR assays which have proved critical in selecting which ACP colonies to use in the first inoculation step. Our funding request is based on an inoculation pace of at least 300 plants monthly. This pace will require 10 to 20 individual colonies of hot ACP.	CRDF	CRDF		HLB Host
42	15-025	Stover, Ed	USDA	HLB Resistance and Tolerance in Citrus Scion Breeding	$ 441,935	10/1/2015	9/30/2018	3	1) Test the resistance/tolerance of citrus accessions and susceptible standards treated with antibiotics to generate a range of Liberibacter titers. 0-24 months. 2) Assess replicated trees of 50 genotypes, including our most promising advanced selections, which have been subjected to no-choice CLas+ ACP feeding followed by several months in a free-flying CLas+ ACP house, and have now been in the field for 15 months at our Picos farm. 0-36 months 3) Establish and assess field trials of tolerant vs. standard materials and a mandarin population including extensively genotypes mapping materials, plants already prepared. 0-36 months 4) Assess growth and HLB development in replicated field trials of sweet-orange-like hybrids and mandarin-hybrids, including identified HLB-tolerant material and standards, will each be planted at six field sites across Florida citrus growing regions, 0-36 months 5) Conduct RNAseq of five tolerant and closely related susceptibles shortly after challenge with CLas+ vs CLas- ACP to assess transcriptome differences and identify common markers, 24-36 months 6) Receive seed and establish trials of Microcitrus and Eremocitrus hybrids ranging from pure Microcitrus and Eremocitrus including advanced breeding lines (Queensland Dept. of Ag. and Fisheries, M. Smith) 16-36 months 7) Complete assessment of plant growth, cropping and Liberibacter titer of standard cultivars (Temple, Fallglo, Sugar Belle, Tango, Hamlin and Ruby) in the field for last four years. 0-12 months 8) Estimate potential extension of tree health in tolerant materials in comparison to standards. 30-36 months 9) Complete development of method for rapid selection of HLB-resistance using destructive sampling of all tissues from small plants. Use method on array of 20 genotypes also in field trial of 50 genotypes (step 2 above) and correlate results. 0-36 months. 10) Analyze chimeras produced using mature tissue of Hamlin sweet orange on: a) Rubidoux Poncirus, b) HLB-resistant Poncirus hybrids, and c)Temple, (where CLas lives). 0-24 months 11) Assess HLB resistance of chimeras. 24-36 months	CRDF	CRDF		HLB Host
43		Belknap/William R; Mc Cue/Kent F	USDA, ARS - Pacific West Area, Western Regional Research Center, Crop Improvement And Genetics Research, Albany, CA	Host-Specific Molecular Genetic Tools for Development of Disease-Resistant Crops					Obj: 1. Develop components for construction of intragenic citrus lines, products of direct genetic modification employing only native DNA sequences. 2. Use of potato Zebra Chip Disease as a model for evaluating a potential citrus Huanglongbing (HLB)-resistance transgene efficacy. 3. Develop and exploit extant molecular tools (15x genome of Carrizo that represents the best current citrus source of HLB tolerance) and Zebra Chip tolerant potato lines to identify potential Liberibacter disease tolerance/resistance genes with commercial applications	USDA/ARS	USDA/ARS		HLB Host
44	S-000763	Gmitter, Frederick G, Jr	University of Florida	HUANGLONGBING TOLERANT ROOTSTOCKS AND SCIONS INTRODUCTION INTO THE UC RIVERSIDE AND USDA-ARS CALIFORNIA NATIONAL CLEAN	$ 151,841	8/15/2015	8/14/2017	2		UF	UNIV OF CALIFORNIARIVERSIDE	US DEPT OF AG	HLB Host
45		Private Industry	Private Industry	Hydrosolar field scale thermotherapy	$ 962,729				This project was selected through the Broad Agency Announcement announced through the Department of Homeland Security Science and Technology Directorate. It is a two year project that will utilize components readily available to growers to circulate solar heated water through tubing placed around the exterior of the tree base.	USDA/ARS			HLB Host

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46	15-026	Stover, Ed	USDA	Implementing Transgenic Tools to Produce Commercial Scion Cultivars Resistant to HLB and Canker	$ 540,758	8/15/2015	8/14/2018	3	1. Assess use of isolated leaf inoculation, small plant destructive sampling over time, and L crescens	CRDF			HLB Host
47	931C	Gonzalez, Claudio	University of Florida	In Vitro testing of chemicals on tree leaves collected from HLB-infected trees to determine their efficacy against HLB	$ 203,918	2/1/2014	7/31/2015	2	Rapid evaluation method to evaluate drug's effectiveness directly from tree samples.	CRDF			HLB Host
48	15-8130-0485-CA	Nian Wang	University of Florida	Integrated Management of HLB for Sustainable Citrus Production in Florida Using an Integrated Management Approach	$ 566,034	1/16/2015	1/15/2017	2	1. Determine best methods to promote tree health of category 1 trees and limit the negative effect of HLB on those trees. 2. Conduct thermotherapy treatment of category 2 trees. 3. Determine best methods for preventing Las infection of replanted trees that replaced category 3 trees using iGuard protectors. 4. Conduct economic analysis: yield and quality analysis. 5. Outreach at field days, grower meetings, and other extension events. The proposed work will result in an optimized integrated HLB management approach which can be adopted by growers to control HLB.		HLB MAC		HLB Host
49	14C00000035	Morgan, Kelly T	University of Florida	IRRIGATION SCHEDULING TO ADDRESS WATER DEMAN OF GREENING- INFECTED CITRUS TREES	$ 96,000	10/1/2013	3/31/2016	2		UF	WATER MGMT DISTRICTSSOUT HWEST FLORIDA		HLB Host
50	22785	Morgan, Kelly T	University of Florida	IRRIGATION, NUTRIENT MANAGEMENT AND CROP MODELING INTERFACE PROJECTS	$ 43,500	11/3/2015	6/30/2016	1		UF	FL DEPT OF AG AND CONSUMER SER		HLB Host
51	15-003	Bowman, Kimberly	USDA	Metabolomic profiling to accelerate development of HLB tolerant rootstocks	$ 539,104	7/1/2015	6/30/2018	3	Susceptibility of existing citrus rootstock cultivars to HLB and other diseases pose a great risk for tree and crop loss. The availability of resistant rootstocks with other qualities essential for superior production of citrus would effectively eliminate disease as a threat and permit continuous higher production at much lower production cost. The proposed research will be complementing the USDA rootstock development program and is expected to identify metabolite profiles in citrus rootstock cultivars, and conferred to commercial citrus scions, which are associated with tolerance to HLB, tolerance to other stresses, and the excellent production of citrus fruit. Metabolite profiles of field grown plants established during the first year of research will be correlated with data from previous and ongoing rootstock trials regarding HLB tolerance, growth performance, and citrus fruit production. Continuous experiments involving greenhouse and field studies during the following years will allow us to refine metabolic profiles and to integrate findings into our breeding efforts. The ultimate goal of this project is the early selection of most promising candidate rootstocks prior to long-term field testing, therefore reducing the time and expense of testing, and accelerating the release of trees for commercial use. In addition, we expect to identify metabolites that are associated with resistance to HLB and that may be employed for development and improvement of early detection methods of HLB and therapeutic strategies to reduce Las titer levels in infected citrus trees.	CRDF	CRDF		HLB Host
52	834	Duan, Yongping	USDA	Optimizing Heat Treatment in the Fields and Understanding the Molecular Mechanism Behind the Success of Thermotherapy for the Control of Citrus HLB	$ 385,900	4/1/2014	3/31/2016	2	1: to investigate the effect of heat stress on Las, associated prophages and those genes involved in the phage lytic cycle. 2: to monitor healthy and HLB-affected citrus genome-wide response to heat stress. 3: to optimize field thermotherapy to produce a standard operating procedure.	CRDF	CRDF		HLB Host
53	5300-154	Gottwald, Tim R.	USDA-ARS	Risk-Based survey for decision making in the management of huanglongbing	$ 519,580	10/1/2013	9/30/2016	3	To develop an early detection and prediction protocol for HLB/ACP for urban and commercial citrus in California.	CRB	CPDPP		HLB Host
54		Kunta, Madhura	TAMUK-Citrus Cen	Screening citrus rootstock and scion, and transgenic plants for Huaglongbing	$ 6,000	2/16/2016	8/31/2016	1	1.Inoculate the plants through grafting of HLB-infected grapefruit shoots. 2. Evaluate resistance of citrus genotypes including four rootstock and four transgenic citrus plants against HLB by qPCR. 3. Evaluate plants that show resistance to Phytophthora against HLB by qPCR. 4. Evaluate Rio Red grapefruit seedlings generated by tissue culture of brown aborted seeds from highly infected trees. 5. Propagate HLB-tolerant/resistant plants by cuttings.	TCPB	TCPB		HLB Host
55	15-039C	Stover, Ed	USDA	Secure site for testing transgenic and conventional citrus for HLB and psyllid resistance	$ 260,980	1/1/2016	12/31/2018	3	Transgenic strategies for controlling HLB and its psyllid vector will be tested in a secure environment in which ideal care is provided for the invaluable research material in full compliance with regulatory requirements. Non-transgenic citrus with reasonable probability of resistance will be tested and may provide resistant planting materials with fewer regulatory constraints. This care will be provided with no compromise to the research teams' ownership of tested intellectual property and no USDA/ARS expectation of inclusion in the related patents secured when USDA/ARS was not involved in development of the plant materials, expression vectors or other material tested.	CRDF	CRDF		HLB Host
56	934.1C	Wang, Nian	University of Florida	Soil Drenches of products to combat initial HLB infection in young citrus trees	$ 11,028	6/1/2014	5/31/2016		Test 4 soil-applied treatments plus a water treated control (5 treatment plots) on health and HLB status of orange trees over 3 to 5 years. The 5 treatment plots of 20 trees each will be replicated 4 times.	CRDF	CRDF		HLB Host
57	934C	Curtis, John	Better Crops, LLC	Soil Drenches of products to combat initial HLB infection in young citrus trees	$ 15,000	6/1/2014	5/31/2016		Test 4 soil-applied treatments plus a water treated control (5 treatment plots) on health and HLB status of orange trees over 3 to 5 years. The 5 treatment plots of 20 trees each will be replicated 4 times.	CRDF	CRDF		HLB Host
58	2015-70016-23030	Ehsani, Reza J	University of Florida Board of Trustees	Steam-generated Supplementary Heat Thermotherapy as an Immediate Treatment for Prolonging Productivity of HLB-infected Citrus Trees	$ 3,495,832	1/15/2015	1/14/2019	4	Objective 1. Enhance the existing steam-generated supplementary heat thermotherapy system so that it will generate consistent heat and provide a uniform temperature to the canopy and roots. Objective 2. Investigate the effect of steam-based heat treatment on the survivability of CLas and the expression of HLB symptoms in the canopy and roots. Objective 3. Develop a transcription-based viability assay for CLas. Objective 4. Evaluate the effectiveness of steam-based thermotherapy considering the pretreatment condition of roots as affected by pests and diseases and characterize the effects of the treatment on pests and diseases. Objective 5. To determine the time-temperature combinations for the inactivation of HLB that does not result in tree defoliation under select heating regimes. Objective 6. As a pre-treatment, apply advanced biomaterials to plant surfaces to improve the thermotherapy process. In this regard, develop new application technology as appropriate. Objective 7. Conduct comprehensive economic analyses of the steam-generated supplementary heat thermotherapy system.	NIFA	NIFA (SCRI-CDRE)		HLB Host

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59	899	Etxeberria, Ed	University of Florida	Strigolactones type growth regulators to combat HLB in Florida	$ 347,426	5/1/2014	4/30/2017	3	1. Optimization of SL doses for induction of new cambium, phloem, and xylem in healthy controls and HLB-infected greenhouse grown citrus trees. 2. Evaluation of SL (at concentrations determined on objective I) on root and shoot architecture in greenhouse grown and grove trees. 3. Evaluation of SL on induction and colonization of symbiotic arbuscular mycorrhizal (AM) fungi. 4. Evaluation of effect of SL and fungicidal combination on Phytophthora species. 5. Phenological, physiological, biochemical, and anatomical modeling of fruit development in control and HLB-affected trees under successful treatments. 6. Evaluation of growth regulator GR24 on carbon and nutrition partitioning in young leaves, roots, and fruit production. 7. Establishment of sustainable fruit production in HLB-infested grove using above approaches.	CRDF	CRDF		HLB Host
60	943C	Rogers, Michael	University of Florida	Support for scale-up of Thermal Therapy Treatment: Evaluation before and after thermotherapy heat treatments to combat HLB	$ 82,456	3/1/2015	2/28/2016	1	To test HLB infected citrus trees before and after Thermal Therapy treatments. Preliminary trials of scale-up technology will be evaluated at a preliminary level, and those further along in testing will be subjected to full evaluation protocol. The proposal is based on eight independent sites to be evaluated within the year to test the hypothesis that TT treatments will mitigate the effects of HLB on tree health and yield.	CRDF	CRDF		HLB Host
61		Vidalakis	UC Riverside	Tolerant Rootstock through CCPP for testing in CA and AZ	$ 779,514				Root stock tolerant to HLB as tested in FL will be made available for field testing in California through the National Clean Plant Network's Citrus Clonal Protection Program in order to determine the suitability of the cultivar under California conditions.	USDA/ARS			HLB Host
62	15-8130-0484-CA	Jim Graham	University of Florida	Treatment of Bicarbonates in Irrigation Water and Soil in Florida Citrus Groves Affected by HLB.	$ 172,916	1/1/2015	12/31/2016	2	Evaluate acidification of water and soil treatment which reduce bicarbonate in soil and irrigation water for their effects on health and productivity of HLB-infected trees. 1. Evaluate replicated trials acidification of irrigation water and soil treatment that reduce bicarbonate in soil and soil water to quantify their effects on root health, root pathogen status, nutritional response health and yield of HLB-infected trees. 2. Survey Florida groves for root density, tree nutrient status and yields that have already implemented water/soil treatments to reduce soil pH and bicarbonate concentrations in comparison to unmanaged groves that are either untreated or have experienced little or no bicarbonate stress based on the status of irrigation water and/or liming history. 3. Perform an economic analysis of bicarbonate management in terms of irrigation water and soil acidification costs cersus benefit from gains in tree health and productivity so that growers may prioritize their expenditure on practices that mitigate the effect of losses of tree productivity due to HLB		HLB MAC		HLB Host
63	15-013	Grosser, Jude	University of Florida	Understanding and Manipulating the Interaction of Rootstocks and Constant Nutrition to Enhance the Establishment, Longevity and Profitability of Citrus Plantings in HLB-Endemic Areas.	$ 340,778	10/1/2015	9/30/2018	3	I. Greenhouse study to determine if combined overdoses pf TigerSul manganese and Florikan poly-coated sodium borate improve HLB-infected tree health and impact Liberibacter titers in roots and shoots across multiple rootstocks, and to determine if the overdoses are detrimental (toxic) to healthy non-infected trees on the same rootstocks. III. To evaluate the effect of complete, balanced and constant nutrition of HLB-infected mature trees (combinations, delivery, economics).	CRDF	CRDF		HLB Host
64	732	Graham, Jim	University of Florida	Understanding and reducing early root loss in HLB affected trees	$ 359,931	4/1/2013	3/30/2016	3	Objective 1: Description of seasonal root loss and physiological changes in roots. Objective 2: Determine specific root responses to HLB in potted plants to identify Las induced responses compared to phloem disruption as markers for rapid screening of new rootstock germplasm. Objective 3: Identify rootstocks and develop measures to mitigate root loss in the presence of HLB. Goal: To improve root health in HLB affected trees for improved yield	CRDF	CRDF		HLB Host
65	15-8130-0499-CA	Grosser, Jude William	University of Florida	WIDESPREAD FIELD TESTING OF NEW HLB-TOLERANT CITRUS ROOT	$ 424,072	2/15/2015	2/14/2017	2		UF	US DEPT OF AGANIMAL & PLANT HLTH INSPECTION		HLB Host
66	15-8130-0499-CA	Kim Bowman, Jude Grossner	University of Florida	Widespread Field Testing of New HLB-Tolerant Citrus Rootstocks	$ 424,072	2/15/2015	2/14/2017	2	1. Establish multiple field trials using the most promising HLB-tolerant rootstocks in commercial plantings in all the major Florida citrus production areas. 2. Evaluate early growth and tree health of trees in the new trials. 3. Hold field days at some of the trials to showcase the new rootstocks. 4. Transfer the new rootstocks to California and other US citrus production areas in a process as allowed by State and Federal regulations.		HLB MAC		HLB Host
67	15-8130-0500-CA	Georgios Vidalakis	University of California, Riverside	Rapid Propagation of HLB Tolerant Scion and Rootstocks to US Citrus	$ 1,450,975	2/1/2015	1/31/2017	2	1. Establish pathogen tested budwood sources of HLB-tolerant scion and rootstock types so that they are available throughout the US citrus industry. 2. Propagate this material through enhance axillary node proliferation in tissue culture, where genotypes are responsive, to rapidly reach commercial numbers of trees available for planting throughout the US citrus industry. 3. Produce trees for commercial plantings and horticultural evaluations as determined by industry needs.		HLB MAC		HLB Host
68	726L	Gonzalez, Carlos	Texas AgriLife Research	A Bacterial Virus Based Method for Biocontrol of Liberibacter	$ 386,902	5/1/2013	10/31/2016	3	1. Isolate and characterize Xac phages. As previously stated a large pool of virulent phages having a diversity of surface receptors is necessary for the development and implementation of a successful phage-based biocontrol system for control of Xac. However, due to limit of one year funding we will work to isolate and characterize a limited pool of phages. It must be reiterated that only virulent and non-transducing phages should be used for the development of an effective, sustainable and ethical phage based control system for citrus canker. Therefore, full characterization is necessary before phages are released as biocontrol agents. All phages will be initially characterized as previously outlined for the ability to form clear plaques, not form lysogens and morphology. The genomes of candidate virulent phages will then be sequenced and annotated to ensure virulent status. Receptor diversity will be based on limited host range studies due to time limit. 2. Initiate phage persistence studies on plant tissue. Studies will be conducted as previously outlined in Objective IIIa using virulent phage Xfas303, a fully characterized KMV-like phage shown to have activity against Xac field strains (North 40, Block 22, Fort Besinger; See preliminary results) obtained from Florida. Phage will be sprayed with and without a protective carrier. The protective carriers developed by Balogh, et al. (2003 and 2008) and along with others will be evaluated. 3. Determine therapeutic efficacy of Xac phages. Studies will be conducted as previously outlined in Objective IIIb in cooperation with Dr. Nian Wang.	CRDF	CRDF		HLB Pathogen
69		Ehsani	UF	A Compact, Mobile, and Improved Tree Steaming System for Thermal Therapy of Individual Medium-sized Citrus Trees.	$ 302,794				This project will provide a scalable, compact and mobile system for treatment of HLB-infected trees and make the system accessible and available for use by growers and researchers.	USDA/ARS			HLB Pathogen

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70	15-027	Triplett, Eric	University of Florida	A MULTI-OMICS APPROACH TOWARD THE CULTURING OF LIBERIBACTER ASIATICUS	$ 325,912	7/1/2015	6/30/2017	2		UF	CITRUS RESEARCH & DEVEL FDTN		HLB Pathogen
71	15-040C	Triplett, Eric	University of Florida	Rapid turn-around evaluation of up to 1200 promising antimicrobial compounds (or combinations), using the L.crescens assay	$ 26,040	7/1/2015	6/30/2016	1	The compounds will be evaluated using the L.crescens assay developed by Triplett et. al. In this assay each antimicrobial compound will be tested by growing the L.crescens bacteria in the presence of candidate compounds at three different concentrations for 2 days in order to see which antimicrobials and which concentrations inhibit the growth. The amount of growth is quantified by incubating the bacteria/antimicrobial mixture with PrestoBlue Cell Viability Reagent, a fluorophore that changes from blue and nonfluoresceni to red and highly fluorescent in the presence of live cells. This change in fluorescence is detected using a fluorescence micro-plate reader.	CRDF	CRDF		HLB Pathogen
72	15-043C	Wang, Nian	University of Florida	Rapid turn-around evaluation of up to 25 antimicrobial compounds for efficacy in reducing titers of the bacterium Candidatus Liberibacter on diseased 6-year old trees Hamlin on Swingle.	$ 55,000	7/1/2015	6/30/2016	1	Field trials will be conducted for different antimicrobial compounds to determine whether they could control HLB by reducing Las population in planta. Oxytetracycline will be used as a positive control and no treatment will be used as a negative control. The trunk injection method will be used for application.	CRDF	CRDF		HLB Pathogen
73	5100-153	Pagliccia, Deborah	University of California, Riverside	Real Time PCR co-detection of *Candidatus* Liberibacter species and *Spiroplasma citri*	$ 21,000	10/1/2015	9/30/2016	1	To co-detect *Candidatis* liberbacter species associated with HLB and *Spiroplasma citri* , the causal agent of Stubborn disease of citrus in mixed infected trees in California using RT-qPCR with more specific primers.	CRB	CRB		HLB Pathogen
74	5300-164	Leveau, Johan	University of California, Riverside	A microbiota-based approach to citrus tree health	$ 313,819	10/1/2014	9/30/2016	2	To characterize microbial communities (microbiota) associated with healthy and HLB-impacted citrus trees and discover biomarkers or microbial signatures to use for an early detection of HLB.	CRB	CRB		HLB Pathogen
75	2015-70016-23029	Lorca, Graciela	University of Florida Board of Trustees	A novel antimicrobial approach to combat Huanglongbing disease	$ 2,096,540	1/21/2015	3/31/2018	3	Objective 1. Optimization of antimicrobial treatment in infected citrus seedlings. Objective 2. Field trials: application of the antimicrobial treatment and evaluation of environmental impact. Objective 3. Identify and evaluate the antimicrobial activity of natural compounds that have chemical scaffolds similar to the two effective compounds we have already identified.	NIFA	NIFA (SCRI-CDRE)		HLB Pathogen
76	5300-151	Chen, Jianchi	USDA-ARS	A phage/prophage-based PCR system for sensitive and specific detection of "*Candidatus* Liberibacter asiaticus" and *Spiroplasma citri*	$ 87,618	10/1/2012	9/30/2015	3	To develop PCR-based detection systems using multi-copy bacerial genes (phage/prophage) that are highly sensitive and specific to CLas and *Spiroplasma citri* that cause HLB and Stubborn diseases in citrus, respectively.	CRB	CRB		HLB Pathogen
77	935C	Wang, Nian	University of Florida	Assays - continuation testing of Powell RSA 1 - antimicrobials	$ 88,000	7/1/2014	6/30/2015	2	Test different antimicrobial compounds against HLB using trunk injection method.	CRDF			HLB Pathogen
78	14-8130-0384-CA	Dawson, William O	University of Florida	ASSESSMENT OF FACTORS AFFECTING DETECTION OF CANDIDATUS LIBERIBACTER ASIATICUS INFECTIONS IN CITRUS NURSERY STOCK	$ 175,989	8/1/2014	10/30/2016	2		UF	US DEPT OF AGANIMAL & PLANT HLTH INSPECTION		HLB Pathogen
79	5300-150	Slupsky, Carolyn	University of California, Davis	Biomarkers for detection of Liberibacter infection in citrus trees through ^{1}H-NMR-based metabolomics	$ 649,699	10/1/2011	9/30/2016	5	To use metabolomics as a novel method for early detection of CLas infection in citrus.	CRB	CRB		HLB Pathogen
80	14-8130-0474-CA	Tim Gottwald and Peggy Heiser	CCK9	Canine Detection of Citrus HLB	$ 1,444,203	9/30/2014	10/1/2015	2	Determine the feasibility of using canines in early detection of HLB. 1. Assay canine sensitivity and reliability under lab and field conditions. 2. Collect and assay diseased and healthy citrus for volatiles profile, determine differences via mass spectrometry, test combinations against trained canines to identify which volatiles they alert to. 3. Maximize canine field efficiency and estimate accuracy for symptomatic and asymptomatic trees. 4. Develop a certification protocol to register commercial canine handlers. 5. Promote commercialization with competent canine detector companies to foster development of detector dog teams 6. Deliver methodology to regulatory agencies and producers via presentations, webinars, and publications.		HLB MAC		HLB Pathogen
81	803	Duan, Yongping	USDA	Characterization and manipulation of the prophages/phages of 'Candidatus Liberibacter asiaticus' for the control of citrus huanglongbing	$ 574,219	5/1/2014	4/30/2017	3	1: to characterize the prophage/phage Pr-D (iFP3) and its role in disease suppression, and potential for "cross protection". 2: to investigate the dynamics of the prophages/phages in Las bacteria by revealing their variations in gene expression and recombination. 3: to identify critical elements, such as heat and chemical stress that facilitates lytic activities of the prophages.	CRDF	CRDF		HLB Pathogen
82	2015-70016-22992	Ramadugu, Chandrika	The Regents of the University of California	Characterization of Liberibacter populations and development of field detection system for citrus huanglongbing	$ 1,683,429	2/1/2015	1/31/2020	3	Develop genomic sequence information for Liberibacter variants currently known to exist in California, Texas and other regions (objective 1), use the information to design inexpensive, sensitive, field deployable kits using Loop-mediated amplification (LAMP) technology, and a field adaptable SmartDART™ detection device (objective 2). A user-friendly LAMP method will be developed to detect all Liberibacter variants relevant to HLB. We will improve vector trapping and storage using a 'Smart trap' that captures only psyllids and stores them at ambient temperatures (objective 3). The final objective is to promote the use of this technology for widespread detection of Liberibacters with help from citrus growers and extension workers.	NIFA	NIFA (SCRI-CDRE)		HLB Pathogen
83	5300-175	LeVesque, Cynthia	CRB Lab, Riverside	Comparative study of early detection techniques: Texas 2	$ 254,619	10/1/2015	9/30/2016	1	Comparing accuracy and reliability of various early detection technologies using citrus samples collected in Texas.	CRB	CRB		HLB Pathogen
84	5300-158	Ng, James	University of California, Riverside	Construction of the cloned infectious cDNA of Citrus tristeza virus (California isolate): a critical step in developing the tool for RNA interference-mediated inhibition of inset pests and pathogends of citrus in California	$ 154,696	10/1/2014	9/30/2016	2	To develop an infectious cDNA clone of a mild strain of CTV (CTV-T30) from California to be used as a functional viral expression vector for RNAi-mediated inhibition of CLas, the causal agent of HLB and its psyllid vector (ACP). There is also a possibility of using this expression vrctor to express therapeutic peptides to treat infected trees or as a prophylactic measure to protect healthy trees.	CRB	CRB		HLB Pathogen

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85	15-032C	Irey, Mike	US Sugar Corp/Southern Gardens	Continued Support for the Southern Gardens Diagnostic Laboratory	$ 291,799	7/1/2015	6/30/2017	2	Service/Support	CRDF	CRDF		HLB Pathogen
86	717	Duan, Yongping	USDA	Control Citrus HLB by Blocking the Function of two Critical Effectors Encoded by Candidatus Liberibacter asiaticus	$ 410,000	5/1/2013	4/30/2016	3	The overall project goal is to understand the molecular mechanism of how these effectors interact with host proteins and obtain more insights into the pathogenesis of the Las bacterium, and therefore, to control citrus HLB by blocking the functions of these two critical effectors encoded by 'Candidatus Liberibacter asiaticus'. Objective 1: to characterize the molecular interactions between the effectors and the host mitochondrial proteins. Objective 2: to screen for molecules that inhibit the effector functions. Objective 3: to control HLB using the inhibitor(s) and/or other related molecules.	CRDF	CRDF		HLB Pathogen
87	2016-70016-24781	Gupta, Goutam	New Mexico Consortium	Design and delivery of therapeutic proteins for HLB protection	$ 3,320,000	2/1/2016	1/31/2018	2	Objective 1. Identify (a) Liberibacter genes/proteins and (b) citrus genes/proteins as potential targets for therapies to protect against HLB. Objective 2. Design and express HLB-protective proteins that either clear Liberibacter or block disease development. Objective 3. Deliver HLB-protective proteins in planta for short-, intermediate-, and long-term protection. Objective 4. Perform epidemiologic modeling to assess the efficacy and cost of the therapeutic proteins in HLB protection; perform socio-economic modeling to analyze consumer acceptance. Objective 5. Train students and technicians in basic and translational approaches developed in Objectives 1-4; communicate to the growers about the scope and deliverables of the project and report the progress made in this project.	NIFA	NIFA (SCRI-CDRE)		HLB Pathogen
88	5300-162	Slupsky, Carolyn	University of California, Davis	Detection of Candidatus liberibacter in citrus in Hacienda Heights and other areas of California using	$ 252,773	10/1/2013	9/30/2016	3	To validate the use of NMR-based metabolomics methods as an effective means to detect early HLB infection in citrus in urban areas in California using PCR.	CRB	CPDPP		HLB Pathogen
89	2015-70016-23027	Gmitter, Frederick G	University of Florida Board of Trustees	Determining the Roles of Candidate Genes in Citrus-HLB Interactions and Creating HLB-resistant Citrus Cultivars	$ 3,338,248	3/15/2015	3/14/2020	5	Objective 1. Validate candidate gene expression in inoculated citrus through RNAseq. Objective 2. Identify sequence polymorphisms in candidate genes from citrus accessions with different responses to HLB and dissect the gene structure and genomic organization of candidate genes. Objective 3. Understand the roles of candidate genes by overexpressing them in HLB-susceptible citrus cultivars. Objective 4. Develop CRISPR-mediated technologies for breeding of non-transgenic HLB-resistant citrus. Objective 5. Precision editing of candidate genes for producing HLB-resistant citrus. Objective 6. Outreach and disseminate project results to stakeholders and the public.	NIFA	NIFA (SCRI-CDRE)		HLB Pathogen
90	5300-170	Lin, Hong	USDA-ARS	Develop a novel target-basis of anti-virulence strategy for controlling HLB	$ 72,424	10/1/2015	9/30/2016	1	To screen and identify antimicrobial compounds that specfically target CLas by disrupting its virulence/pathogenicity mechanism halting HLB infection *in planta* .	CRB	CRB		HLB Pathogen
91	15-027	Triplett, Eric	University of Florida	Developing a culture medium for Liberibacter asiaticus through comparative multi 'omics analysis with its closest cultured relative, L. crescens	$ 325,912	7/1/2015	6/30/2017	2	Overall goal: The development of a robust, defined medium that provides sustained and reproducible growth of an L. asiaticus culture. Obj. 1: Use comparative genomics approaches to identify means to culture L. asiaticus including metabolic reconstruction based on our new defined media and the identification of the essential gene set needed to culture L. crescens. Obj. 2. Continue to integrate multi-omics approaches to improve the medium for L. crescens, which, by extension, will get us closer to a robust medium for L. asiaticus. Overarching Obj. 3 - embedded with all other objectives. Test each new media design for its ability to sustain growth by L. asiaticus. Obj. 4. Characterization of the physiology and genome of the L. asiaticus culture.	CRDF	CRDF		HLB Pathogen
92	2015-70016-23028	Brown, Susan	Kansas State University	Developing an Infrastructure and Product Test Pipeline to Deliver Novel Therapies for Citrus Greening Disease	$ 3,734,480	3/1/2015	2/28/2017	2	Research areas include: 1) molecular interaction inhibitor discovery (gut membrane binding peptides, RNA aptamers and non-toxic chemical library screening) to block psyllid acquisition/transmission of the HLB-bacterium and/or bacterial growth in the plant; 2) dsRNA delivery to induce psyllid RNAi responses that block bacterium transmission or kill the psyllid (or both) and; 3) optimization of a novel therapeutic delivery system that has negligible environmental impact, is economical in comparison to current. control strategies and is highly adaptable for different solution strategies.	NIFA	NIFA (SCRI-CDRE)		HLB Pathogen
93	2016-70016-24844	Gabriel, Dean W	University of Florida	DEVELOPMENT NEW THERAPIES FOR HUANGLONGBING VIA CULTURING CA. LIBERIBACTER ASIATICUS	$ 3,999,508	2/1/2016	1/31/2020	4		UF	US DEPT OF AGNATL INST FOOD & AGRICULTURE		HLB Pathogen
94	15-031C	Etxeberria, Ed	University of Florida	Development of a laser-based system to deliver antimicrobials to citrus trees: Greenhouse testing.	$ 197,585	7/1/2015	6/30/2016	1	The overall objective of this project is to further the research into the use of laser light as a safe, clean and efficient means to infuse antimicrobials into HLB-affected citrus trees. Specific goals are 1. To build a more flexible and elaborate laser machine that will allow for more complex and decisive experiments in the greenhouse; 2. Test for the effectiveness of several delivery systems for antimicrobials; and 3. Carry out initial field experiments with young trees.	CRDF	CRDF		HLB Pathogen
95		Kunta	Texas A&M Kingsville	Development of a root sampling protocol for early detection of HLB	$ 744,675				This project will compare results of root versus leaf testing and provide a root sampling strategy to support early detection.	USDA/ARS	CRDF		HLB Pathogen
96		Mark Nakhla	USDA APHIS PPQ S&T	Development of Conventional and Real-time PCR Primers for Detection of 'Candidatus Liberibacter africanus' in Infected Tissues	$ 68,000	9/30/2015	9/29/2016		Develop a rapid, sensitive and Laf specific real-time PCR method Develop a new Laf specific conventional PCR method to be used for the confirmatory tests				HLB Pathogen
97		Mark Nakhla	USDA APHIS PPQ S&T	Development of Direct Sequencing Method to Obtain Complete 16S rRNA Gene Sequence of 'Candidatus Liberibacter africanus' from Infected Plant Tissues	$ 68,000	9/30/2015	9/29/2016		Develop a PCR product direct sequencing method to obtain the whole 16S rRNA gene sequence from infected tissues for HLB Laf identification. Increase the specificity of the US federal confirmatory tests of HLB-Laf				HLB Pathogen
98	2016-70016-24824	Gang, David R	Washington State University	Development of in vitro biofilm and planktonic culture of Ca. Liberibacter asiaticus: a game change in HLB research	$ 2,115,000	2/1/2016	1/31/2018	2	1) developing CLso ("Candidatus Liberibacter solanacearum") as a model for in vitro biofilm and planktonic culture; 2) establishing a system for in vitro culture of CLas biofilms; 3) establishing a system for host cellfree culture of CLas, and 4) providing standard operating procedures for culture of CLas to the research community and providing cultures through standard repositories.	NIFA	NIFA (SCRI-CDRE)		HLB Pathogen

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99	2016-70016-24844	Gabriel, Dean W	University of Florida Board of Trustees	Development of new therapies for Huanglongbing via culturing Liberibacter asiaticus	$ 3,999,508	2/1/2016	1/31/2020	4	Objective 1: Concerted, parallel and coordinated efforts towards obtaining viable Las cultures. Objective 2: Define the influence of physical environment in Las culturability. Objective 3: Define the role of chemical signaling and co-factors in culturability of Las. Objective 4: Develop genetic tools that enable delivery of (missing) candidate growth factor genes identified and partially characterized into Las.	NIFA	NIFA (SCRI-CDRE)		HLB Pathogen
100	15-017	Killiny, Nabil	University of Florida	Disrupt LuxR solo quorum sensing that mediates plant virulence and insect transmission of Candidatus Liberibacter asiaticus to control the disease	$ 157,144	8/1/2015	7/31/2017	2	1. To enhance citrus resistance to CLas by quenching the quorum sensing signals; CLas quorum sensing signals will be quenched by expressing acyl-homoserine lactonase (AHL-lactonase) in citrus plants. 2. To test the effect of AHL-producing citrus plants on the pathogencity of CLas; an AHL-producing citrus plant will be produced to study the effect of AHL on the pathogencity of CLas. 3. To prevent CLas from infecting citrus plants by jamming bacterial communication of CLas; Quorum-sensing (QS) antagonists will be used to block the cell-to-cell signaling of CLas. 4. Identification of AHLs in Asian citrus psyllids hemolymph using GC-MS. Because different types of symbionts are confined in a small environment 'arena' within their insect host, cooperative interactions and communication among theses. 5. Test commonly used bioassay strains to find the best reporter strain for the AHLs present in ACP or AHL mimic compounds present in the phloem sap of citrus. In addition, we aim to develop a more sensitive reporter (double sensors).	CRDF	CRDF		HLB Pathogen
101	5300-173	Godfrey, Kris	University of California, Davis	Effect of mixed infections of plant pathogens on detection of HLB using two early detection methods	$ 214,737	10/1/2015	9/30/2016	1	To determine the ability of two early detection methods (VOC and metabolomics) to distinguish HLB in mixed infections of citrus stubborn and CTV diseases.	CRB	CRB		HLB Pathogen
102	2016-70016-24833	Ma, Wenbo	The Regents of the University of California	Effectoromics of the Huanglongbing (HLB) associated pathogen	$ 3,990,772	2/1/2016	1/31/2021	5	The goal of this project is to systematically analyze SDEs from a variety of Las isolates in different citrus growing areas and use this knowledge to: 1) develop antibody cocktail-based HLB diagnosis methods that directly detect Las; 2) generate HLB resistant citrus by modifying the citrus targets of SDEs using the recently developed genomeediting approach.	NIFA	NIFA		HLB Pathogen
103	5300-174	Yokomi, Raymond	USDA-ARS	Establish a system to infect and maintain *Nicotiana benthamiana* and citrus with the recombinant CTV	$ 94,950	10/1/2015	9/30/2016	1	To construct a mild California recombinant CTV as a tool to express antimicrobial peptides (AMPs) against HLB and RNA interference (RNAi) against the Asian citrus psyllid (ACP). Multiple genes stacked in the CTV vector can express horizontal and vertical control effectors simultaneously.	CRB	CRB		HLB Pathogen
104	782	Triplett, Eric	University of Florida	Evaluation of Candidate Antimicrobial Compounds or Combination of Compounds using Liberibacter crescens assay, for Efficacy in Reducing Titer in Bacterium Candidatus Liberibacter asiaticus as Control Agents Against HLB Individually and in Combination	$ 26,040	7/1/2013	6/30/2015	2	The compounds will be evaluated using the L.crescens assay developed by Triplett et. al. In this assay each antimicrobial compound will be tested by growing the L.crescens bacteria in the presence of candidate compounds at three different concentrations for 2 days in order to see which antimicrobials and which concentrations inhibit the growth. The amount of growth is quantified by incubating the bacteria/antimicrobial mixture with PrestoBlue Cell Viability Reagent, a fluorophore that changes from blue and nonfluorescent to red and highly fluorescent in the presence of live cells. This change in fluorescence is detected using a fluorescence micro-plate reader.	CRDF	CRDF		HLB Pathogen
105	15-049C	Booker, Brad	Florida Ag Research	Evaluation of minimal-risk and biopesticide products as a protectant and therapy for HLB	$ 14,000	11/1/2015	3/31/2017	2	1) Determine ability of candidate materials to supress CLas populations in trees (2-4 years old) by already infected and showing symptons of HLB 2) Determine abilityof candidate materials to prevent or slow infection of new trees (2-4 years old) by ACP.CLas.	CRDF	CRDF		HLB Pathogen
106	15-009	Gabriel, Dean	University of Florida	Exploiting the Las phage for potential control of HLB	$ 419,500	8/1/2015	7/31/2017	2	The overall goal of the project is to enable the practical exploitation of the presence of lytic prophage in all known Florida Las strains by identification of chemicals or a biological control method that could be used to artificially : 1) trigger the phage lytic cycle in psyllids and thereby cure the psyllids by provoking an innate immune response and cure citrus by provoking a stronger innate immune response; 2) suppress the expression of phage-encoded lysogenic conversion genes, particularly peroxidase in citrus; 3) disable phage peroxidase enzymatic function in citrus, or 4) any combination of the above in existing Las infected trees in the field and thereby cure the trees. Obj. 1: Control of HLB using the putative Las LexA target. Obj. 2: Control of HLB using the psyllid repressor as target. Obj. 3: Control of HLB using Las peroxidase and Las lytic cycle activator(s) as targets. Obj. 4. Field and greenhouse testing of lead compounds.	CRDF	CRDF		HLB Pathogen
107		Bill Dawson	University of Florida, CREC	Factors affecting detection of Candidatus Liberibacter asiaticus infections in Citrus Nursery Stock produced in enclosed structures.	$ 176,989	8/1/2014	10/30/2016	2	1) Compare the current CG protocol approved by APHIS with alternative PCR –based diagnostic protocols; tests will compare all PCR conditions relevant for conventional PCR vs. qPCR and conventional vs. nested PCR. 2) Compare bacterial titers in leaf mid-ribs, bark, and roots to determine if bacterial titer differs significantly among these tissues in CNS trees in enclosed structures; 3) determine the effects of temperature on bacterial titer in CNS trees; 4) determine if the citrus rootstock / scion combinations impact CLas detection.	CHRP	CHRP		HLB Pathogen
108	14-8130-0469-CA	Dr. Greg Hodges	Florida Department of Agriculture and Consumer Services	Field Trial to Evaluate Control and Analyze Residues from Passive Trunk Injection of Penicillin-G (Florida)	$ 679,579	9/12/2014	9/12/2016	2	Conduct controlled experiments that evaluated the efficacy of penicillin-G trunk injections to HLB-infected Hamlin and Valencia citrus in Polk County, Florida and grapefruit citrus in Ft. Meade, Florida. Year 1 Objectives 1. Test efficacy of passively injected penicillin-G on HLB infected trees. 2. Determine presence/absence of residue in trees and fruit treated. 3. Determine effect of penicillin-G on microbial communities within treated citrus tree foliage and roots, and soil. 4. Monitor development of resistance in microbial communities associated with treated trees. Year 2 Objectives (beginning 2016) 1. Determine levels of penicillin-G and derived metabolites, penilloic acid and penllic acid, at time of harvest. 2. Determine if four sequential injection applications of penicillin-G at a rate of 1,000 ppm will produce better titer reduction numbers from the year one application rates. 3. Gather data indicating effects of penicillin applications on microbial communities.		HLB MAC		HLB Pathogen
109	15-048C	Minter, Tom	Florida Pesticide Research. Inc.	Field Trials of Bactericide Application Methods.	$ 74,250	10/1/2015	3/31/2017	1	1) Determine ability of trunk injected materials to suppress CLas populations in HLB affected citrus trees; 2) Determine the cost per acre for trunk injections	CRDF	CRDF		HLB Pathogen
110		Hodges	FL DPI	Field Trial to Evaluate HLB Control and Analyze Residues from Passive Trunk Injection of Penicillin-G	$ 679,579				This project is a limited field trial of Penicillin-G, tests for residues (the first piece of information needed to determine if Penicillin could even be considered for further testing), and tests for metabolites and other by-products of the treatment.	USDA/ARS			HLB Pathogen

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111	424	McNellis, Timothy	Pennsylvania State University	Functional disruption of the NodT outer membrane protein of Candidatus Liberibacter asiaticus for rootstock-mediated resistance to citrus greening using a phloem-directed, single-chain antibody	$ 55,000	7/1/2011	6/30/2016	3	The ultimate objective of this proposal is to develop citrus rootstocks that can be used to control HLB in fruiting variety scions. A transgenic approach will be used. Transgenic citrus plants producing a phloem-targeted, single-chain antibody recognizing an outer membrane protein of Ca. L. asiaticus will be developed and tested for resistance to HLB. The antibody will be translationally fused with the FLT protein, which is a phloem-mobile protein that gets efficiently translocated from lower parts of the plant to upper parts of the plant, even through graft unions. The FLT-antibody fusion protein is expected to be functional and to move systemically through the phloem, including from a transgenic rootstock into a non-transgenic scion. However, the current proposal is limited to producing and testing the transgenic plants for resistance to HLB and does not include testing of graft transmissibility of any HLB resistance that may be observed.	CRDF	CRDF		HLB Pathogen
112	805	Long, Sharon	Stanford University	Functional genomics of Liberibacter in a model system	$ 540,197	4/1/2014	9/30/2016	2	1. Clone a preliminary set of CLas regulatory genes, and synthesize/clone target promoters, and provide proof of principle for use of this synthetic model system approach. 2. Use activator/promoter pairs to control expression of fluorescence in S. meliloti. Use these engineered strains to carry out high-throughput screen of compounds that inhibit the CLas regulatory protein.	CRDF	CRDF		HLB Pathogen
113	5300-131	Jin, Hailing	University of California, Riverside	Identification and characterization of *Candidatus* Liberobacter-induced small RNAs for early diagnosis of HLB citrus greening- towards understanding natural defense mechanisms against HLB	$ 978,823	10/1/2007	9/30/2016	9	To identify HLB-specific induced small RNAs that can be developed as early diagnostic markers in citrus and to identify small RNAs and genes (mRNAs) that are specifically upreguated in tolerant/resistant varieities and likely to be used to develop commercially important resistant varieties.	CRB	CRB		HLB Pathogen
114	750	Ma, Wenbo	University of California - Riverside	Identification of key components in HLB using effectors as probes	$ 299,781	4/1/2013	3/31/2016	3	The main goal of this proposed research is to identify the targets of CLas effectors in citrus. These effector targets are likely to be key components in HLB pathogenesis. We will then explore strategies to modify these targeted processes or disrupt the interaction of effectors with their targets, which may lead to improved resistance/tolerance of citrus to HLB. Three objectives will be pursued to accomplish this overall goal: 1) Identify citrus proteins associating with three selected CLas effectors using yeast two hybrid screens; 2) Confirm the effector-host target interactions using a series of in vitro and in vivo assays; 3) Design control strategies aiming to enhance the resistance/tolerance of citrus to HLB based on effector activities and the functions of their targets.	CRDF	CRDF		HLB Pathogen
115	5300-160	Coaker, Gitta	University of California, Davis	Identifying and characterizing citrus targets from "*Candidatus* Liberibacter asiaticus"	$ 282,348	10/1/2013	9/30/2016	3	To characterize the distribution of CLas and expression of CLas effector proteins in citrus over time after psyllid transmission and to investigate the importance of citrus proteases under greenhouse and field conditions. The CCPP1 effector can target a Subtilisin-like protease and several members of this famly are upregulated during infection, including serine, aspartic and cysteine proteases.	CRB	CRB		HLB Pathogen
116	5300-176	McCollum, Greg	USDA-ARS	Improving early detection of HLB via ACP nymph/citrus flush sampling	$ 113,000	10/1/2015	9/30/2016	1	To improve diagnostic reliability of PCR-based (qPCR and dPCR) assays and determine the diagnostic reliability of ACP adult/nymph/flush assays.	CRB	CRB		HLB Pathogen
117	5300-161	Godfrey, Kris	University of California, Davis	Infrastructure support for research on detection and management of HLB and ACP	$ 257,952	10/1/2013	9/30/2016	3	The purpose of the Contained Research Facility (CRF) at the University of California-Davis is to provide infrastructure support to researchers who primarily work on the early detection technologies (dectection of HLB infection in asymptomatic leaves) by culturing CLas (Hacienda Heights strain) and rearing colonies of CLas-negative and Clas-positive Asian citrus psyllids.	CRB	CRB		HLB Pathogen
118	938C	Richardson, Taw	AgroSource, Inc.	Large Scale Lab/Greenhouse/Field Trial Evaluation - HLB	$ 1,877,041	7/1/2014	6/30/2016	1	Identify useful HLB management therapies, (1) that have the best chance to rapidly achieve EPA and state regulatory approvals and be delivered to growers in the near-term, (2) develop optimal HLB therapies in the mid-term, (3) provide a novel option for tree health management, and (4) to further track and treat selected season-one trees to evaluate the effects of consecutive year bactericidal therapy on HLB titer, tree health, and tree productivity. It should be noted that these are individually distinct objectives and that each are being pursued in parallel and will be prioritized by the CRADA based upon scientific and regulatory factors.	CRDF	HLB MAC		HLB Pathogen
119	MCB-1050883	Folimonova, Svetlana Yuryevna	University of Florida	MECHANISM OF SUPERINFECTION EXCLUSION BY AN RNA VIRUS	$ 599,586	5/1/2013	3/31/2016	3		UF	NATL SCIENCE FOU		HLB Pathogen
120	733	Grishin, Nick	Southwestern Medical	Molecular basis of Citrus Greening and related diseases gleaned from genome analyses of hosts and pathogens	$ 200,000	4/1/2013	3/30/2015	2	The overall goal of the project is to generate hypotheses about molecular mechanisms of CLa pathogenicity from the comparative genomic analysis of the host, pathogen and vector, and to present the results as a website that shows predictions of spatial structures and functions for all proteins in analyzed genomes for the citrus research community to use. The following specific objectives will be the steps towards the goal: Obj. 1) Using the computational pipeline developed for the analysis of CLa proteome, predict spatial structures and functions for all proteins in two available Citrus genomes and drafts of the psyllid genome. Obj. 2) Improve the prediction pipeline initially developed for Prokaryotic genome and adapt it to the analysis of Eukaryotic genomes. Obj. 3) Present results of analysis as a comprehensive website with a dedicated webpage for each protein in these organisms, showing details of predictions. Obj. 4) Compare analyzed genomes with each other. Find predicted physical and functional interactions and associations between proteins from different genomes. Obj. 5) Foster collaborations with experimentalists, helping them with the analysis of proteins they have chosen as research targets.	CRDF	CRDF		HLB Pathogen
121	946C	Nufarm	Nufarm Americas, Inc.	Mycoshield Magnitude of Residue Study for Citrus Crop Group.	$ 291,370	3/12/2015	9/30/2016	1	Conduct field trial residues to establish tolerances for oxytetracycline on the citrus crop group.	CRDF	CRDF		HLB Pathogen
122	RD309-129/S000851	Ritenour, Mark A	University of Florida	NATURAL ESSENTIAL OIL COMPOUNDS WITH HEAT TREATMENT TO CONTROL STEM END ROT ON GRAPEFRUIT DURING STORAGE	$ 10,948	9/1/2015	8/31/2016	1		UF	UNIV OF GEORGIASARE/ACE	US DEPT OF AG	HLB Pathogen

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123	2016-70016-24828	Santra, Swadeshmukul	University of Central Florida	NIFA Centers of Excellence: Multifunctional surface/sub-surface/systemic therapeutic (CoE:MS3T) technology for HLB management	$ 1,975,000	2/1/2016	1/31/2018	2	Objective 1. Develop non-phytotoxic MS3T formulation, characterize for residual and optimize synthesis process for achieving best efficacy at low product cost. Objective 2. Evaluate the efficacy of MS3T formulations against ACP and CLas, and optimize the application rate and schedule for optimal disease control. Objective 3. Evaluate impact of MS3T formulations on tree health and fruit quality, arthropod pests and natural enemies in the field in absence of HLB. Objective 4. Compare economic benefit of adapting MS3T technology with currently used disease management strategies in Florida, Texas and California. Objective 5. Develop and implement an extension program for comprehensive management of HLB and other citrus diseases with an emphasis on environmentally sustainable citriculture.	NIFA	NIFA (SCRI-CDRE)		HLB Pathogen
124		Bill Dawson	University of Florida, CREC	Optimizing risk based decision support tools for citrus huanglongbing early detection and disease management	$ 121,625	8/15/2015	8/14/2016		a. Optimize Citrus Health Management Area (CHMA) boundaries to maximize control of HLB. b. Examine the impact of solar position and other environmental parameters on the distribution of HLB that leads to disease edge effects, quantitate the effect, and develop updated sampling protocols to take advantage of this unique disease spatial pattern. c. Examine and analyze the impact of fruit transportation networks that effect the distribution of HLB and ACP distribution and spread (e.g., highways and secondary roadways between production areas, packinghouses, and juice plants), update sampling protocols to incorporate this effect, and develop control/mitigation protocols. d. Based on the data for the first three objective above will be integrated with various climatological variables and a risk-based GIS model will be constructed. The model will be refined vial further integration with the Gilligan-Gottwald HLB simulation model to test and optimize various control scenarios to minimize tree infection and replacement to minimize losses due to HLB.	CHRP	CHRP		HLB Pathogen
125	5300-171	Sumerlin, Brent	University of Florida	Photosynthate-responsive polymeric nano-carriers for phloem-specific delivery in the treatment of HLB	$ 117,128	10/1/2015	9/30/2016	1	To develop polymer nanoparticles that encapsulate pesticides and nutrients needed to combat citrus greening and only release these active compunds under the elevated concentrations of sugars present in the phloem.	CRB	CRB		HLB Pathogen
126	2014-67021-21589	Mulchandani, Ashok	The Regents of the University of California	Point-of-use nanosensor for detection of citrus greening disease (Huanglongbing)	$ 499,995	12/1/2013	11/30/2016	3	The overall objective of the proposed research is to develop, characterize, test and validate a point-of-use (POU) immunosensor based on novel nanogap electrode based electrical detection and immunomagnetic separation to extract and concentrate the target for highly sensitive and selective, rapid, low-cost, facile and quantitative detection of HLB.	NIFA	NIFA (AFRI-Agriculture Systems and Technology: Nanotechnology for Agricultural Food Systems)		HLB Pathogen
127	767	Triplett, Eric	University of Florida	Rapid identification of antibiotics useful in the control of citrus greening disease	$ 406,637	4/1/2013	6/30/2016	3	The overall goal of this project is to identify a large number of antibiotics effective in the reduction of CLas infection in citrus. Those antibiotics found to be effective in the citrus plant infection assay will also be tested for their ability to reduce CLas population sizes in the psyllid. Specific objectives: Objective 1. Identify a large number of antibiotics that are likely to be phloem mobile based on their ionizability, molar volume, octanol:water partition coefficients (referred to as logKow). Objective 2. Test the ability of these putative phloem-mobile antibiotics to inhibit Liberibacter crescens, a cultured, close relative of CLas. Objective 3. Test the phytotoxicity of the likely phloem mobile compounds that inhibit L. crescens as identified in Objective 2. Phytotoxicity is tested after L. crescens sensitivity since the bacterial sensitivity test is much faster and cheaper than the phytotoxicity test. Objective 4. Determine the ability of non-phytotoxic antibiotics, which inhibit the growth of Liberibacter crescens to also inhibit CLas infection in a rapid plant assay. Objective 5. Determine the ability of those antibiotics that are effective in the plant assay to reduce the number of CLas cells in inoculated psyllids. Objective 6. Test antibiotics effective in objectives 4 and 5 to prevent or eliminate symptoms in a traditional CLas infection assay. Objective 7. Knowledge gained from this work will be rapidly disseminated to the citrus community to encourage field-testing of those antibiotics efficacious in objectives 3 and 5.	CRDF	CRDF		HLB Pathogen
128	944C	Pelz-Stelinski, Kirsten	University of Florida	Small plant assay for testing the efficacy of antimicrobial materials against HLB	$ 125,797	3/1/2015	7/31/2016	1	RSA-The objectives of this assay are to test the efficacy of antimicrobial materials at various rates against CLas, mobility of the material in the plant particularly in the phloem, and phytotoxicity.	CRDF	CRDF		HLB Pathogen
129	916	Wang, Nian	University of Florida	Screening and application of antibacterial producing microbes to control citrus Huanglongbing	$ 431,180	7/1/2014	6/30/2017	3	1: Test antibacterial-producing bacteria against Liberibacter crescens and other Rhizobiaceae bacteria which are closely related to Las. 2: Control HLB using antibacterial-producing bacteria.	CRDF	CRDF		HLB Pathogen
130	6.0298.00	Industry	Integrated Plant Genetics, Inc.	Spray treatment methods of targeted plant gene silencing to control citrus diseases.	$ 180,000	FY16		1	This proposal suggestion is to utilize existing Integrated Plant Genetics (IPG) genetically modified (GM) citrus plants with the silenced anti-apoptosis gene as direct comparators to evaluate RNAi formulated into nanoparticles (NPs) developed as a potential cost-effective field treatment (spray) for citrus. Initial evaluations will involve greenhouse and growth chamber assays for duration of antibacterial defense responses triggered by HLB-specific elicitors. The goal is to provide proof of concept that NPs can be formulated into effective slow release field spray applications of RNAi to suppress a target plant gene for 4 - 8 weeks. A specific deliverable is the results of a field test efficacy trial of the NP formulation against HLB in a heavily infected Florida commercial grove.	Farm Bill Section 10007	Farm Bill Section 10007		HLB Pathogen

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131	15-8130-0494-CA	Wenbo Ma	University of California, Riverside	Standardization of Antibody-Based Early HLB Detection Methods for Near-Term Applications	$ 428,154	4/1/2015	3/31/2017	2	Establish antibody-based methods suitable for early and large-scale HLB detection that will support short-term implementations at the industrial level and be ready for commercialization within one or two years. The project goals is to finalize the standard operating procedure for antibody-based HLB detection for growers. 1. Determine the optimal concentration and combination of CLasCCPP1 and CLasCCPP3 for HLB early detection. 2. Identify a chromogenic reagent that is suitable for the direct tissue imprint assay for HLB detection. 3. Validate and finalize a standard operating procedure using a large number of samples from field and greenhouse. 4. Conduct a preliminary study of detecting Class secreted protein(s) using root tissues. 5. Using Clas-specific antibody pairs to confirm HLB detection using the direct branch imprint assay. 6. Develop an ELISA procedure for HLB detection. 7. Optimize the ELISA procedure using a large number of field and greenhouse trees.		HLB MAC		HLB Pathogen
132	2016-70016-24782	Stelinski, Kirsten	University of Florida Board of Trustees	Targeting microbes to control Huanglongbing of citrus	$ 2,800,000	2/1/2016	1/31/2018	2	Objective 1. Development of morpholino (PPMO)-EGS Technology to disrupt CLas in Citrus plants. Objective 2. Development of morpholino (PPMO)-EGS Technology targeting CLas and bacterial symbionts in ACP. Objective 3. Evaluation and delivery of gene-specific PPMO-EGS antimicrobials in field trials.	NIFA	NIFA (SCRI-CDRE)		HLB Pathogen
133	15-043C	Wang, Nian	University of Florida	TEST DIFFERENT ANTIMICROBIAL COMPOUNDS AGAINST HLB USING TRUNK INJECTION METHOD	$ 13,750	7/1/2015	6/30/2016	1		UF	CITRUS RESEARCH & DEVEL FDTN		HLB Pathogen
134	14-934.1C	Wang, Nian	University of Florida	TREATMENTS TO COMBAT INITIAL HLB INFECTION IN YOUNG CITRUS TREES	$ 11,028	6/1/2014	5/31/2016	2		UF	CITRUS RESEARCH & DEVEL FDTN		HLB Pathogen
135	15-037C	Santra, Swadeshmukul	University of Central Florida	T-SOL™ antimicrobial for the management of citrus canker and HLB	$ 240,224	7/1/2015	6/30/2017	2	1) Devevlop bactericidal foundation - 2) Greenhouse screen for efficacy - 3) Conduct field trials of efficacy, durability and phytotoxicity	CRDF	CRDF		HLB Pathogen
136	5300-168	McCollum, Greg	USDA-ARS	Use of digital PCR for improved early detection of "*Candidatus* Liberibacter asiaticus" infection in citrus and ACP	$ 147,500	10/1/2014	9/30/2016	2	To improve diagnostic reliability of PCR-based (qPCR and dPCR) assays and determine the diagnostic reliability of ACP adult/nymph/flush assays.	CRB	CRB		HLB Pathogen
137	58-5034-5-023	Dawson, William O	University of Florida	USE OF RNAI TO MITIGATE RESPONSES OF CITRUS INFECTED WITH WITH CANDIDATUS LIBERIBACTER ASIATICUS (CLAS) ON DEVELOPMENT	$ 20,834	5/1/2015	3/31/2016	1		UF	US DEPT OF AGAGRICULTURAL RESEARCH SERVICE		HLB Pathogen
138	15-8130-0489-CA	Madhurababu Kunta	Texas A&M University-Kingsville Citrus Center	Validation of Early Detection Method and Development of HLB Diagnostic Method Using Root Samples	$ 744,675	4/1/2015	3/31/2017	2	Validate the rapid and efficient method for early detection of HLB using citrus root samples, which should result in the establishment of detection methods of HLB in pre-symptomatic infected trees. Project goals are to conduct root testing methods of DNA extraction using several PCR methods compared to leaf samples, conduct a cost/benefit analysis of diagnostics, and establish a standard protocol for HLB detection using root samples. 1. Identify HLB-infected symptomatic field trees in Immokalee, Florida and South Texas for analysis, employ technicians, and purchase material for sampling and PCR. 2. Conduct qPCR, and confirm positive samples by cPCR and sequencing for young grapefruit and sweet orange field trees for which we know the time of earliest inoculation and which, to date, show no disease symptoms, located in close proximity to known HLB-infected orchards in Florida and in South Texas on a monthly basis. 3. Conduct qPCR, cPCR, and sequencing on DNA extracts from HLB-infected greenhouse plants exposed to HLB infected ACP in USDA ARS facility, Fort Pierce, FL. 4. First round collection of samples from mature symptomatic field trees including grapefruit and sweet orange from South TX and Immokalee, FL. 5. Conduct HLB diagnostic assays (qPCR and cPCR), and sequencing on first round collection 6. Second round collection of samples from mature symptomatic field trees including grapefruit and sweet orange from South TX and Immokalee, FL. 7. Conduct HLB diagnostic assays (qPCR and cPCR), and sequencing on second round collection. 8. Evaluate cost/benefit of HLB diagnostic tests using root samples compared to using leaf samples. 9. Disseminate research results to citrus growers.		HLB MAC		HLB Pathogen
139	TAMUK#15-0511	Stansly, Philip Anzolut	University of Florida	VALIDATION OF EARLY DETECTION METHOD AND DEVELOPMENT OF HLB DIAGNOSTIC METHOD USING ROOT SAMPLES	$ 29,200	4/1/2015	3/31/2017	2		UF	TEXAS A&M UNIV KINGSVILLE	US DEPT OF AG	HLB Pathogen
140	2015-70016-23010	Johnson, Evan G	University of Florida Board of Trustees	Zinkicide A Nanotherapeutic for HLB	$ 4,613,838	3/1/2015	2/29/2020	5	Objective 1. Development, improvement, and characterization of Zinkicide nanoparticles. Objective 2. Test the efficacy of new Zinkicide formulations and optimize field application for optimal HLB control while minimizing non-target effects on beneficial organisms. Objective 3. Determine residue lifespan of Zinkicide in planta and toxicology on non-target organisms. Objective 4. Evaluate the economic viability of using Zinkicide to manage HLB compared to existing methods of citriculture in the presence of HLB.	NIFA	NIFA (SCRI-CDRE)		HLB Pathogen
141	907	Johnson, Evan	University of Florida	Zinkicide: A novel therapeutic zinc particulate based formulation for preventing citrus canker and HLB.	$ 203,744	6/1/2014	3/31/2016	1	The goal of this project is to develop a viable bactericide alternative to Cu with reduced phytotoxicity that is effective against both Citrus Canker and HLB 1. Field testing of Zinkicide for control of Huanglongbing and Citrus Canker 2. Determine optimal delivery system for effective HLB control 3. Mechanistic study of Zinkicide activity against Xanthomonas citri and Liberibacter spp. 4. Continued development and improvement of Zinkicide formulation for optimal bactericidal effect and systemic plant mobility with minimum phytotoxicity	CRDF	CRDF		HLB Pathogen
142		Heiser	CCK9	Canine Detection of Citrus HLB	$ 627,768				Detector dogs have proven to be highly adept at detecting citrus canker and early results suggest they will be an effective early detection tool for HLB.	USDA/ARS			HLB Pathogen
143		Louws	NCSU	Canine Detection of Citrus HLB	$ 179,177				Detector dogs have proven to be highly adept at detecting citrus canker and early results suggest they will be an effective early detection tool for HLB.	USDA/ARS			HLB Pathogen
144	5300-169	Falk, Bryce	University of California, Davis	Artificial microRNA-based targeting of the ACP for HLB management	$ 85,000	10/1/2015	9/30/2016	1	To optimize and develop plant-based RNA interference (RNAi) delivery tools and approaches to specifically target the Asian citrus psyllid and to produce transgenic citrus (scions and rootstocks) expressing amiRNAs and evauate their efficacy towards ACP.	CRB	CRB		HLB Vector

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145		David Bartels	USDA APHIS PPQ S&T	Asian Citrus Psyllid and HLB Management Program Support and GIS Data Development	$ 139,000	6/15/2015	6/14/2016		1. Maintain the Lower Rio Grande Valley Citrus Survey a. Maintain the citrus geodatabase with current orchard locations, varieties, planting date information, and additional attributes necessary for program delivery. b. Incorporate additional spatial data, such as aerial imagery or County Tax Appraisal District data, when it becomes available. c. Maintain and update the grower/owner information collected by Texas Citrus Mutual with the citrus geodatabase. d. Update detections of citrus greening disease trees and their removal status. e. Incorporate and provide quality control for the data received from the APHIS PPQ FO Citrus Survey Program, including survey point and diagnostic reports. 2. Provide GIS support to additional Citrus Health Response Program (CHRP) projects at the USDA APHIS PQ CPHST Mission Laboratory 3. Data collection and maintenance on the MAB citrus research orchard blocks. a. Collect psyllid data and temperature information from the citrus research block. b. Provide general maintenance support for the orchards. c. Provide survey support and ground truthing for other agency data sets.	CHRP	CHRP		HLB Vector
146	14-8130-0337-CA	Dr. David Morgan	California Department of Food & Agriculture	Augmentation of Production of Parasitoids of ACP at Existing California Facilities	$ 102,365	5/1/2014	4/30/2016	2	Support augmentation of parasitoid rearing and release in Southern California where ACP populations have increased to high levels. 1. Purchase supplies to enable maximum production of greenhouse and facilities. 2. Obtain and train personnel essential to running the expanded operation. 3. Establish a communication and record keeping system that will effectively track materials used and production process.		HLB MAC		HLB Vector
147	5500-196	Stouthamer, Richard	University of California, Riverside	Biological control of ACP in California	$ 712,704	10/1/2010	9/30/2016	6	To mass-rear and optimize the establishment of Tamarixia radiata and other natural enemies of ACP to slow down the spread of HLB and to determine insecticide susceptibility.	CRB	CPDPP		HLB Vector
148		Dan Flores	USDA APHIS PPQ S&T	Biological Control of ACP in Texas	$ 294,920	9/1/2015	8/31/2016		A) Increase mass production levels and release numbers of T. radiata at release sites in the LRGV B) Increase our efforts of installing more field insectary cages throughout areas of high concern in south Texas C) Continue to evaluate the establishment and impact of T. radiata and monitor populations of the ACP	CHRP	CHRP		HLB Vector
149	15-035C	Rogers, Michael	University of Florida	Continuing support of Citrus Health Management Areas (CHMA's)	$ 155,017	7/1/2015	6/30/2017	2	CHMA Support	CRDF	CRDF		HLB Vector
150	15-8448-1792	King, Raina	Texas Citrus Pest and Disease Management Corporation	Coordinated Area-Wide Asian Citrus Psyllid Control Program	$ 387,487	3/1/2015	8/31/2017	2	The primary objective of this program is to aid in sustaining long-term ACP control efforts in the commercial citrus production counties of Texas (Cameron, Hidalgo and Willacy). This is to be accomplished in the most efficacious, least expensive way possible and with minimal environmental impacts. The area-wide control program is a voluntary, grower-driven effort in which all treatment-related costs are paid by the growers. To accomplish the work outlined in this agreement, Texas Citrus Pest and Management Corporation, INC (TCPDMC) will conduct the following activities: 1. Work with scientists to further refine current ACP control strategies and develop new strategies to control psyllids. 2. Develop 2 distinct zones and up to 10 sub-zones (e.g., grower "neighborhoods") throughout the LRGV to improve program effectiveness through reduction of treatment window timelines during the dormant period and, to the extent possible, the growing season. 3. Gain grower input where additional refinement of the area-wide program is necessary. 4. ACP population levels will be monitored every two weeks in 100 blocks of commercial citrus throughout LRGV. Site selection for monitoring will be based on grower cooperation. 5. Collect ACP from commercial groves with the intent to test them for HLB presence at Texas A&M-Kingsville Citrus Center in Weslaco. 6. Compare psyllid population levels from year to year and season to season to help determine overall program effectiveness. 7. Continue training of grove owners and managers to scout their own groves and to recognize symptoms of HLB in both leaves and fruit.	TCPDMC	USDA- CHRP		HLB Vector
151	15-036C	Rogers, Michael	University of Florida	Correlating pesticide residue analysis with psyllid feeding to improve protection of young trees	$ 451,603	7/1/2015	6/30/2018	3	Residue analysis	CRDF	CRDF		HLB Vector
152	15-020	Mou, Zhonglin	University of Florida	Create citrus varieties resistant to Huanglongbing (HLB) through transgenic and nontransgenic approaches	$ 112,688	7/1/2015	6/30/2018	3	The overall goal of this proposal is to create citrus varieties resistant or tolerant to HLB using two different approaches. One approach is to generate HLB-resistant/tolerant transgenic citrus plants and the other approach is to screen for HLB-resistant/tolerant citrus mutants. These two approaches complement each other. (1) Confirm HLB resistance or tolerance in citrus transgenic lines and putative mutants. (2) Stack the ELP3 and NPR1 genes in citrus. (3) Generate and test transgenic citrus plants overexpressing newly cloned disease resistance genes.	CRDF	CRDF		HLB Vector
153		Evan Braswell	USDA APHIS PPQ S&T	Determining the origin of HLB-positive Asian Citrus Psyllids and Estimating Dispersal of Tamarixia radiata	$ 83,994	9/30/2014	9/29/2016	2	1. Obtain population samples of ACP from caged orchard and dooryard trees. 2. Survey various stable isotopes differences in ratios between orchard and dooryard trees. 3. Test post-DNA extraction tissues for utility in stable isotope analysis. 4. Acquire “hot” ACP carcasses from HLB testing facilities and determine stable isotope ratios. 5. Evaluate marking systems (i.e., beet sugar vs. plants grown in 13C enriched CO2) to determine the duration of the signature of 13C enrichment. 6. Establish release sites for studies on the dispersal distance (1, 2, 3, 5, and 7 miles) of T. radiata at CPHST Mission Laboratory 7. Conduct mark and recapture studies at established sites. 8. Test captured T. radiata for biased 13C:12C ratios.	CHRP	CHRP		HLB Vector

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154	15-8130-0490-CA	Mamoudou Setamou	Texas A&M University-Kingsville Citrus Center	Development and field-level testing of systems for dissemination of a pathogenic fungus to Asian citrus psyllid on residential citrus	$ 321,777	2/15/2015	2/14/2017	2	1. Examine weathering effects on pathogen dispensers and determine the application or replacement frequency of pathogen dispensers to maintain psyllid control efficacy. 2. Determine the amount of PFR-97 foliar sprays and/or pathogen dispensers needed per residential tree for effective psyllid control. 3. Determine the total costs of using foliar sprays and/or pathogen dispensers on residential trees relative to reduction in ACP populations. 4. Work with a private company for mass production of the pathogen dispensers for commercialization and create a user guide for implementation of PFR-97 sprays and dispensers for ACP control.		HLB MAC		HLB Vector
155	15-8130-1511-CA	Mamoudou Setamou	Texas A&M University-Kingsville Citrus Center	Development and implementation of a novel attract and kill approach for the management of Asian citrus psyllid in residential areas, active- and abandoned commercial citrus groves	$ 545,150	4/1/2015	3/31/2017	2	The long term goal of this project is to improve the sustainability of ACP control by strengthening ongoing area wide control programs in the different states with the following seven specific objectives over a two year period: 1. Determine the numbers of attract and kill devices to be deployed per residential tree or along border trees of commercial groves for effective control. The results will provide practical recommendation to end-users on how many devices will be required for their trees. 2. Evaluate the residual control of attract and kill devices as a result of weathering effects and determine their replacement frequency to maintain high control efficacy. 3. Determine the total costs of using attract and kill devices by growers and homeowners relative to the reduction in ACP populations. 4. Evaluate the non-target impact of the attract and kill devices on T. radiata and an indicator ladybeetle known to feed on psyllid nymphs. 5. Create user guide for attract and kill devices that includes information on numbers and placement of devices on trees, suggestions for optimum replacement timeframe. 6. Conduct outreach activities to show end-users how to handle and deploy these attract and kill devices for ACP control in various settings. 7. Work with a private company for mass production of these devices for commercialization.		HLB MAC		HLB Vector
156	5500-189E	Qureshi, Jawwad	University of Florida	Development of an Asian citrus psyllid (ACP) management plan for organic citrus	$ 139,353	10/1/2014	9/30/2016	2	To develop a management program to control ACP in organic citrus groves in order to reduce ACP-HLB spread to neighboring conventional groves thus contributing to area-wide management.	CRB	CRB		HLB Vector
157		Greg Simmons	USDA APHIS PPQ S&T	Development of Field Insectary Cage Rearing Methods for Parasitoids of ACP, IPM methods & Other Bio-rational Techs for ACP Management in CA	$ 802,133	9/30/2015	9/29/2016	3	Support for ACP classical biological control program in Arizona 1. Produce and send 80,000-100,000 Tamarixia for release in Yuma and Mojave counties. 2. Conduct evaluations to determine establishment and impacts Field cage production and Tamarixia mass-rearing methods development. 3. Evaluate citrus varieties to optimize Tamarixia production methods. 4. Determine planting, pruning, fertilization and irrigation regimes to maximize new foliage growth. 5. Determine optimal inoculation rates and introduction methods for ACP and Tamarixia. 6. Produce 400,000 or more Tamarixia, to contribute to California's classical biocontrol program. 7. Develop harvesting, collection, and storage methods for Tamarixia adults and pupae and ACP adults. 8. Technology Transfer of Mass-Rearing Technology. 9. Evaluate quality assessment methods for mass produced Tamarixia. 10. Develop field cage rearing techniques for Diaphorencyrtus aligarhensis and provide 100,000 wasps for release. cooperators for release into suitable infested areas in Southern California. 11. Develop ACP mass-rearing and handling methods to support ACP genetic control technology development. Development of IPM Strategies for Treatment of ACP - 1. Test the effects of key eradication program and areawide grower treatments on ACP and T. radiata establishment, persistence and impact. Test conventional foliar insecticides (pyrethroids, organophosphates, neonicotinoids, and various soft insecticides such as Delegate, Agri-Mek and Exirel), conventional systemic insecticides (imidacloprid, Platinum and Movento) and organic materials (such as Entrust, Pyganic and oils) and biorationals. 12. Evaluate the factors that determine the establishment success and impact of T. radiata in commercial groves. 13. Conduct open field tests of pesticide applications and impacts on natural enemies Analysis of ACP Area-Wide Control Program Data for Decision Making Support The objective will be analyze program data so that ACP-HLB program management can have more rapid access to the technical information and analyses needed for decision making. Work will include collaboration and model development with UC Davis epidemiologists and other University and USDA researchers to improve information delivery to CDFA and CPDPC program leadership.	CHRP	CHRP		HLB Vector

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158	14-8130-0336-CA	Brian Taylor	Citrus Research Board	Development of Mass-Rearing Methods for the Parasitoid, *Tamarixia radiata* (California)	$ 1,079,818	5/1/2014	4/30/2016	2	Develop new mass-rearing methods and technology to support classical biological control of the Asian Citrus Psyllid in California and Arizona. Through joint partnership with the beneficial insectary industry, additional cooperators will help the ACP control program develop efficient production systems at a rapid pace & additional Tamarixia can be produced for release reducing the threat of HLB spread in CA. 1. Establish a joint technology development mass-rearing project with the beneficial insectary industry. 2a, b, c. Assess establishment, spread, and impact of Tamarixia at release and non-release sites via surveys. 2d. Monitor citrus growth, ACP phenology, and nymph parasitism rates. 2e. Conduct ACP life table studies in presence/absence of natural enemies. 3a. Evaluate optimal citrus species for Tamarixia production. 3b. (Year 2 goal) Determine methods to maximize production of healthy host plants. 3c. Determine optimal inoculation rates of ACP parasitoid production. 3d. Determine optimal timing and ACP stage inoculation of Tamarixia. 3e. (Year 2 goal) Evaluate effects of light, temperature, and humidity on production 3f. Develop wasp harvest, handling, storage, and shipping methods. 4. Provide starter material to insectaries. 5a. Provide 52,000- 104,000 wasps for release in Arizona citrus. 5b. Provide AZ evaluation support.		HLB MAC		HLB Vector
159	5050-023	Stouthamer, Richard	University of California, Riverside	Development of mass-rearing methods for the parasitoid, *Tamarixia radiata* , to support classical biological control	$ 320,192	10/1/2013	9/30/2016	3	To assess the establishment, spread and impact of *Tamarixia radiata* for the classical biological control of ACP in urban southern California.	CRB	FEDERAL GRANT		HLB Vector
160	5500-206	Stelinski, Lukasz	University of Florida	Development of new trapping and control methods for ACP based complex citrus volitiles lure blends	$ 158,789	10/1/2014	9/30/2016	2	To develop a more potent synthetic lure to improve monitoring and the possibility for new management tractics, ex. attract & kill devices.	CRB	CRB		HLB Vector
161	58-6034-6-011	Powell, Charles A	University of Florida	DEVELOPMENT OF NOVEL INSECT CONTROL STRATEGIES BASED ON RNAI AND INSECT DETERRENT PROTEINS FOR INSECT PESTS OF CITRUS	$ 60,500	1/1/2016	1/28/2017	1		UF	US DEPT OF AGECONOMIC RESEARCH SERVICE		HLB Vector
162	590	Rogers, Michael	University of Florida	Enhancing psyllid control through a better understanding of the effects of pesticide applications on psyllid feeding and mortality	$ 889,701	5/1/2012	4/30/2015	3	The goal of this proposed work is to improve psyllid control and minimize the spread of the HLB pathogen through more effective use of pesticide applications. Objective 1, an electrical penetration graph (EPG) monitor will be used to determine whether insecticides can disrupt the psyllid feeding behaviors responsible for pathogen transmission. For insecticides that disrupt psyllid feeding behavior, the longevity of feeding disruption provided will be determined. Objective 2 will examine the duration of psyllid control provided by foliar-applied insecticides in a typical grove setting. This objective will address whether certain insecticides perform better at certain times (seasons) of the year and examine the use of adjuvants to increase the longevity of psyllid control provided. Objective 3 will examine the use of different application methods of neonicotinoid insecticides for young and intermediate sized trees to maximize the level of psyllid control provided by soil-applied systemic products. Objective 4 is a multi-year evaluation of 4 different season-long approaches to young tree care to determine which approach is most likely to prevent HLB in young trees in order to bring them into production. Objective 5 will examine whether once a young tree has become infected with the HLB pathogen, is there a benefit to continuing to control psyllids on those plants already infected?	CRDF	CRDF		HLB Vector
163	14-8130-0334-CA	Dr. Trevor Smith	Florida Department of Agriculture and Consumer Services	Expansion of the ACP Biocontrol Program in Florida and Southeastern States	$ 535,500	7/30/2014	10/30/2015	1	Improve infrastructures to the Florida Division of Plant Industry Dundee and Gainesville Biological Control Laboratories in order to dramatically increase production of Tamarixia radiata from 3 million wasps to over 7 million wasps a year; 2-3 times greater than previous parasitoid biocontrol production. dramatically increase production of *Tamarixia* 1. Create two walk-in insect rearing chambers with 6 separate rooms. 2. Install lab equipment for storing, & packaging parasitoids for field release. 3. Add ventilation & AC system to maintain proper temperature control. 4. Develop a screen work area to process ACP host plants. 5. Purchase insect rearing benches for easy access to cages in chambers. 6. Install artificial grow lights to provide timed day light for ACP host plants. 7. Purchase 2 trucks for field releases, supply movement, & data collection. 8. Add 2 incubators for storing wasps at reduced temps to increase parasitism. 9. Replace ventilation in Gainesville lab to maintain proper environment for ACP host plants, psyllids, & wasps & reduce mortality. 10. Repair Gainesville glasshouse panels to increase wasp production. 11. Increase Tamarixia rearing production to 800,000 wasps /month		HLB MAC		HLB Vector
164	582	Pelz-Stelinski, Kirsten	University of Florida	Factors influencing transmission of the huanglongbing (greening) pathogen by the Asian citrus psyllid and methods for interrupting the transmission process	$ 577,703	5/1/2012	2/29/2016	3	1. Determine how cold and heat acclimation and temperature-mediated gene expression 2. Determine the distribution of Wolbachia infections among psyllid populations 3. Investigate the effect of Wolbachia on psyllid fitness and capacity for Las transmission 4. Investigate Wolbachia-mediated changes in ACP immune gene expression	CRDF	CRDF		HLB Vector
165	2016-70016-24779	Cilia, Michelle	USDA	Harnessing natural variation in the ability of the Asian citrus psyllid to transmit Lberibacter for the development of novel HLB control strategies.	$ 1,951,763	2/1/2016	1/31/2019	3	1. Discover genetic populations of ACP that segregate for CLas acquisition and transmission competency. 2. Functionally characterize the ACP endosymbiont toxin diaphorin and establish whether the relationship between the ACP endosymbiont Profftella and the ACP is a viable target for ACP control. 3. Functionally characterize ACP proteins involved in CLas transmission. 4. Develop an ACP-CLas yeast biosensor that can be used by growers. 5. Enhance cross-disciplinary undergraduate education and research at Cornell through participation in the International Genetically Engineered Machines (iGEM) Competition.	NIFA	NIFA		HLB Vector

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166	5500-191	Hoddle, Mark	University of California, Riverside	Host specificity testing of *Diaphorencyrtus aligarhensis* sourced from the Punjab of Pakistan for classical biological control of ACP in California	$ 392,228	10/1/2011	9/30/2016	5	To establish *Diaphorencyrtus aligarhensis* (DA) as a new biological contol agent against ACP in residential areas and organic citrus groves in southern California. This may help protect commercial citrus production areas from ACP and HLB and could complement ACP suppression by *Tamarexia radiata* and other natural enemies.	CRB	CRB		HLB Vector
167	711	Bonning, Bryony	Iowa State University	Identification of Bacillus thuringiensis endo-toxins active against Adult Asian Citrus Psyllid	$ 500,000	5/1/2013	4/30/2017	3	The overall goal of this application is to identify a Bt crystal toxin with toxicity to ACP and to further enhance toxicity by genetic modification. The long term goal of the proposed research is an effective management strategy for the psyllid and associated huanglongbing disease that is more sustainable, less costly and more environmentally benign than the repeated application of broad spectrum insecticides. This work will provide the foundation for sustainable management of the ACP through the use of transgenic citrus, or through delivery of the ACP-active Bt toxin using a non-pathogenic phloem-limited virus such as the Citrus tristeza virus vector. Objective 1. Screen Bt strains for activity against the ACP and identify ACP-active Cry toxins We will screen toxins from up to 200 Bt strains with diverse insect toxicities and toxin profiles for ACP toxicity. Objective 2. Modify a Bt toxin for psyllid toxicity We will isolate peptides that bind to ACP gut membrane by screening a phage display library, and confirm gut binding of selected peptides.	CRDF	CRDF		HLB Vector
168	15-8130-0482-CA	David E. Ways	Skeeta, Inc.	Immediate Expansion of the Mass Production of *Tamarixia radiata* using Skeeta Field Insectary Cages (Texas)	$ 185,500	12/10/2014	12/31/2015	1	The purpose of this project is to expand production of Tamarixia radiata by using 120 Skeeta field insectary cages to reduce populations of ACP in residential citrus in Texas. 1. Provided 15 newly designed Skeeta field cages per month for 8 months. 2. Evaluated effectiveness of Skeeta cages to mass produce Tamarixia by comparison to existing cages at the USDA Mission Lab in Texas. 3. Modified Skeeta cages to enhance effectiveness and standardize system.		HLB MAC		HLB Vector
169	5500-197	Stouthamer, Richard	University of California, Riverside	Impact of resident predator species on control of ACP populations	$ 199,405	10/1/2012	9/30/2016	3	To determine which predators feed on ACP in California by DNA testing and compare the effectiveness of these predators and evaluate the best candidates for potential conservation biological control and/or mass release.	CRB	CRB		HLB Vector
170	941C	Pelz-Stelinski, Kirsten	University of Florida	Influence of Thermal Therapy on Transmission of Candidatus Liberibacter asiaticus	$ 105,782	2/1/2015	7/31/2016	1	The objective of this study will be to determine how each of these heat treatment methods may influence acquisition of a systemic, circulative infection of Candidatus Liberibacter asiaticus by the Asian citrus psyllid, and subsequent inoculation (transmission) to susceptible hosts. Moreover, the magnitude of heat treatments on Las transmission will be evaluated over time for one year following application. A second objective is to evaluate the acquisition and transmission efficiency of nymphs subsequent to development on infected plants subjected to heat treatments.	CRDF	MAC		HLB Vector
171	15-038C	Stelinski, Lukasz	University of Florida	Insecticide resistance monitoring and management in Florida citrus to maintain sustainable control of Asian citrus psyllid within Citrus Health Management Areas	$ 129,491	7/1/2015	6/30/2017	2	We have already documented resistance in regional FL ACP populations, where prescribed MOAs are applied up to 12 times/yr to suppress new HLB infections, which began in earnest in 2007. A recent investigation from Mexico has shown that ACP had become 100-fold and 4000-fold resistant to organophosphates and neonicotinoids. This is alarming and illustrates how lack of resistance management can allow ACP populations to become grossly resistant to our best tools leading to product failures. Our goal is to prevent this from happening pro-actively by monitoring resistance within CHMAs and prescribing appropriate management protocols.	CRDF	CRDF		HLB Vector
172	2015-33610-24313	Woods, Daniel	Inscent, Inc.	Integration of Novel Attractants into Bait and Kill Stations for Control of the Asian Citrus Psyllid	$ 500,000	9/1/2015	8/31/2017	2	Objective 1: Enhancing the attractant by identifying additional Arometics. Objective 2. Enhancing the Arometic Attractant by testing for compound synergy.Objective 3. Enhancing the Arometic Attractant by improving the formulation.	NIFA	NIFA (SBIR-Plant Production and Protection-Biology)		HLB Vector
173	932.1C	Keesling, James	University of Florida	Mathematical Modeling to evaluate Psyllid Shield Concept	$ 113,523	6/1/2014	5/31/2016	2	Bring the necessary precision to a field trial design by accurately modeling the performance of the Psyllid Shield concept over different spatial dimensions, neighboring psyllid and disease pressure, and RNAi performance.	CRDF			HLB Vector
174	858	Santra, Swadeshmukul	University of Central Florida	New non-phytotoxic composite polymer film barrier as ACP repellent for controlling HLB infection	$ 350,000	4/1/2014	3/31/2017	3	1: OSCF formulation development and optimization (Santra) In this objective we will perform the following tasks. (i) Prepare OSCF materials from readily available chemicals (such as silica precursors, acid/base catalyst, ionic cross-linker and PAM), (ii) Systematically characterize OSCF materials, (iii) Optimize the synthesis protocol to produce OSCF formulations that will exhibit strong rainfastness, (iv) Develop a scalable synthesis protocol and prepare formulations for field trials and (v) Study OSCF liquid formulation stability and evaluate its shelf-life. 2: EPG testing to evaluate change of ACP feeding behavior (Rogers) 3. Field trial for evaluation of ACP population control (Graham and Rogers) 4. Evaluation of HLB infection using PCR method (Graham and Irey)	CRDF	CRDF		HLB Vector
175	2015-70016-23011	Falk, Bryce	Regents of the University of California	Non-transgenic, near term RNA interference-based application strategies for managing Diaphorina citri and citrus greening Huanglongbing	$ 4,579,067	3/1/2015	2/28/2018	3	1). Optimize the Florida CTV to deliver efficacious D. citri interfering RNAs in Florida nontransgenic citrus. 2). Develop a California CTV for similar applications in California citrus. 3). Evaluate D. citri-infecting viruses for RNAi application. 4). Modeling/testing RNAi systems under greenhouse and/or field conditions. Objective 5). Evaluate the economic impact of using RNAi technologies in citrus for controlling D. citri and HLB. Objective 6). Develop effective Extension Outreach programs for RNAi-based strategies.	NIFA	NIFA (SCRI-CDRE)		HLB Vector
176	5300-163	Cilia, Michelle	USDA-ARS	Not all psyllids are created equal: why do some transmit Liberibactor in citrus Hacienda Heights	$ 395,990	10/1/2014	9/30/2016	2	To identify and characterize proteins and metabolites of ACP and its bacterial endosymbionts, that are involved in the transmission of CLas to citrus using mass spectrometry-based proteomics. ACP genes encoding candidate proteins will be silenced using CTV technology for delivery of blokers of CLas spread and transmission in citrus.	CRB	CRB		HLB Vector
177	5500-189	Morse, Joe	University of California, Riverside	Optimizing chemical control of Asian citrus psyllid in California	$ 697,118	10/1/2010	9/30/2016	6	Goals are to control ACP in California by reducing its dispersion into new areas and thus slowing HLB spread and delaying the emergence of pesticide-resistant ACP strains, integrating biological control to the extent possible, and reducing the potential for secondary pest outbreaks.	CRB	CRB		HLB Vector
178	15-024	Stelinski, Lukasz	University of Florida	Predicting When, Why, and Where Asian citrus psyllids move to increase effectiveness of insecticide sprays.	$ 161,116	8/1/2015	7/31/2017	2	Overall Goal: Determine the effects of abiotic factors on Asian citrus psyllid dispersal and flight capability. Obj. 1: Determine the fight initiation thresholds of ACP depending on temperature and humidity. Obj. 2: Determine the effect of wind speed on flight and the direction of psyllid flight with respect to wind. Obj. 3: Determine the effects of barometric pressure changes on psyllid dispersal. Obj. 4: Measure how psyllid dispersal is affected by abiotic factors in the field. Obj. 5: Establish a model to predict the risk of ACP dispersal/invasion based on prevailing abiotic conditions. Deliver this model as an online tool for growers.	CRDF	CRDF		HLB Vector

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179	AGR DTD 08-01-2015	Stansly, Philip Anzolut	University of Florida	PROPOSAL FOR CITRUS FIELD TRIAL ON HLB AND CANKER FOR THE ROULLIER GROUP	$ 51,836	8/1/2015	7/31/2016	1		UF	ROULLIER R&D		HLB Vector
180	780nu	Shatters, Bob	USDA	Rear and Release Psyllids as Biological Control Agents - An Economical and Feasible Mid-Term Solution for Huanglongbing (HLB) disease.	$ 1,264,097	9/1/2012	8/31/2017	5	nuPsyllid Sub-Award	CRDF	NIFA, SCRI		HLB Vector
181	781nu	Falk, Bryce	University of California - Davis	Rear and Release Psyllids as Biological Control Agents - An Economical and Feasible Mid-Term Solution for Huanglongbing (HLB) disease.	$ 1,504,880	9/1/2012	8/31/2017	5	nuPsyllid Sub-Award	CRDF	NIFA, SCRI		HLB Vector
182	782nu	Hartung, John	USDA	Rear and Release Psyllids as Biological Control Agents - An Economical and Feasible Mid-Term Solution for Huanglongbing (HLB) disease.	$ 174,900	9/1/2012	8/31/2017	5	nuPsyllid Sub-Award	CRDF	NIFA, SCRI		HLB Vector
183	783nu	Bartels, David	USDA	Rear and Release Psyllids as Biological Control Agents - An Economical and Feasible Mid-Term Solution for Huanglongbing (HLB) disease.	$ 347,534	9/1/2012	8/31/2017	5	nuPsyllid Sub-Award	CRDF	NIFA, SCRI		HLB Vector
184	784nu	Brown, Judy	University of Arizona	Rear and Release Psyllids as Biological Control Agents - An Economical and Feasible Mid-Term Solution for Huanglongbing (HLB) disease.	$ 720,767	9/1/2012	8/31/2017	5	nuPsyllid Sub-Award	CRDF	NIFA, SCRI		HLB Vector
185	785nu	Grafton-Cardwell, Elizabeth	University of California - Riverside	Rear and Release Psyllids as Biological Control Agents - An Economical and Feasible Mid-Term Solution for Huanglongbing (HLB) disease.	$ 487,481	9/1/2012	8/31/2017	5	nuPsyllid Sub-Award	CRDF	NIFA, SCRI		HLB Vector
186	786nu	Polek, MaryLou	Citrus Research Board	Rear and Release Psyllids as Biological Control Agents - An Economical and Feasible Mid-Term Solution for Huanglongbing (HLB) disease.	$ 40,000	9/1/2012	8/31/2017	5	nuPsyllid Sub-Award	CRDF	NIFA, SCRI		HLB Vector
187	787nu	Galindo, Celestina	California Department of Food and Agriculture	Rear and Release Psyllids as Biological Control Agents - An Economical and Feasible Mid-Term Solution for Huanglongbing (HLB) disease.	$ 450,494	9/1/2012	8/31/2017	5	nuPsyllid Sub-Award	CRDF	NIFA, SCRI		HLB Vector
188	788nu	Hay, Bruce	California Institute of Technology	Rear and Release Psyllids as Biological Control Agents - An Economical and Feasible Mid-Term Solution for Huanglongbing (HLB) disease.	$ 1,221,682	9/1/2012	8/31/2017	5	nuPsyllid Sub-Award	CRDF	NIFA, SCRI		HLB Vector
189	789nu	Rohrig, Eric	Florida Department of Consumer Services	Rear and Release Psyllids as Biological Control Agents - An Economical and Feasible Mid-Term Solution for Huanglongbing (HLB) disease.	$ 230,274	9/1/2012	8/31/2017	5	nuPsyllid Sub-Award	CRDF	NIFA, SCRI		HLB Vector
190	790nu	Coop, Leonard	Oregon State University	Rear and Release Psyllids as Biological Control Agents - An Economical and Feasible Mid-Term Solution for Huanglongbing (HLB) disease.	$ 85,829	9/1/2012	8/31/2017	5	nuPsyllid Sub-Award	CRDF	NIFA, SCRI		HLB Vector
191	791nu	Setamou, Mamoudou	Texas A & M University	Rear and Release Psyllids as Biological Control Agents - An Economical and Feasible Mid-Term Solution for Huanglongbing (HLB) disease.	$ 225,477	9/1/2012	8/31/2017	5	nuPsyllid Sub-Award	CRDF	NIFA, SCRI		HLB Vector
192	792nu	Giulianotti, Marcelo	Torrey Pines Institute for Molecular Studies	Rear and Release Psyllids as Biological Control Agents - An Economical and Feasible Mid-Term Solution for Huanglongbing (HLB) disease.	$ 294,873	9/1/2012	8/31/2017	5	nuPsyllid Sub-Award	CRDF	NIFA, SCRI		HLB Vector
193	793nu	Gang, David	Washington State University	Rear and Release Psyllids as Biological Control Agents - An Economical and Feasible Mid-Term Solution for Huanglongbing (HLB) disease.	$ 322,491	9/1/2012	8/31/2017	5	nuPsyllid Sub-Award	CRDF	NIFA, SCRI		HLB Vector
194	794nu	Pelz-Stelinski, Kirsten	University of Florida	Rear and Release Psyllids as Biological Control Agents - An Economical and Feasible Mid-Term Solution for Huanglongbing (HLB) disease.	$ 957,223	9/1/2012	8/31/2017	5	nuPsyllid Sub-Award	CRDF	NIFA, SCRI		HLB Vector
195	795nu	Turpen, Tom	Technology Innovation Group	Rear and Release Psyllids as Biological Control Agents - An Economical and Feasible Mid-Term Solution for Huanglongbing (HLB) disease.	$ 360,000	9/1/2012	8/31/2017	5	nuPsyllid Sub-Award	CRDF	NIFA, SCRI		HLB Vector

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196	796nu	White, James	James White	Rear and Release Psyllids as Biological Control Agents - An Economical and Feasible Mid-Term Solution for Huanglongbing (HLB) disease.	$ 50,000	9/1/2012	8/31/2017	5	nuPsyllid Sub-Award	CRDF	NIFA, SCRI		HLB Vector
197	797nu	Browning, Harold	Citrus Research and Development Founfation, Inc.	Rear and Release Psyllids as Biological Control Agents - An Economical and Feasible Mid-Term Solution for Huanglongbing (HLB) disease.	$ 262,000	9/1/2012	8/31/2017	5	nuPsyllid Sub-Award	CRDF	NIFA, SCRI		HLB Vector
198	15-021	Pelz-Stelinski, Kirsten	University of Florida	Regulation of Las transmission and microbial colonization by the Asian citrus psyllid immune system	$ 185,732	9/1/2015	8/31/2017	2	The goal of this project is to determine whether pathogen or dsRNA exposure primes the ACP immune system to resist future infection by pathogens, including Las, and whether this effect is multigenerational. The development, fecundity, microbial community, and Las transmission capacity will be evaluated in controlled laboratory experiments. ACP selected for resistance to Las will be reared for subsequent field investigations of transmission conducted under Florida conditions. Obj. 1- Investigate the specificity and efficacy of immune priming response in ACP. Obj. 2- Investigate specificity RNAi immune priming in ACP. Obj. 3- Examine effect of prior immune challenge on transmission of Las. Obj. 4- Determine the transgenerational immune priming response, including transgenerational effects on Las acquisition and endosymbionts. Obj. 5- Determine the effectiveness of ACP selected for Las or endosymbiont resistance under field conditions in Florida citrus.	CRDF	CRDF		HLB Vector
199	15-8130-0488-CA	Mark Hoddle	UC Riverside	Release and Establishment is CA of Diaphorencyrtus aligarhensis, Parasitoid of ACP Sourced in Punjab, Pakistan	$ 330,563	1/1/2015	12/31/2016	2	1. Maintain plant, ACP, and *D. aligarhensis* production. 2. Select 15-20 release and control sites for D. aligarhensis releases and monitoring. Sites will be chose that are at least 5 miles from the nearest *T. radiata* release sites. 3. Implement and maintain ant control. 4. Begin and continue D. aligarhensis releases. 5. Begin and continue ACP and flush monitoring. 6. Determine if D. aligarhensis reproduces in the field and established populations survive the winter.		HLB MAC		HLB Vector
200	5500-194	Hoddle, Mark	University of California, Riverside	Releasing and monitoring of *Tamaraxia radiata* in Southern California	$ 509,336	10/1/2011	9/30/2016	5	To mass-rear and release *Tamarixia radiata* , as a parasitoid of ACP, and monitor its establishment and spread in southern California and to study the role of natural enemies and ants in this system.	CRB	CRB		HLB Vector
201	447	Stansly, Phil	University of Florida	Role of Nutritional and Insecticidal Treatments in Mitigation of HLB in New Citrus Plantings	$ 324,430	2/15/2012	2/14/2016	3	The overall objective of this research is evaluate the individual and combined contributions of vector control and foliar nutrients in order to bring a new solid block planting of juice oranges into profitable production. 1. Evaluate psyllid populations, HLB incidence and intensity, gene expression, tree growth, and eventually yield in newly planted citrus blocks 2. Assess separate contributions of vector control and foliar nutritional applications to the above parameters 3. Evaluate the effectiveness of reflective mulch to control ACP 4. Provide economic analysis of costs and projected benefits. 5. Extend results to clientele	CRDF	CRDF		HLB Vector
202	850	Albrigo, Gene	University of Florida	Scheduling ACP spring spray selection based on the Citrus Flowering Model	$ 90,000	4/1/2014	3/31/2017	3	The overall objectives of these studies are to provide advanced knowledge of spring leaf flush and flowering for spring flush ACP control and predict the best 4-5 week window for bee foraging in citrus. 1: Collect weather, flowering and leaf flush data for recent 10 years and use to improve the Citrus Flowering Monitor System. Particular goals are to improve near-bloom temperature responses of the model and add leaf flushing time to the flowering time in the monitor system. Additionally, it would be desirable to add the 5 % open flower point as the point of likely bee activity. 2: Establish a 4-5 week peak flowering period as part of the monitor and test it for use of chemicals with ACP effectiveness but minimum bee toxicity, after which all effective ACP control chemicals would again be used. Work with growers and beekeepers to see if this approach is feasible for both concern of the grower for adequate ACP control and beekeepers for adequate access to citrus flowers for their bees.	CRDF	CRDF		HLB Vector
203	14-8130-0335-CA	Raina King	Texas Citrus Pest & Disease Management Corp	Strengthening the ACP Biological Control Program in Organic and Abandoned Groves and Residential Settings in Texas	$ 810,846	5/1/2014	4/30/2016	2	Scale-up the ACP biocontrol program in non-managed or organic habitats to reduce the risk of HLB spread near the Rio Grande Valley citrus industry. The goals are to Increase Tamarixia radiata parasitoids rearing and release in high-risk areas with confirmed HLB-positive trees and infected psyllids, and increase inoculation of citrus trees by application of the fungus Isaria fumosorosea (Ifr) which will infect psyllids at all growth stages and will complement biocontrol work with Tamarixia. LB spread near the Rio Grande Valley citrus industry. 1. Identify high-risk areas for release sites and field rearing cages through GIS. 2. Increase the distribution of biocontrol agents , monitor the effects of releases. 3. Construct field cage insectaries in residential communities and provide educational awareness to residents. 4. Provide alternative biocontrol , Isaria fumosorosea (Ifr), to residential trees during overwintering season when Tamarixia nymphs are minimal. 5. Increase Tamarixia production at the Texas A&M AgriLife, Weslaco location, and increase orange jasmine at Texas A&M University Kingsville- Citrus Center.		HLB MAC		HLB Vector
204	Inter-agency	Dr. Daniel Flores	Center for Plant Health Science and Technology	Strengthening the ACP Biological Control Program in Organic and Abandoned Groves and Residential Settings in Texas	$ 248,000	4/28/2014	9/30/2015	2	Supports the effective biological control of Asian citrus psyllids in non-managed or organic habitats and in residential settings in Texas, reducing the risk of HLB spread and improving the viability of the Texas citrus industry. 1. Increase Tamarixia production at PPQ CPHST Mission Lab with two newly built greenhouses. 2. Install of field insectary cages in residential communities to supplement biocontrol efforts. 3. Oversee the increase of Tamarixia production by Texas Citrus Pest and Disease Management Corporation at the Texas A&M AgriLife - Weslaco location.		HLB MAC		HLB Vector

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205	5500-205	Qureshi, Jawwad	University of Florida	Toxicity of synthetic and organic insecticides to *Tamarixia radiata* , ecto-parasitoid of Asian citrus psyllid	$ 69,642	10/1/2015	9/30/2016	1	To determine toxicity of both synthetic and organic insecticides to Tamarexia radiata, the ACP parasitoid using integrated management.	CRB	CRB		HLB Vector
206	616	Rogers, Michael	University of Florida	Ultra High Performance Liquid Chromatography – Pesticide Residue Analysis	$ 172,500	5/1/2012	4/30/2015	1	This work includes determining the residual activity of pesticide applications for controlling the Asian citrus psyllid. As a result of more in-depth work on the objectives proposed, the number of samples being generated has far exceeded our previous estimation of how many samples we would be analyzed. Thus, this proposal seeks additional funding to permit the increased number of residue samples that will be processed in our lab using recently purchased LC-MS-MS. The overall objectives these analyses will support is the correlation of pesticide residue levels in plant and the longevity of control provided with differing rate, timing and application methods.	CRDF	CRDF		HLB Vector
207	853	LaPointe, Stephen	USDA	Why is Poncirus trifoliata resistant to colonization by Asian citrus psyllid?	$ 187,681	5/1/2014	6/30/2016	2	1: Identify host plant-produced volatile chemicals and leaf/plant metabolites that are attractive or repellant to adult male and/or female ACP; 2: Test preference (antixenosis) and development (antibiosis) of ACP adults on susceptible and resistant host plants; 3: Identify attractive or repellent volatiles, metabolites or their blends and study the behavior of ACPs to these odorants or taste blends using Y-tube olfactometer assay, caged vial assay, flight tunnel assay and SPLAT probing assay.	CRDF	CRDF		HLB Vector
208	919	Dewdney, Megan	University of Florida	A method to monitor for Guignardia citricarpa (Gc) ascospores in Florida groves.	$ 42,650	5/1/2014	10/31/2015	1	1. Optimize Guignardia citricarpa ascospore extraction procedures and qPCR with automated extraction system. 2. Determine if prototype passive ascospore traps will capture a sufficient number of Guignardia citricarpa ascospores to be an effective monitoring tool. Monitor for G. citricarpa ascospores in six locations around state.	CRDF	CRDF		Citrus Black Spot
209	15-005	Dewdney, Megan	University of Florida	Asexual inoculum production of Guignardia citricarpa, the causal agent of citrus black spot	$ 255,227	7/1/2015	6/30/2018	3	Citrus production in Florida will be more difficult and expensive due to the presence of citrus black spot. Only recently has it come to light that there is just one mating type present in Florida which means that it is very unlikely G. citricarpa ascospores are present to cause disease. This means that the only form of inoculum are the pycnidiospores but very little is known about the production of pycnidospores in the grove. The focus of the proposed studies is to better understand what conditions are needed to produce pycnidiospores in each tissue type known to harbor the fungus, and what conditions promote or decrease their survival. The information will allow for better understanding of where and when inoculum is present and ultimately improve control strategies in Florida. In order to achieve these goals, the following specific objectives will be addressed; Obj. 1: To determine the temperature and relative humidity optima for Guignardia citricarpa pycnidiospore infection and production on citrus twigs, leaf litter, and fruit. Obj. 2: To determine the relative potential of Guignardia citricarpa to form pycnidiospores on citrus twigs, leaf litter, and fruit. Obj. 3: To determine whether Guignardia citricarpa can survive and reproduce on citrus debris on grove equipment.	CRDF	CRDF		Citrus Black Spot
210	921	Schneider, William L.	USDA	Determining the role of a novel virus in Citrus blight.	$ 400,000	10/1/2014	9/30/2016	2	1. Generate a complete genome sequence for CBAPRV. 2. Develop a highly specific RT-PCR assay that can determine when CBAPRV is active. 3. Use this assay to screen a large number of trees from blight affected areas in Florida. 4. Transmission tests to determine if CBAPRV is the causal agent of citrus blight.	CRDF	CRDF		Citrus Black Spot
211	20668	Lee, Won Suk	University of Florida	DEVELOPMENT OF CITRUS BLACK SPOT SENSING USING MULTISPECTRALIMAGING	$ 157,577	12/19/2013	8/31/2016	3		UF	FL DEPT OF AG AND CONSUMER SER	US DEPT OF AG	Citrus Black Spot
212	716	Dewdney, Megan	University of Florida	Improved fungicide control measures for pre- and post-harvest management of citrus black spot	$ 289,300	4/1/2013	6/30/2016	3	The overall goal of this project is to find new products to control citrus black spot pre- and postharvest with the aim to slow the spread and impact of the disease. Objective 1. Determine the base line level of Guignardia citricarpa sensitivity to fungicides registered for disease control in citrus and evaluate new products for efficacy against G. citricarpa in vitro. Objective 2. Conduct and improve implementation of spray trials for efficacy of registered products for citrus and to evaluate novel compounds in the field. Objective 3. Optimize field evaluation of control measures through analysis of the spatiotemporal disease progress utilizing past and current field data of the outbreaks to gain knowledge on the incidence, severity and rate of the epidemic and assess the fungal population to increase the likelihood of successful field research. Objective 4. Evaluate products and treatment conditions for postharvest control of citrus black spot.	CRDF	CRDF		Citrus Black Spot
213	715	Dewdney, Megan	University of Florida	The leaf litter cycle of citrus black spot and improvements to current management practices	$ 577,352	5/1/2013	6/30/2016	3	The focus of the proposed studies is on understanding the inoculum cycle as a means to limit the impact of this disease and manage it in a cost effective manner. In order to do this, the following specific objectives will be addressed; Objective 1. Determine if a) leaf litter biodegradation treatments reduce Guignardia spp. pseudothecia and improve control afforded by routine fungicide applications; b) if biodegradation is affected by the current fungicide application practices; and c) whether the biodegradation treatments will affect current citrus best management practices (BMP). Objective 2. Determine the seasonal dynamics of leaf litter inoculum load in varying management regime intensities and how environment affects pseudothecia production in the leaf litter. Objective 3. Test if the resistance to black spot in the leaves and fruit in sour orange is correlated and under simple genetic control through laboratory and field testing of progeny of sour orange crosses in both Florida and Australia.	CRDF	CRDF		Citrus Black Spot
214	06-S130691	Wang, Nian	University of Florida	A BACTERIAL VIRUS BASED METHOD FOR BIOCONTROL OF CITRUS CANKER	$ 71,232	5/1/2013	4/30/2016	3		UF	TEXAS A&M UNIV	CITRUS RESEARCH & DEVEL FDTN	Citrus Canker
215	M1301780	Carlos Gonzalez	Plant Pathology & Microbiology	A Bacterial Virus Based Method for Biocontrol of Citrus Canker	$ 854,918	5/1/2013	10/31/2016	3		TAMU			Citrus Canker

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216	754	Mou, Zhonglin	University of Florida	Application of a natural inducer of systemic acquired resistance and engineering non-host resistance in citrus for controlling citrus canker	$ 366,032	5/1/2013	10/31/2016	3	The overall goal of our research is to transfer disease resistance technology from the model plant Arabidopsis to citrus. The objective of this project is to increase citrus disease resistance through two different approaches. One approach is to activate the NAD+-mediated defense signaling pathway, the other approach is to engineer non-host resistance. We plan to achieve the goal of this application by pursuing the following two specific aims: 1) Increase citrus disease resistance by activating the NAD+-mediated defense signaling pathway. 2) Engineer non-host resistance in citrus to control citrus canker and HLB.	CRDF	CRDF		Citrus Canker
217	922	Wang, Nian	University of Florida	Control citrus canker by manipulating the EBE (effector binding element) of CsLOB1 which is the citrus susceptibility gene for citrus canker disease	$ 436,045	4/1/2014	3/31/2017	3	I: Generate non-transgenic EBECsLOB1-modified citrus II: Test how modification of the EBE of CsLOB1 gene affects citrus resistance against citrus canker and other important traits 2.1. Test how modification of the EBE of CsLOB1 gene affects citrus resistance against citrus canker 2.2. Experimental evolution analysis of the Xcc strain on the EBECsLOB1-modified grapefruit to investigate how stable is the resistance 2.3. Test how modification of the EBE of CsLOB1 gene affects other important citrus traits	CRDF	CRDF		Citrus Canker
218	15-050C	Behlau, Franklin	Fundecitrus	Effect of windbreaks, copper bactericides and citrus leaf miner control on temporal and spatial progress of citrus canker.	$ 44,000	11/1/2015	10/31/2016	1	The objective of this project is to quantify the relative effect of Cu, Wb and Lc on the spatial and temporal progress of citrus canker under conducive conditions for epidemics and disease loss. The experiment is set up in a 10 ha plot planted with Valencia sweet orange grafted on Rangpur lime. The different treatments are the combination of up to three control measures (Cu, Wb, Lc) or none. Copper treated plots are being sprayed with Kocide (35% metallic copper) at 1 kg metallic copper/ha every 21 days.	CRDF	CRDF		Citrus Canker
219	15-022	Reuber, T. Lynne	Two Blades Foundation	Engineering citrus for canker resistance	$ 367,598	7/1/2015	6/30/2018	3	In order to develop durable disease resistance strategies for the control of citrus canker, we will test complementary molecular genetic approaches for canker resistance to determine which can contribute to a stacked resistance approach. We plan to combine three elements: (i) PAMP-triggered immunity (PTI), (ii) effector-triggered immunity (ETI), and (iii) genome editing to create a variant of a citrus ortholog of a gene that controls recessive resistance in pepper. In this manner, we hope to engineer multiple levels of resistance that would make it very difficult for the pathogen to overcome and thus serve as stable and durable resistance in citrus plants. Obj. 1: Assess canker resistance conferred by the PRRs EFR and XA21 (continuation of CRDF grant 12-062-556) (Jones Laboratory) Obj. 2: Introduction of the Pepper Bs2 Disease Resistance Gene into Citrus to Control Xac. (Staskawicz laboratory) Obj. 3: Development of Genome Editing Technologies (Cas9/CRISPR) for Citrus Improvement (Staskawicz laboratory)	CRDF	CRDF		Citrus Canker
220	937C	Richardson, Taw	AgroSource, Inc.	Firewall Canker Efficiency on Round Oranges	$ 366,680	7/1/2014	6/30/2016	1	Collect data from replicated field trials in both FireWall and FireLine use on round oranges to assess their efficacy against citrus canker in the 2015 season. Also, to perform resistance monitoring for both FireWall and FireLine treatments in the phyllosphere and rhizosphere of the treated versus untreated trees for the 2015 season. Combined, these data can be used to support the application for Section 18 emergency exemptions for citrus canker treatment with these bactericides.	CRDF	CRDF		Citrus Canker
221	936C	Richardson, Taw	AgroSource, Inc.	Firewall Section 18 Grapefruit Canker (and HLB) Field use Evaluation	$ 155,500	7/1/2014	6/30/2016	1	Collect data from commercial use of Firewall in grapefruit groves under the Section 18 to monitor efficacy against canker and HLB.	CRDF	CRDF		Citrus Canker
222	759	Santra, Swadeshmukul	University of Central Florida	Fixed-Quat: A novel alternative to Cu fungicide/bactericide for preventing citrus canker	$ 260,050	4/1/2013	7/31/2016	3	The overall goal of this project is to develop Fixed-Quat nanotechnology as an alternative to Cu based fungicides/bactericides for the prevention of citrus canker. Specific objectives are to: (i) Prepare Fixed-Quat SiNP/NG formulations from readily available ingredients, (ii) Systematically characterize Fixed-Quat SiNP/NG materials, (iii) Study antimicrobial properties, phytotoxicity and retention properties, (iv) Optimize the synthesis protocol to produce non-phytotoxic nanoformulations that will exhibit superior antimicrobial properties and strong adherence properties, (v) Develop a scalable synthesis protocol and prepare formulations for field trials and (vi) Study both the suspension and dry state stability and evaluate the shelf-life of Fixed-Quat SiNP/NG.	CRDF	CRDF		Citrus Canker
223	TBO902	Moore, Gloria A	University of Florida	GENETIC RESISTANCE TO CITRUS CANKER CONFERRED BY THE PEPPER BS3 GENE	$ 673,786	4/1/2009	3/31/2016	7		UF	TWO BLADES FOUNDATION		Citrus Canker
224	730	Graham, Jim	University of Florida	Monitoring streptomycin resistance in Xanthomonas citri in support of FireWall registration for canker	$ 141,129	5/1/2013	4/30/2016	3	Objective 1. Apply a protocol for sampling grapefruit and oranges for streptomycin resistance Objective 2. Evaluate the efficacy of mixing copper with streptomycin compared to streptomycin alone for reduction in risk of streptomycin resistance in Xcc. Objective 3. Quantify the local systemic activity of streptomycin for control of Xcc inoculum in lesions of grapefruit and oranges	CRDF	CRDF		Citrus Canker
225		Vessela Mavrodieva	USDA APHIS PPQ S&T	Optimization of a multiplex real-time PCR TaqMan assay for improved molecular screening of Xanthomonas spp. that cause citrus canker	$ 86,650	9/30/2015	9/29/2016		1) Selection of an appropriate internal PCR control gene target, preferably of bacterial, not plant origin. Design of primers/probe set. 2) Optimization of multiplex TaqMan PCR (real-time) protocol with the current citrus canker primer/probe set (VM3/4 and VM11): selection of PCR reagents concentration and reaction parameters. 3) Evaluation of the assay's analytical sensitivity and specificity with corrections, if needed. 4) Optimization of multiplex TaqMan PCR (real-time) protocol with a different (other than VM3/4 and VM11) set of citrus canker specific primer/probe set if needed. 5) Testing of archived and fresh field samples of different hosts and geographical regions (FL and LA). 6) Optimization of the testing protocol: multiplex Taqman PCR coupled with a user friendly bacterial streaming samples. 7) Development of a diagnostic work instruction for distribution to regional laboratories.				Citrus Canker
226	M1302835	Carlos Gonzalez	Plant Pathology & Microbiology	Sub w/ University of Florida: A Bacterial Virus Based Method for Biocontrol of Citrus Canker	$71,232 (Sub)	5/1/2013	4/30/2016	3		TAMU			Citrus Canker

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227		Gang Wei	USDA APHIS PPQ S&T	Development and Validation of Conventional PCR and Real-Time PCR Methods for the Detection of *Citrus leprosis virus* in Plants	$ 68,000	9/30/2015	9/29/2016		1) Design and evaluate more primer sets for conventional RT-PCR (cRT-PCR) in detection of CiLV-N 2) Select primers with higher analytical sensitivity and specificity 3) Test with additional imported diseased samples using selected primers 4) Select at least one primer set to optimize a cRT-PCR for detection of CiLV-N 5) Develop a draft work instruction of conventional RT-PCR for CiLV-N 6) Test primers and probes for one-step multiplex quantitative RT-PCR (qRT-PCR) for detection of CiLV-C, CiLV-C2, CiLV-N as well as the Nad5 plant RNA at the same time with four Dual-Labeled probes. 7) Optimize the multiplex qRT-PCR 8) Develop a draft work instruction for the multiplex qRT-PCR				Citrus Leprosis
228		Vessela Mavrodieva	USDA APHIS PPQ S&T	Development of a test proficiency testing (PT) panel for molecular diagnosis of Citrus leprosis virus	$ 86,650	9/30/2015	9/29/2016		1) Evaluate two approaches of CiLV panel batch production from a) infected field tissue and b) artificially developed sample by spiking of healthy tissue with in vitro transcript 2) Optimization of buffer formulation and tissue/suspension lyophilization protocol. 3) Evaluate homogeneity and stability of the lyophilized CiLV tissue batches at different temperature conditions. 4) Production of healthy citrus and CiLV infected tissue batches in a range of target concentration. 5) CiLV PT test-panel validation and assembly. 6) CiLV test panel distribution and PT results analysis 7) SOP for panel preparation.				Citrus Leprosis
229	5300-172	William L. Schneider	USDA-ARS	Development of PCR based diagnostic tools for detection and differentiation of Citrus leprosis associated viruses	$ 56,428	10/1/2015	9/30/2016	1	To identify multiple species of cytoplasmic- and nuclear-citrus leprosis virus (CiLV-C and CiLV-N) associated with citrus leprosis-like symptoms using species specific primers by conventional as well as qRT-PCR.	CRB	CRB		Citrus Leprosis
230		Bacilio Salas	USDA APHIS PPQ S&T	Evaluation of the efficacy of miticides to control *Brevipalpus* mites, potential vector of CiLV.	$ 72,989	9/1/2015	8/31/2016		The objectives of this project is 1) to test commercial miticides (Table 1) sold in TX for their effectiveness to control Brevipalpus mites on citrus under field conditions, 2) Monitor populations of Brevipalpus mites over time after miticide treatment, and if possible 3) quantify mortality over time of Brevipalpus mites in miticide treated trees and untreated control trees.	CHRP	CHRP		Citrus Leprosis
231		Roxanne Farris	USDA APHIS PPQ S&T	Survey for *Brevipalpus* mites and Citrus Leprosis Virus in the Lower Rio Grande Valley of Texas and Limes Imported from Mexico	$ 74,600	9/26/2015	9/25/2016		1. Obtain mite collections from Rio Grande Valley Surveys. 2. Obtain mites collected at the ports and from international collaborators. 3. Obtain morphological identification for those mites submitted to Ron Ochoa. 4. Finalize an RNA extraction procedure for RNA isolation from a single mite. Extraction procedures may include a DNA/RNA extraction method. Complete work instruction. 5. Perform PCR of mitochondrial DNA and obtain sequence data on the mites. This will provide us with DNA sequences for molecular identification. 6. Finalize a reverse-transcriptase PCR assay for the detection of RNA, including viral RNA on both a conventional and real-time PCR platform. Complete work instruction. 7. Technology transfer: testing of work instructions developed at the CPHST Beltsville lab for the detection of Citrus Leprosis off of plant material. This will include CiLV-cytoplasmic type I, CiLV-nuclear type I and CiLV-cytoplasmic type II. 8. Testing of potentially infected mites with newly adapted real-time PCR assays for the detection of Citrus leprosis. 9. Develop a non-destructive DNA/RNA extraction procedure to preserve the morphological integrity of the mite specimens. Complete work instruction 10. Determine if virus detection can be performed on non-destructive extractions 11. Develop methods for collecting mite specimens in bulk 12. Perform spiking experiments to determine sensitivity of the CiLV detection assays	CHRP	CHRP		Citrus Leprosis
232	58-2034-5-012	Rogers, Michael E	University of Florida	DETECTION OF XYLELLA FASTIDIOSA ACQUIRED OR INOCULATED BY BLUE-GREEN SHARPSHOOTERS	$ 26,400	6/1/2015	5/31/2016	1		UF	US DEPT OF AGAGRICULTURAL RESEARCH SERVICE		CVC
233		Krugner/Rodrigo; Stenger/Drake C; Chen/Jianchi; Backus/Elaine A; Wallis/Christophe; Lin/Hong; Xiao Chang-Lin; Sisterson Mark S	USDA, ARS - Pacific West Area, San Joaquin Valley Agricultural Sciences Center, Crop Diseases, Pests And Genetics Research, Parlier, California	Epidemiology And Management Of Pierce'S Disease And Other Maladies Of Grape					The overall goal of this project is to mitigate losses due to Xylella fastidiosacaused diseases during crop production and to develop effective, sustainable disease and insect-vector management strategies by characterizing host-pathogen-vectorenvironment interactions of these complex pathosystems. Specific objectives for the project are outlined below: Objective 1: Characterize genomic and biological diversity of Xylella fastidiosa strains. Objective 2: Elucidate molecular interactions of Xylella fastidiosa with horticultural and model plant hosts that result in disease susceptibility or resistance. Objective 3: Determine biological/ecological/transmission properties of Xylella fastidiosa vectors. Objective 4: Develop and assess strategies to manage diseases caused by Xylella fastidiosa.	USDA/ARS	USDA/ARS		CVC
234	15-0215-SA	Gabriel, Dean W	University of Florida	HIGH-THROUGHPUT LIVE CELL SCREEN FOR SMALL MOLECULES TARGETING TOLC EFFLUX PUMP OF XYLELLA FASTIDIOSA	$ 113,730	7/1/2015	6/30/2016	1		UF	STATE OF CALIFORNIADEPT OF FOOD & AGRICULTURE		CVC
235	59-0101-5-005	Dewdney, Megan M	University of Florida	UPDATE: RECOVERY PLAN FOR CITRUS VARIEGATED CHLOROSIS	$ 9,996	9/1/2015	8/31/2016	1		UF	US DEPT OF AGAGRICULTURAL RESEARCH SERVICE		CVC

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236	5400-148	Adaskaveg, James	University of California, Riverside	Epidemiology and management of Phytophthora diseases of citrus in California	$ 398,000	10/1/2013	9/30/2016	3	To evaluate multiple active ingredients with different modes of action to manage Phytophthora diseases of citrus for overseas markets where some species of Phytophthora are quarantine pests.	CRB	CRB		Phytophthora
237		Ancona, Veronica	TAMUK-Citrus Cen	Evaluation of Control methods for Phytophthora infected citrus	$ 3,200	2/16/2016	8/31/2016	1	1. To determine the optimal timing of field application of RidomilGold®SL in controlling Phytophthora infections 2. To monitor field population of Phytophthora for development of resistance to RidomilGold®SL	TCPB	TCPB		Phytophthora
238	16-010C	Dewdney, Megan	University of Florida	Enhancement of postbloom fruit drop control measures	$ 268,643	3/1/2016	2/28/2018	2	1. Conduct ground and aerial applications of fungicides to determine the efficacy and economics of fungicide treatments. 2. Determine if Luna Sensation has enough systemic activity to protect flowers from before they fully develop and open 3. Determine if the period flowering of trees affected by huanglongbing can be narrowed to eliminate the offseason bloom that contributes to the PFD inoculum increase in groves.	CRDF	CRDF		Postbloom Fruit Drop
239		Bacilio Salas	USDA APHIS PPQ S&T	Chemical control of sweet orange scab (SOS) caused by Elsinoe australis on citrus fruits	$ 39,848	9/1/2015	8/31/2016		1) Determine the effectiveness of chemicals used in organic citrus packinghouses to control E. australis on citrus fruits 2) Determine the viability of E. australis on fruits shipped to consumers after treatment with chemicals(s) by proprietary method (s) at the organic packing house	CHRP	CHRP		Sweet Orange Scab
240	1S.0199.00	State Government	Louisiana Dept. of Agriculture and Forestry	Citrus Commodity Survey	9,556	FY16		1	The main goal of this cooperative program is to continue strengthening a state-wide network of cooperators that will help identify these pest threats, determine and implement the most effective means of preventing, detecting, and responding to these pest threats, and to communicate the risks and needs to land management personnel, relevant industries, and the public. Specific goals outlined by this program include: collecting and submitting pest survey samples and data; increasing public awareness and increasing communication of the threats posed by the 13 targeted pests.	Farm Bill Section 10007	Farm Bill Section 10007		IPM
241	1S.0446.00	State Government	California Department of Food and Agriculture	Citrus Commodity Survey	485,000	FY16		1	The purpose of the survey is to detect the presence of citrus pests (citrus canker, huanglongbing, citrus variegated chlorosis, sweet orange scab, Asian citrus psyllid, brown citrus aphid, citrus leprosis virus and citrus longhorned borer) which are either of export significance or can seriously damage production by adversely impacting tree health.	Farm Bill Section 10007	Farm Bill Section 10007		IPM
242		Vargas/Roger I; Mcquate/Grant T; Chang/Chiou Ling; Manoukis/Nicholas; Geib/Scott M; Hollingsworth/Rob	USDA, ARS - Pacific West Area, Daniel K. Inouye U.S. Pacific Basin Agricultural Research Center, Tropical Crop And Commodity Protection Research, Hilo, Hawaii	Detection, Control And Area-Wide Management Of Fruit Flies And Other Quarantine Pests Of Tropical/Subtropical Crops					The goals of our project plan are to conduct foundational research to create the knowledge base necessary to develop innovative control methods and IPM strategies, and to conduct applied research to produce information and products that improve pest control in tropical agriculture. The four major objectives of our program are: Objective 1: Model pest invasion pathways, and investigate the genomics/genetics, physiology/behavior, population dynamics, biology/ecology, and natural enemies of tropical and subtropical fruit flies and other invasive pests to develop technologies to control (contain, suppress, and eradicate) these pests in Hawaii and the Pacific, the U.S. mainland, and elsewhere. 1A: Build an analysis of emerging tephritid fruit fly genomes, including linkage mapping, uniform and consistent gene structural and functional annotation, and comparative genomic analysis. 1B: Conduct surveys on coffee berry borer (CBB) distribution and abundance on Hawaii Island to provide a baseline for a predictive model that integrates GIS, pest insect population dynamics, host plant phenology, weather data and grower practices to drive area-wide management of CBB on Hawaii Island. Objective 2: Determine physiological, genetic, and biological factors limiting the effectiveness of the sterile insect technique (SIT) and natural enemies in control and eradication of fruit flies and other tropical plant pests of quarantine significance. 2A: Improve the effectiveness of mass reared fruit flies for SIT by quantifying the impact of colony infusion on incorporating wild gene 2B: Investigate parasitoid-fruit fly host interactions from the molecular to the field level. Objective 3: To increase export of tropical fruits and vegetables, improve attractants and trapping systems for surveillance and detection, and develop lures, baits, and reduced risk pesticides for area-wide IPM of fruit flies and/or other tropical plant pests of quarantine significance. 3A: Evaluation of C. capitata, B.dorsalis and B. cucurbitae captures in traps baited with solid trimedlure (TML), methyl eugenol (ME) and raspberry ketone (RK) male lure and insecticide dispensers weathered in Hawaii and California. 3B: Evaluation of mixtures, weathering and chemical degradation of SPLAT-spinosad ME and cue-lure (C-L) for fruit fly control under Hawaii and California conditions. 3C: Evaluation of a new attractant system for detection, monitoring and control of the sweetpotato vine borer, a pest of quarantine significance in Hawaii. Objective 4: Provide baseline information for development of low prevalence and/or pest-free zones, for implementation in Hawaii and the U.S. mainland, to promote or allow unimpeded movement of fruit and vegetable exports. 4A: Create area of low pest prevalence (ALPP) as an independent measure of systems approaches for melon fly. 4B: Utilize models to evaluate the sensitivity of trapping grids for detection and control of insect pests such as tephritid fruit flies. 4C. Effectiveness of foliar and bait sprays against C. capitata, B.dorsalis, B. cucurbitae and B. latifrons.	USDA/ARS	USDA/ARS		IPM
243	6.0355.01	Foreign	IAEA	Development of generic phytosanitary treatment schedules for exotic tephritid fruit flies.	205,000	FY16		1	This project was initiated through FY2015 Farm Bill funding to provide research support and generate data to address long standing questions related to efficacy and conduct of cold treatments for tropical tephritid fruit flies. In FY2016 we propose to continue current efforts to generate data in support of harmonzining phytosanitary cold treatment schedules. This project proposal will leverage the resources and capabilities of the Joint FAO/IAEA Programme on Nuclear Techniques in Food and Agriculture toward the economical and efficient development of harmonized generic phytosanitary cold treatments for groups of fruit hosts and/or species of Tephritidae. In the FAO/IAEA laboratories in Seibersdorf, Austria, tropical tephritid fruit flies are reared for sterile insect technique research, and those same colonies can be used for research and development of phytosanitary treatments.	Farm Bill Section 10007	Farm Bill Section 10007		IPM

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244	6.0355.02	APHIS	USDA APHIS	Development of generic phytosanitary treatment schedules for exotic tephritid fruit flies.	15,000	FY16		1	This project was initiated through FY2015 Farm Bill funding to provide research support and generate data to address long standing questions related to efficacy and conduct of cold treatments for tropical tephritid fruit flies. In FY2016 we propose to continue current efforts to generate data in support of harmonzining phytosanitary cold treatment schedules. Additionally, we will expand the project to include evaluating the generic phytosanitary irradiation treatment schedule of 150 Gy on Tephritid species where data is not available.	Farm Bill Section 10007	Farm Bill Section 10007		IPM
245	925	Dutt, Manjul	University of Florida	Diaprepes control using a plant based insecticidal transgene approach	$ 80,000	7/1/2014	6/30/2016	2	1: Isolation and cloning of putative root specific promoters, terminators and lectin/CpTi gene sequences. Cloning of these gene sequences into transformation vectors. Agrobacterium mediated transformation with these construct(s) into commercial rootstock such as carrizo. 2: Production of recombinant proteins and force-feeding assays of diaprepes reared on an artificial medium. Molecular evaluation of transgenic plants. 3: Cloning putative transgenics for analyses. Test propagated transgenic rootstocks in greenhouse for tolerance to Diaprepes. Prepare grafted trees containing the best performing rootstocks with a non transgenic scion. Test non transgenic scion for presence/absence of transgene product.	CRDF			IPM
246		Strickman/Daniel A	USDA, ARS - Office of National Programs, Crop Production And Protection, Beltsville, Maryland	Discovery & Development Of Biological Control Agents For Weeds/Insect Pests...Invasive In The U.S. Native To Australia & Southeast Asia					Objective 1: Discover, identify, and initiate the characterization of new biological control agents for targets, including, but not limited to, the weeds Melaleuca quinquenervia, Lygodium microphyllum, Casuarina spp., Paederia foetida, Rhodomyrtus tomentosa, Triadica sebifera and Hydrilla verticillata, and the psyllid pest, Diaphorina citri. Other weeds and insect pests that are invasive in the U.S. and native to Australia and/or Southeast Asia can become priority targets as required. Objective 2: Conduct preliminary field and laboratory research on natural enemies to assess efficacy and host-range to determine their potential for use as biological control agents. Assess results to prioritize potential agents for introduction into the United States. Expedite establishment of high-priority agents by collecting, rearing and shipping to U.S. collaborators for high priority target weeds, such as additional agents for M. quinquenervia. Objective 3: Conduct ecological studies on targets that identify the key regulatory factors in its native habitat and use this understanding to direct selection of agents.	USDA/ARS	USDA/ARS		IPM
247	5400-119	Adaskaveg, James	University of California, Riverside	Disease forcasting and management of Septoria spot of citrus	$ 405,580	10/1/2008	9/30/2016	8	To continue developing management strategies for Septoria spot to keep Korean market open to California citrus export. Disease forcasting is part of the research which provides the industry a risk assessment for Septoria spot and the development of new pre- and postharvest fungicides with different modes of action.	CRB	CRB		IPM
248	2015-70006-24164	Rosenheim, Jay	The Regents of the University of California	Ecoinformatics ("Big Data") For Improved Citrus Pest Management	$ 174,998	9/1/2015	8/31/2019	4	Objective 1: Integrate research and extension. Objective 2: Assemble a database. Objective 3: Quantify the impact of direct pests (citrus thrips, katydids, citrus cutworms, citrus peelminers, California red scale). Objectives 4 and 5: Quantify the impact of indirect pests (California red scale, citricola scale, citrus red mite, cottony cushion, scale) on the quantity, quality, and economic value of the citrus harvest. Objective 6: Combine the results on how each pest influences the amount and quality of harvested fruit. Objective 7: Identifying least-disruptive ACP control methods. Objective 8: Extension.	NIFA	NIFA (Crop Protection and Pest Management- Applied Research and Deelopment Program)		IPM
249	601	Stansly, Phil	University of Florida	Effective and Sustainable Insecticidal Control of Citrus Leafminer, Phyllocnistis citrella (Stainton) Lepidoptera: Gracillariidae) to Slow Spread of Citrus Canker Disease.	$ 205,540	6/1/2012	5/31/2015	3	The overall objective of this proposal is to improve the present management system for CLM. To accomplish this goal we propose the following specific research objectives: 1. Assess the use of pheromone traps for monitoring CLM populations, and development of a preliminary degree-day model, 2. Evaluate effectiveness of early season and aerial applications to reduce CLM and canker, 3. Obtain baseline susceptibility to key insecticides, 4. Use a diagnostic dose to monitor resistance in field populations of CLM exposed to intensive versus modest insecticide use. 5. Evaluate commonly used insecticides for effects on key CLM natural enemies.	CRDF	CRDF		IPM
250	5500-208	Vargas, Roger	USDA-ARS	Effects of ACP cover sprays against fruit flies (Tephritidae) and their natural enemies	$ 30,000	10/1/2015	9/30/2016	1	To generate data on the efficacy of Asian citrus psyllid (ACP) insecticides against Mediterranean, oriental and melon fruit flies and three natural enemies for California citrus industry, when and if fruit fly quarantines occur.	CRB	CRB		IPM
251		Adkins/Scott T; Hilf/Mark E; Turechek/William; Duan/Yong Ping; Gottwald/Timothy	USDA, ARS - Southeast Area, U.S. Horticultural Research Laboratory, Subtropical Plant Pathology Research, Fort Pierce, FL	EMERGING DISEASES OF CITRUS, VEGETABLES, AND ORNAMENTALS					Obj: 1. Characterize ecology, biology, epidemiology, molecular genetics, and vector and host (crop and weed) interactions of domestic, exotic, newly emerging, and reemerging pathogens. 1a. Characterize the etiology, molecular biology and genetics of 'Candidatus Liberibacter asiaticus (Las),' the bacterium associated with citrus huanglongbing (HLB). 1b. Molecular characterization, vector interactions and/or epidemiology of Groundnut ringspot virus (GRSV), Squash vein yellowing virus (SqVYV) and other viruses of vegetables, ornamentals, and weeds, and Xanthomonas fragariae [causing angular leaf spot (ALS) on strawberry]. 1c. Characterize meteorological components affecting the epidemiology of Asiatic citrus canker (ACC), the interaction of the Asian leaf miner with ACC, the Asian citrus psyllid with HLB, the interaction of whiteflies with SqVYV, and the interaction of thrips with GRSV. 2. Develop/refine rapid, sensitive reliable detection/sampling methods for pathogens. 2a. Develop improved detection methods for GRSV, Las and Xanthomonads on citrus and strawberry. 2b. Develop new and augment existing surveillance methods and protocols for HLB, Xanthomonas citri subsp. citri on citrus, and the other newly introduced citrus diseases such as citrus black spot (CBS) and sweet orange scab (SOS). 3. Develop or improve comprehensive integrated disease management strategies. 3a. Develop and use stochastic models to test various disease control strategies for HLB, ACC, CBS and diseases caused by other exotic pathogens. 3b. Develop and implement the most efficacious strategies for disease management of HLB, Xanthomonads of citrus and strawberry, CBS, Plum pox virus (PPV), and viruses of vegetables and ornamentals.	USDA/ARS	USDA/ARS		IPM
252	5500-501b	Morse, Joseph	University of California, Riverside	Export issues: Fuller rose beetle, citrus thrips, bean thrips and mites- CORE Program	$ 336,455	10/1/2012	9/30/2015	3	To determine economic thresholds, develop sampling methods, apply insecticides in an appropriate manner, maximize natural enemies and develop alternatives to insecticide treatments such as pheromone disruption.	CRB	CRB		IPM

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253		Schneider/William L; Luster/Douglas G	USDA, ARS - Northeast Area, Foreign Disease-Weed Science Research, Frederick, Maryland	Identification, Characterization, And Biology Of Foreign And Emerging Viral And Bacterial Plant Pathogens					These objectives are designed to address the risks of foreign plant viral and bacterial diseases, via the collection and characterization of foreign viruses and bacteria, the development of broad range and pathogen specific diagnostics, and the assessment of biological factors associated with disease epidemiology, including evolutionary capacity, alternative hosts and transmission efficiency. 1: Collect germplasm, characterize accessions, and generate reagents for the development of diagnostic assays for foreign and emerging bacterial plant pathogens. 1A. Collect and characterize foreign and emerging bacterial plant pathogens. 1B. Characterization of toxin production among Rathyibacter species. 1C. Develop immunodiagnostic reagents for specific and sensitive detection and diagnosis of emerging bacterial pathogens, such as Rathayibacter toxicus. 2: Develop broad range diagnostics for plant pathogens using massively parallel sequencing and high-throughput screening. 2A. Develop massively parallel sequencing based diagnostics for the detection of viral and bacterial plant pathogens. 2B. Develop massively parallel sequencing based diagnostics for the detection of pathogens in vectors. 3: Assess the effects of host shifting and constant insect presence on viral evolution and pathogenesis. 3A. Develop a mechanism for assessing the effect of constant vector presence on a persistently transmitted virus (Soybean dwarf virus). 3B. Develop a mechanism for assessing the effect of constant vector presence on a semi-persistently transmitted virus. (Citrus tristeza virus) 3C. Develop a mechanism for assessing the effect of constant vector presence on a non-persistently transmitted virus (Plum pox virus). 4: Conduct vector transmission and vector interaction studies for emerging insecttransmitted plant pathogens. 4A. Determine potential host range (commercial and wild reservoir) for Cotton leaf roll dwarf virus (CLRDV). 4B. Determine potential vectors for CLRDV.	USDA/ARS	USDA/ARS		IPM
254		Handler/Alfred M; Allan/Sandra A; Mankin/Richard W; Meagher Jr/Robert L; Nagoshi/Rodney N; Shirk/Paul D	USDA, ARS - Southeast Area, Center For Medical, Agricultural And Veterinary Entomology, Iinsect Behavior And Biocontrol Research, Gainesville, Florida	Improved Biologically-Based Methods For Insect Pest Management Of Crop Insect Pests					Objective 1. Develop new transgenic conditional lethal strains for sexing and sterility in tephritid and drosophilid fruit flies to be used in the sterile insect technique, produce redundant lethality systems for ecological safety, and transgenic technology for emerging pest species such as the Asian citrus psyllid. Objective 2. Develop paratransgenic strains that eliminate the ability of host populations to vector plant disease by using Wolbachia cytoplasmic incompatibility to drive pathogen immunity throughout populations of key pests such as Asian citrus psyllid, glassy-winged sharpshooter, and potato/tomato psyllid. Objective 3. Develop automated acoustic methods for improved surveillance and detection of hidden and invasive pests such as red palm and citrus root weevils and Asian long-horned beetle that will facilitate more rapid information collection/processing by use of big data technologies. Objective 4. Develop improved visual-cue trap systems for surveillance of invasive and outbreak insect pests such as Asian citrus psyllid and corn silk fly, and improve strategies for detecting and predicting the dispersal of these pests by understanding the role of visual and other stimuli in affecting their behavior. Objective 5. Develop predictive models for fall armyworm migration pathways that are shifting due to climate change, and improve area-wide landscape management tactics for these pests by developing cover crop and biological control strategies to control them. Sub-objective 5.A. Develop genetic methods to monitor fall armyworm population behavior and air transport models to describe and predict its migration pathways and potential changes in infestation patterns due to climate change. Sub-objective 5.B. Improve area-wide landscape management tactics by developing cover crop and other strategies to mitigate pest populations such as fall armyworm, and attract or support natural enemies and pollinators.	USDA/ARS	USDA/ARS		IPM
255		Alborn/Hans T; Stuhl/Charles J	USDA, ARS - Southeast Area, Center For Medical, Agricultural And Veterinary Entomology, Chemistry Research, Gainesville, Florida	Insect, Nematode, And Plant Semiochemical Communication Systems					Objective 1. Develop new improved attractants for weevils (Anthonomus pepper and cranberry weevils and Sitophilus maize and rice weevils) based on combinations of host plant kairomones and/or aggregation pheromones. Objective 2. Develop pheromones and kairomones to improve the efficacy of mass-reared entomophagous nematodes used in biocontrol. Objective 3. Develop kairomone-based attractants and repellants to control arthropod pests of honey bees, including the Varroa mite and the small hive beetle. Objective 4. Elucidate kairomone-based communication systems of tephritid fruit flies (Anastrepha and Bactrocera spp.) and the impact of kairomones on accelerated development of sexual signaling and reproductive maturity.	USDA/ARS	USDA/ARS		IPM
256		Hartung/John S	USDA, ARS - Northeast Area, (BARC) Beltsville Agricultural Research Center, Molecular Plant Pathology Laboratory, Beltsville, MD	INVASIVE PATHOGENS OF CITRUS					Objective 1: Develop and use assays to characterize the interactions of exotic citrus pathogens with their hosts or vectors. Objective 2: Determine the etiology of exotic diseases of citrus and the diversity of exotic citrus pathogens.	USDA/ARS	USDA/ARS		IPM

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257		Lapointe/Stephen L; Patt/Joseph M; Shatters/Robert G; Hall/David Goodsell; Hunter/Wayne B	USDA, ARS - Southeast Area, U.S. Horticultural Research Laboratory, Subtropical Insects And Horticulture Research, Fort Pierce, FL	IPM Methods for Insect Pests of Orchard Crops					Obj: Objective 1: Discover, develop and implement semiochemical-based control and monitoring methods for key pests of orchard crops including, but not limited to, Asian citrus psyllid, citrus leafminer, citrus canker disease, and the Diaprepes root weevil. Sub-objective 1a: Identify physiologically active odorants and attractant blends for detection and monitoring of ACP. Sub-objective 1b: Complete large scale tests and promote adoption of CLM mating disruption. Sub-objective 1c: Identify attractants for DRW and Sri Lankan weevil. Objective 2: Identify sources of resistance and characterize traits and mechanisms conferring plant resistance to the Asian citrus psyllid in Citrus and near-Citrus relatives. Sub-objective 2a: Identify and determine the underlying mechanism of resistance in Poncirus trifoliata to oviposition by Asian citrus psyllid (ACP). Sub-objective 2b: Describe feeding behavior of ACP on susceptible and resistant citrus and near-citrus germplasm. Objective 3: Develop and implement new and improved biological control strategies for key pests of citrus, including Asian citrus psyllid, using existing and new natural enemies. Sub-objective 3a: Biological control of Asian citrus psyllid by Hirsutella citriformis. Sub-objective 3b: Development of an autodisseminator of entomopathogens to suppress ACP populations. Objective 4: Develop and implement control of key pests and vectors including, but not limited to, Asian citrus psyllid by 1) identifying interdiction points in key biological processes through genomics, proteomics and metabolomics, 2) identifying inhibitors (dsRNA, peptides, chemicals), and 3) developing delivery methods, e.g., transgenic plants and topical applications of exogenous compounds. Sub-objective 4a: Combining molecular/cellular biology (including targeted and omics level research) with bioassays to identify interdiction molecules including but not limited to dsRNAs (as RNAi inducers), peptides, peptidomimetics and RNA aptamers that block key molecular events in targeted processes such as, but not limited to, salivary sheath formation, specific digestive processes, and/or disease transmission. Sub-objective 4b: Develop delivery strategies for interdiction molecules.	USDA/ARS	USDA/ARS		IPM
258	926.3C	Urrutia, William	ISCA Technologies, Inc.	Large-scale mating disruption of citrus leafminer validation and product launch	$ 113,333	2/1/2014	1/31/2016	2	Demonstrate efficacy of large-scale applications of a mating disruption system using a pheromone release device (DCEPT CLM) and test hypotheses related to optimal deployment of the product for control of CLM and canker.	CRDF	CRDF		IPM
259		Epsky/Nancy D; Kendra/Paul E	USDA, ARS - Southeast Area, Subtropical Horticulture Research, Miami, Florida	Methyl Bromide Replacement: Mitigation Of The Invasive Pest Threat From The American Tropics And Subtropics					1. Identify semiochemicals that mediate the behavior and physiology of exotic insects such as tephritid (Ceratitis and Anastrepha) and drosophilid (Zaprionus indianus) fruit flies, the redbay ambrosia beetle, the cocoa pod borer, and other new invasive pests from the Caribbean and Central and South America. 1.A. Determine and document behavioral and olfactory responses to semiochemicals that have potential use in monitoring and control systems. 1.B. Identify and quantify insect semiochemicals; develop improved systems to collect and identify semiochemicals. 2. Develop semiochemical- and/or chemical-based technologies that lead to products for detection, behavioral disruption, or surveillance of insect pests that threaten food security. 2.A. Develop synthetic and natural product lures based on host location and/or feeding cues that are formulated for effective use in integrated pest management. 2.B. Develop optimized trapping and control systems based on chemical lures in combination with traps and bait stations. 3. Develop practical systems for integrated pest management using semiochemical and other detection-based technologies to reduce the threat of importation and establishment of exotic pests from foreign tropical and subtropical environments by suppressing and/or controlling the population at the source. 3.A. Develop IPM tools for tephritid fruit flies using semiochemical-based technologies for use by regulatory agencies and growers; develop new approaches including improved protocols and spatial analysis techniques to assess monitoring approaches and control systems such as attract-and-kill technologies 3.B. To complement traditional breeding programs for plants resistant to R. lauricola, identify RAB resistant varieties that are low in RAB attractants and integrate quantitative semiochemical phenotype with genotype for marker-assisted selection of pest resistant plants to complement traditional breeding programs.	USDA/ARS	USDA/ARS		IPM
260		Baker/Con J	USDA, ARS - Northeast Area (BARC), Beltsville Agricultural Research Center, Molecular Plant Pathology Laboratory, Beltsville, Maryland	Physiological And Molecular Signaling In Viroid And Bacterial Disease					Objective 1: Identify changes in host gene expression and small RNA-mediated regulation associated with viroid and bacterial infection and disease development as potential targets for disease management. Objective 2: Identify key metabolites that are involved in the early stages of pathogenesis and may have global effects on disease resistance through either their bioactive nature or effect on redox-status. Sub-objective 2.A. Identify and quantify secondary metabolites induced upon infection of tomato with either P. syringae or potato spindle tuber viroid (PSTVd). Sub-objective 2.B. Determine bioactivity of secondary metabolites induced upon infection of tomato with either P. syringae or PSTVd. Sub-objective 2.C. Determine the effect on redox status of secondary metabolites induced upon infection of tomato with either P. syringae or PSTVd. Objective 3: Identify the molecular signals and pathways used by viroids to move through the cytoplasm, enter the nucleus or chloroplast of the host cell, and begin replication. Sub-objective 3.A. Determine the role of host protein 4/1 (and other proteins interacting with 4/1) in the intraand intercellular movement of PSTVd. Sub-objective 3.B. Use sequence motifs derived from Eggplant latent viroid (ELVd) to redirect mRNAs encoding enzymes involved in terpenoid biosynthesis into the chloroplast.	USDA/ARS	USDA/ARS		IPM
261		Dawson, William O	University of Florida	REMOVE TRANSMISSIBILITY BY APHIDS FROM THE CTV VECTORS	$ 746,077	8/1/2011	10/31/2018	7		UF	SO GARDENS CITRUS NURSERY		IPM
262	5500-501a	Grafton-Cardwell, Beth	University of California, Riverside	Screen new pesticides, monitor for resistance, developing economic threshold for pests, monitoring programs & control tactics- CORE Program	$ 1,678,659	10/1/2011	9/30/2016	4	To determine economic thresholds, develop sampling methods, apply insecticides in an appropriate manner, maximize natural enemies and develop alternatives to insecticide treatments such as pheromone disruption.	CRB	CRB		IPM
263	6.0615.00	Academia	Texas A&M University-Kingsville	Strengthening the Mexican fruit fly (Anastrepha ludens) eradication program through attract-and-kill strategies in resi	$ 135,000	FY16		1	The proposed project seeks to develop a novel systems approach for mitigating the menace of Mexfly by strategically deploying 'attract-and-kill devices' in unmanaged citrus and by improving the current bait spray program in commercial groves with the goal of complementing the ongoing Mexfly eradication efforts in Texas. The primary goal of this project is to protect the health of the Texas citrus industry by developing innovative-enhanced mitigation and rapid response strategies for the recurring Mexfly problem	Farm Bill Section 10007	Farm Bill Section 10007		IPM
264	926.1C	LaPointe, Stephen	USDA	Sub on Large-scale mating disruption of citrus leafminer validation and product launch	$ 80,000	2/1/2014	1/31/2016	2	Demonstrate efficacy of large-scale applications of a mating disruption system using a pheromone release device (DCEPT CLM) and test hypotheses related to optimal deployment of the product for control of CLM and canker.	CRDF	CRDF		IPM

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265	926.2C	Stelinski, Lukasz	University of Florida	Sub on Large-scale mating disruption of citrus leafminer validation and product launch	$ 20,000	2/1/2014	1/31/2016	2	Demonstrate efficacy of large-scale applications of a mating disruption system using a pheromone release device (DCEPT CLM) and test hypotheses related to optimal deployment of the product for control of CLM and canker.	CRDF	CRDF		IPM
266		Siegel/Joel P; Kuenen/Lodewyk P; Burks/Charles S; Walse/Spencer S; Obenland/David M; Xiao/Chang-Lin	USDA, ARS - Pacific West Area, San Joaquin Valley Agricultural Sciences Center, Commodity Protection And Quality Research, Parlier, California	Systems-Based Approaches For Control Of Arthropod Pests Important To Agricultural Production, Trade And Quarantine					Objective 1: Develop practical, systems-based strategies, for management of pests of fresh fruit and high valuable durable commodities (e.g., navel orangeworm in almonds, pistachios and walnuts, mealybugs on table grapes, codling moth in walnuts, tephritid fruit flies in fruit) through all aspects of production, distribution, and marketing that enhance production and commodity quality. Subobjective 1A: Characterize the biotic and abiotic factors that affect the insecticides used to control navel orangeworm in tree nuts in order to optimize their efficacy and minimize non-target impacts on human health and environmental quality. Subobjective 1B: Characterize and optimize semiochemical strategies for monitoring and control of key dipteran and lepidopteran pests in the context of minimizing preharvest and post-harvest chemical treatment requirements. Subobjective 1C: Characterize and optimize biocontrol strategies for key lepidopteran and dipteran pests in the context of minimizing preharvest and post-harvest chemical treatment requirements. Subobjective 1D: Develop an overall metric of treatment efficacy, via combining the individual contributions from preharvest and post-harvest processes, to evaluate systems-based strategies for insect control in fresh and durable commodities. Objective 2: Develop new treatment technologies or modify existing protocols for post-harvest treatment of pests, such as the Indianmeal moth and the red flour beetle, with the objective of minimizing negative effects to the environment and food quality, while maintaining the positive sensory qualities and marketability of these commodities. Subobjective 2A: Develop technologies to reduce, or eliminate, atmospheric emissions from ventilation effluent following post-harvest fumigations. Subobjective 2B: Develop treatments for novel post-harvest applications involving fresh and durable commodities. Subobjective 2C: Improve semiochemical-based strategies for controlling stored product insect pests in post-harvest scenarios. Objective 3: Develop treatment technologies for action agencies that require alternatives to methyl bromide for phytosanitary and quarantine treatment of pests such as the codling moth, spotted wing drosophila, and Fuller rose beetle. Conduct research to support USDA-APHIS negotiations with trade partners as well as research on the fate and transport of post-harvest agrochemicals, thereby enhancing the competitiveness of U.S. agriculture in the global marketplace. Subobjective 3A: Develop post-harvest treatments for quarantine purposes that minimize reliance on post-harvest methyl bromide (MeBr) fumigations. Subobjective 3B: Obtain sorption and depuration data related to post-harvest fumigations to serve as physicochemical basis for regulation related to nontarget human ingestion and inhalation exposures. Subobjective 3C: Identify agrochemical use strategies and novel technologies to ensure foodstuff residues are compliant with importer regulations.	USDA/ARS	USDA/ARS		IPM
267		Brandon/David L; Cheng/Luisa W; He/Xiaohua; Hernlem/Bradley Jay; Rasooly/Reuven; Stanker/Larry Hen	USDA, ARS - Pacific West Area, Western Regional Research Center, Foodborne Toxin Detection And Prevention Research, Albany, California	Technologies For Detecting And Determining The Bioavailability Of Bacterial Toxins					Provide toxicological data and analytical methodology for microbial toxins that will help ensure a safe food supply. (1) Develop new assays for bacterial toxins and their variants, using immunological and other methods, with emphasis on applicability to practical problems facing the food industry and regulatory agencies. Develop new monoclonal antibody (mAb)-based assays for botulinum neurotoxins (BoNTs), non-toxic neurotoxin-associated proteins, and Shiga toxins (Stx), and optimize antibodies for biosensor applications. Develop methodology for detection of Shiga toxin-producing E. coli (STEC) and a multiplex bead-array assay for detecting Stx and STEC pathogenicity/virulence factors. Develop improved activity assay for staphylococcal enterotoxins. (2) Calibrate in vitro methodology against established animal bioassays, and develop new data on the bioavailability of toxins, the impact of food processing on toxin activities, and the significance of antibody-mediated clearance on toxicity, especially via the oral route of intoxication. Determine the bioavailability of different botulinum neurotoxin serotypes. Validate new toxin assays using activity assays.	USDA/ARS	USDA/ARS		IPM
268	5300-155	Cilia, Michelle	USDA-ARS	Using mass spectrometry technologies to develop novel management strategies for citrus insect vector-borne pathogens	$ 541,553	10/1/2013	9/30/2016	3	To develop an early detection technology based upon citrus peptide biomarkers, identify protein interactions between ACP and CLas and develop precision peptide inhibitors against interacting proteins within the ACP cirtical to CLas transmission.	CRB	CRB		IPM
269	593	Schumann, Arnold	University of Florida	Advanced Production Systems (ACPS) for efficient, sustainable citrus groves	$ 414,039	7/1/2012	6/30/2015	3	The overall goals of this three-year project renewal are to continue the existing ACPS experiments at Auburndale (2.5 year old replant) and at the CREC (mature 20 year old ACPS retrofit) in order to obtain long-term data which is crucial for the successful recommendation and adoption of this technology. A demonstration ACPS experiment testing four different rootstocks was established in March 2011 on 5 acres of CREC's Lake Placid grove, and will also be continued with this project. Finally, two new ACPS experiments will be established to fill gaps and to evolve the new ideas developing from our current research experiments. Specific objectives are: i) To install a 'Valencia' juice orange ACPS replant experiment at the CREC, testing two rootstocks, weed control fabric, and three novel ultra-high planting densities with narrow equipment. ii) To install a grapefruit fresh fruit ACPS replant experiment in the Indian River region in order to adapt the technology for regional priorities, conditions and soil types. iii) To continue the existing ACPS experiments at Auburndale, CREC (Lake Alfred), and Lake Placid.	CRDF	CRDF		Production
270	21145	Futch, Stephen Hubbard	University of Florida	EVALUATION OF TREE TEE-PEES TO IMPROVE FREEZE PROTECTION AND IRRIGATION DISTRIBUTION FOR YOUNG CITRUS TREES	$ 63,100	8/26/2014	6/30/2016	2		UF	FL DEPT OF AG AND CONSUMER SER		Production
271	21963	Morgan, Kelly T	University of Florida	AGRICULTURE FIELD SCALE IRRIGATION REQUIREMENTS SIMULATION (AFSIRS) UPDATE	$ 162,800	4/17/2015	6/30/2016	1		UF	FL DEPT OF AG AND CONSUMER SER		Production

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272	598	Schumann, Arnold	University of Florida	Bringing young citrus trees infected with Candidatus Liberibacter asiaticus into production using intensive horticultural management strategies.	$ 152,952	7/1/2012	6/30/2015	3	This research seeks to determine whether young trees infected with CLas and displaying typical HLB symptoms can be brought to maturity and produce an economically viable yield. This will be achieved by managing a 60 acre grove of 3-year-old 'Valencia' trees using a combination of three different foliar and ground applied nutritional programs. We will monitor tree growth of symptomatic and healthy trees to compare canopy growth rates, fruit yield and quality, as well as rate of disease spread within the grove.	CRDF	CRDF		Production
273	09C00000045	Morgan, Kelly T	University of Florida	CITRUS IRRIGATION MANAGEMENT TO ICNREASE YOUNG TREE GROWTH AND PRODUCTIVITY ON FLATWOOD RIDGE SOILS (B264)	$ 104,050	10/1/2008	6/30/2016	8		UF	WATER MGMT DISTRICTSSOUTHWEST FLORIDA		Production
274	22265	Morgan, Kelly T	University of Florida	CONSERVATION TECHNICIANS BEST MANAGEMENT PRACTICES IMPLEMENTATION ASSISTANCE	$ 507,980	7/1/2015	6/30/2018	3		UF	FL DEPT OF AG AND CONSUMER SER		Production
275		Murden	TX CPDM Corp	Demonstration of new planting strategies	$ 863,396				This project will demonstrate new planting strategies such as raised beds and mulching to increase tree health to decrease the impact of HLB.	USDA/ARS			Production
276	14-8130-0452	King, Raina	Texas Citrus Pest and Disease Management Corporation	Demonstration project for comprehensive management of 0HLB in Texas	$ 863,396	6/1/2015	5/31/2017	2	1. Provide a baseline data set to compare the new design and intensified scouting program effectiveness. It will also be used to assess the impact of removing trees within abandoned groves. 2. demonstrate the effectiveness of ACP management within residential and commercial groves. 3. remove known inoculum around new planting sites. 4. demonstrate an integrated pest management system for young trees and new plantings. 5. determine the cost-benefit of implementation of ACP management and the new planting design.	TCPDMC	HLB MAC		Production
277	F018879	Morgan, Kelly T	University of Florida	ENHANCING AND PROTECTING WATER QUALITY THROUGH PROPER USE OFNUTRIENTS IN AGRICULTURAL AND URBAN SETTINGS	$ 169,871	9/10/2013	6/30/2016	3		UF	UF FOU	MOSAIC ATM	Production
278	SC-1516	King, Raina	Texas Citrus Pest and Disease Management Corporation	Expanding advisement and service roles inside the Texas citrus industry: Grower outreach in psyllid control and HLB early detection	$ 194,300	12/1/2014	3/31/2016	1	One of the keys to this program has been psyllid monitoring: in the form of a pilot baseline effort (2010-2012) and more recently as a real-time service for select growers. In only its first full year of existence, this initiative has proven to be an invaluable asset in the fight against HLB by simultaneously reducing ACP levels and building awareness among growers of what commitment level is necessary to effectively keep their populations in-check.	TCPDMC	Texas Department of Agriculture		Production
279	AGR DTD 05-01-2015	Albrigo, Leo G	University of Florida	FIELD PRODUCTION EVALUATION	$ 26,985	5/1/2015	5/1/2016	1		UF	SUNTTON BIOMEDICAL		Production
280		Mccollum/Thomas G; Plotto/Anne; Bai/Jinhe; Baldwin/Elizabeth A	USDA, ARS - Southeast Area, U.S. Horticultural Research Laboratory, Citrus And Other Subtropical Products Research, Fort Pierce, FL	Horticultural, Physiological, and Genetic Factors Affecting Sustainable Citrus Production					Obj: 1. Determine the critical factors that limit standard and novel citrus cultivars' ability to thrive and become productive in Florida, where HLB and its vector are endemic. 1a. Determine the effects of HLB on response to abiotic and biotic stresses. 1b. Determine the HLB susceptibility of various rootstock/scion combinations in green house trials. 2. Protect and/or rescue valuable and unique ARS citrus germplasm from infection by HLB through appropriate methods, including, micrografting, cyrotherapy, thermotherapy and antibiotics as necessary. 2a: Rescue high-value, novel germplasm that is threatened by HLB as well as other maladies. 2b: Develop improved methods for elimination of CLas from infected citrus. 3. Conduct field trials to evaluate promising scion selections for tree health, productivity and fruit quality. 3a: Determine HLB tolerance for various combinations of rootstocks and scions. 3b: Determine fruit quality attributes of advanced selections of Poncirus trifoliata hybrids that show tolerance to HLB.	USDA/ARS	USDA/ARS		Production
281		Breksa III/Andrew P	USDA, ARS - Pacific West Area, Western Regional Research Center, Healthy Processed Foods Research, Albany, California	Improved Utilization Of Ag. Products Through Identification Of Nitrogen-Containing Bioactive Components Important To Quality & Human Health					Nitrogen-containing plant metabolites are an important class of natural products that contribute to quality and utilization and span the range from essential nutrients to phytochemicals that affect mood and mental well- being and, in some extreme cases, toxins. Due to complexity and difficulty in detection, past research in this area has targeted very specific compounds, resulting in most nitrogen-containing plant metabolites being largely ignored. Objective 1- Develop new or improved existing methods to detect, identify, and characterize N-containing plant metabolites. Establish extraction methods for Ncontaining metabolites from fruit of specialty crops {e.g., citrus, grapes, and tomatoes) and model plant species. Establish High Pressure Liquid Chromatography (HPLC) separation method for the resolution of multiple classes of nitrogencontaining metabolites in a single run. Compare existing methods for the detection and quantification of nitrogen-containing metabolites. Combine the elements of extraction, separation, identification and quantification into an optimized method for the profiling of N-containing plant metabolites. Objective 2- Screen specialty crops for their metabolomic profiles with a particular emphasis on nitrogen-containing metabolites. Initial efforts will focus on fruits from citrus, grapes, and tomatoes. Sub-Objective 2.1. Commence NMP and systematic identification and quantification of nitrogen-containing metabolites found in tissues of citrus, grapes, and tomatoes, using liquid chromatography coupled to mass spectrometer (MS & MS/MS) and nitrogen (CND and/or post column derivatization) detection systems. Sub-objective 2.2. Isolate and/or identify new or novel nitrogen-containing metabolites.	USDA/ARS	USDA/ARS		Production
282	20661	Beeson, Richard C, Jr	University of Florida	IMPROVING YIELD AND PROFIT OF GREENHOUSE PRODUCTION OF CITRUS TREES FOR OUT-PLANTING	$ 127,446	12/16/2013	4/30/2016	2		UF	FL DEPT OF AG AND CONSUMER SER	US DEPT OF AG	Production
283	US-4689-14R	Lee, Won Suk	University of Florida	INNOVATIVE YIELD MAPPING SYSTEM USING HYPERSPECTRAL AND THERMAL IMAGING FOR PRECISION TREE CROP MANAGEMENT	$ 106,000	12/1/2014	11/30/2016	2		UF	BARD (US ISRAEL AG R&D FUND)		Production

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284	5100-150	Kandelous, Maziar	University of California, Davis	Optimization of water and nitrate application efficiency for citrus trees: recommendations for irrigation and fertigation practices	$ 477,054	10/1/2012	9/30/2016	4	To combine field data on soil moisture and nutrients with modeling scenarios to improve and optimize irrigation and fertigation managements in citrus orchards. Practical guidelines will be formulated for the growers for optimizing water and nitrate application efficiency.	CRB	CRB		Production
285	567391	Ehsani, Reza	University of Florida	ROBOT SWARMS AND HUMAN SCOUTS FOR PERSISTENT MONITORING OF SPECIALTY CROPS	$ 299,033	9/1/2015	8/31/2018	3		UF	UNIV OF PENNSYLVANIA	US DEPT OF AG	Production
286		da Graca, John	TAMUK-Citrus Cen	Sustainable Technical support fo Citrus Center Research Programs	$ 53,784	9/16/2015	8/31/2016	1	Key to the success of our research programs is professional technical support we received from our research support personnel, who have expertise in sensitive and expensive equipment and procedures including tissue culture, shoot tip grafting, PCR, HPLC, GC, etc.	TCPB	TCPB		Production
287	AGR DTD 10-02-2014	He, Zhenli	University of Florida	WATER QUALITY MONITORING AND LOAD REDUCTION ESTIMATION OF CITRUS	$ 78,427	10/2/2014	10/1/2016	2		UF	ST LUCIE CNTYBOARD OF COUNTY COMMISSIONERS		Production
288	2013-67021-20934	Xu, Yunjun	University of Central Florida	Automated Stress and Disease Detection in Crops using a Ground and Aerial Vehicle Network and Optical Sensors	$ 1,210,602	8/15/2013	8/14/2018	6	(1) a rapid, in-field plant stress monitoring system using optical sensors with the capability of sensing foliage/canopies, (2) a novel approach that exploits the special geometries of crop layouts to quickly identify a network with a sequence of weightings assigned to nodes to enable prioritizing and optimal assignment of ground agricultural robots to carryout in-situ verification tasks, and (3) an innovative hierarchical and cooperative decision making approach for optimal trajectory planning of ground agricultural robots to accomplish scouting tasks.	NIFA	NIFA (AFRI-National Robotics Initiative)		Sensors
289	873	McCollum, Greg	USDA	Application of new technologies to expedite cleaning of new accessions for use in Florida	$ 180,000	9/1/2014	8/31/2016	2	1. Apply the technique of cryotherapy to clean accessions according to priorities set by stakeholders and citrus breeders in Florida. 2. Apply the Mini-plant biological indexing to test the accessions cleaned by cryotherapy. This is required for release of quarantine status. Using the Mini-plant biological Lee Page - 7 - indexing allows for biological indexing to be performed year round, not just in the colder months and the requirement for less space allows for indexing more accessions each time. By applying the techniques of cryotherapy and mini-plant biological indexing, we have a goal to achieve therapy and release of 45 accessions by the end of year 1, and 225 accessions by the end of year 2.	CRDF	CRDF		Plant Improvement
290		Chaparro, Jose	University of Florida	Breeding Seedless Easy Peel Mandarins	$ 32,237	6/30/2015	6/20/2016	1	Develop, test and prepare for release, easy peel seedless mandarins. Focus on the use of productive parental lines with heightened tolerance to HLB. This will be achieved by: Planting of segregating populations at the Teaching Orcchard in Gainesville, Fl and at the IRREC in Ft Pierce; seedling populations segregating for the seedless trait are evaluated in gainesville FL, Segregating populations evaluated for HLB and canker tolerance at IRREC; evaluation of irradiated ramets of advanced commercial quality selections (Fla. 12-01m and Fla. 13-01m). Fruit quality evaluation of clonal tests. There is no other funding for this work.	NVDMC	NVDMC		Plant Improvement
291	6100	Vidalakis, Georgios	University of California, Riverside	Citrus Clonal Protection Program (CCPP)-CORE Program	$ 3,934,664	10/1/2008	9/30/2016	8	To provide a safe mechanism for the introduction into California of citrus varieties from any citrus-growing area of the world for purposes of research, variety improvement, or direct use by the commercial industry and to maintain blocks of trees that seve as the primary source of pathogen-free, true to type budwood of all important fruit and rootstock varieties for California's citrus industry and citrus researchers.	CRB	CRB		Plant Improvement
292	5100-154	Vidalakis, Georgios	University of California, Riverside	Citrus dwarfing of commercial varieties using TsnRNAs	$ 6,535	10/1/2015	9/30/2016	1	Transmissible small nuclear ribonucleic acids' (TsnRNAs) or viroid RNA species cause dwarfing in spcific citrus varieties without inducing any noticealbe disease symptoms. This dwarfing technology can be used to increase planting density and consequently reducing costs associated with water, land space, labor, etc.	CRB	CRB		Plant Improvement
293		Gmitter, Fred PI, Grosser-Jude Co-PI	University of Florida	CITRUS SCION VARIETY DEVELOPMENT AT UF-CREC	$ 173,638	6/30/2015	6/20/2016	1	Citrus variety improvement is a continual process, one that builds successively on the work already undertaken, and the materials developed and refined; by its very nature, it requires many years for program building, and accumulated knowledge and experience to develop approaches to hasten the desired outcome: new varieties sought by consumers and profitable for growers and the downstream components of the industry. This project provides supplemental, or for some objectives the only, support for scion variety development. It supports the improvement of sweet orange juice products, through development & testing of improved sweet orange varieties to meet the needs of the NFC product lines. It supports the development & testing of new convenient mandarin type varieties. It supports the development & testing of new, better tasting, better looking grapefruit types with decreased potential for drug interactions. It supports the development of elite and novel breeding parents and the production of families of hybrids from which to select potential candidate new varieties. This project necessarily places an emphasis on disease resistance, especially HLB and canker. Specific tools and activities include: diploid and triploid breeding, somatic hybridization, somoclonal variation, advanced tissue culture techniques, rapid evaluation of candidates, fruit quality evaluation, development of botanical descriptions of advanced selections, development of superior parents and irradiation of seedy fresh selections with otherwise superior traits. Funding is supplemental to base funds, and seeks to support important, but otherwise unfunded development activities.	NVDMC	NVDMC		Plant Improvement
294	C14D11879(D02009)	Orbovic, Vladimir	University of Florida	CONSERVATION AND DIVERSIFICATION OF REGULATROY PATHWAYS CONTROLLING STEM CELL PROLIFERATION	$ 31,594	3/15/2014	2/29/2016	2		UF	YALE	NATIONAL SCIENCE FOUNDATION	Plant Improvement

	A	B	C	D	E	F	G	H	I	J	K	L	M
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295		Kuhn/David N; Ayala/Silva Tomas	USDA, ARS - Southeast Area, Subtropical Horticulture Research, Miami, Florida	Conservation, Genetic Analyses, And Utilization Of Subtropical/Tropical Fruit Crops, Sugarcane, And Miscanthus Genetic Resources					1. Efficiently and effectively maintain, back-up, regenerate, characterize, and evaluate tropical/subtropical fruit, sugarcane, Miscanthus, and Tripsacum genetic resources, and distribute samples and associated information worldwide. 1A Maintain, back-up, and regenerate tropical/subtropical fruit, sugarcane, Miscanthus, and Tripsacum genetic resources. 1B Characterize and evaluate tropical/subtropical fruit, sugarcane, Miscanthus, and Tripsacum genetic resources, and distribute samples and associated information worldwide. Standardize the format for evaluation data and improve access to this data by regular updating of GRIN/GRIN Global. 2. Aided by genetic marker information, strategically fill gaps in the current coverage of tropical/subtropical fruit, sugarcane and Miscanthus germplasm collections through domestic and international exchanges. 3. Identify new sets of single nucleotide polymorphism (SNP) markers for increasing the efficiency and effectiveness of mango and lychee genetic resource management and genetic improvement. 3A Identify SNPs from mango transcriptomes through next generation sequencing and apply to genetic resource management and genetic improvement. 3B Identify SNPs from lychee transcriptomes through next generation sequencing and apply to genetic resource management and genetic improvement. 4. Develop new genetic linkage maps for mango and avocado based on thousands of new SNP markers, and apply the new maps, markers, and phenotypic evaluations to identifying and mapping quantitative trait loci (QTLs) for anthracnose resistance in mango, as well as host-plant resistance to laurel wilt and root rot and tolerance to abiotic stresses for avocado. 4A Develop a genetic linkage map for avocado based on SNPs and apply it to identify QTLs for resistance/tolerance to laurel wilt, Phytophthora root rot (PRR), to abiotic stresses and for other horticultural traits. Improve the assembly of the avocado genome by applying knowledge from the genetic map. 4B Develop a genetic linkage map for mango based on SNPs and use to identify QTLs for anthracnose resistance and other horticultural traits.	USDA/ARS	USDA/ARS		Plant Improvement
296	15-045C	Zale, Janice	University of Florida	Continued Funding for the Mature Citrus Facility to Produce Disease Tolerant, Transgenic Citrus	$ 317,963	7/1/2015	6/30/2016	1	To continue developing protocols for mature trasnformation of citrus that can be used to incorporate genes of interest, when available, into Florida cultivars. We will generate at CREC the first mature sweet orange transformants carrying marker genes with the developmental protocols adjusted in the lab and in the growth room for Valencia and Hamlin.	CRDF	CRDF		Plant Improvement
297	15-010	Gmitter, Fred	University of Florida	Development and Commercialization of Improved New Disease Resistant Scions and Rootstocks - the Key For a Sustainable and Profitable Florida Citrus Industry	$ 1,797,148	11/1/2015	10/31/2018	3	The primary goal of this project is to build on the significant progress already made through conventional breeding towards the development of HLB tolerant/resistant commercial scion and rootstock cultivars. 1. Development of rootstocks that can impart HLB tolerance/resistance to grafted scions. 2. Breeding of HLB tolerant/resistant processing sweet orange-like hybrids. 3. Breeding of HLB tolerant/resistant fresh fruit cultivars, including mandarins, grapefruit, and acid citrus fruit. 4. Screening of the UF-CREC germplasm collection to identify and validate HLB tolerant or resistant selections. 5. Advanced field trials, release and commercialization of promising HLB tolerant/resistant scion and rootstock cultivars.	CRDF	CRDF		Plant Improvement
298	5200-144	Louzada, Eliezer	Texas A&M University	Development of consumer-friendly transgenic citrus plants with potential broad spectrum resistance to HLB, citrus canker and *Phytophthora*	$ 311,038	10/1/2013	9/30/2016	3	To develop transgenic citrus overexpressing CSM-1 and NPR-1 genes for resistance to Phytophthora root rot, citrus canker and potentially HLB using recombinase technology. Once a "superior' transgenic line is identified (meaning it did not disrupt any essential gene), it can be used for introduction of other genes in the same location. These will be marker-free, consumer-friendly transgenic plants.	CRB	CRB		Plant Improvement
299	11C00000051	Beeson, Richard C, Jr	University of Florida	DEVELOPMENT OF IRRIGATION SCHEDULES QAND CROP COEFFICIENTS FOR TREES FROM SEEDLINGS TO FIVE INCH CALLIPERS (B293)	$ 89,800	10/20/2010	1/31/2018	7		UF	WATER MGMT DISTRICTSSOUTHWEST FLORIDA		Plant Improvement
300	5300-165	Thomson, James	USDA-ARS	Development of mature budwood transformation technology	$ 155,236	10/1/2014	9/30/2016	2	To develop requisite molecualr tools for the efficient transformation of mature citrus cultivars with native citrus resistance genes. Recombinase technology will be used to stack up genes of interest into known productive scions.	CRB	CRB		Plant Improvement
301	15-002	Bowman, Kimberly	USDA	Development of Supersour and Other Promising Rootstocks for Florida.	$ 959,860	7/1/2015	6/30/2018	3	The goal of this project is to solve the problems of citrus production by developing new rootstock cultivars that induce higher productivity, excellent fruit quality, and better tolerance of environmental conditions, pests, and diseases, including HLB. Specific objectives of the project are: 1. Collect tree health, tree size, yield, and fruit quality data from existing rootstock trials. 2. Test and select the most promising new rootstocks from Supersour and other progeny groups based on laboratory studies, greenhouse testing, and short term field evaluations. 3. Propagate trees with promising new rootstocks and plant additional rootstock field trials, including trials with grower cooperators. 4. Release new rootstock cultivars for commercial use as appropriate, based on performance in field trials. 5. Present information about new and existing rootstocks to Florida growers at meetings and field days, and through grower-targeted and extension publications.	CRDF	CRDF		Plant Improvement
302	5200-201	Roose, Mikeal & Kahn, Tracy	University of California, Riverside	Integrated citrus breeding and evaluation for California	$ 2,831,194	10/1/2011	9/30/2016	5	To develop and evaluate new citrus scion and rootstock cultivars for targeted traits such as disease tolerance and/or resistance to HLB, seedlessness for mandarins and lemons, early and late maturation for mandarins and seedless grapeftuit, excellent flavor and distinguishable characteristics such as enhanced internal and external lycopene and anthocyanin expression.	CRB	CRB		Plant Improvement
303	58-6034-5-018	Gmitter, Frederick G, Jr	University of Florida	INVESTIGATION OF SUGARS, ACIDS, FLAVONOIDS AND LIMONOIDS IN CITRUS LINES WITH VARYING DEGREES OF TOLERANCE TO CITRUS	$ 60,500	4/1/2015	6/30/2017	2		UF	US DEPT OF AGAGRICULTURAL RESEARCH SERVICE		Plant Improvement

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304		Preece/John E; Krueger/Robert	USDA, ARS - Pacific West Area, National Clonal Germplasm Repository For Citrus, Riverside, CA	Management and Characterization of Citrus and Date Genetic Resources and Associated Information					Obj: The mission of the National Clonal Germplasm Repository for Citrus and Dates (NCGRCD), Riverside, CA is to access, maintain, preserve, evaluate, and distribute germplasm of Citrus and date palm (Phoenix dactylifera) and their wild relatives. In addition, research is conducted to enhance the viability and impact of the collections. A major focus of research is to reduce vulnerability of citrus and date palm genetic resources to natural disasters and virulent pathogens by devising cryopreservation methods for in vitro preservation and by developing more effective and efficient disease diagnostic procedures. This project's comprehensive and coordinated genetic resource management efforts will result in ready access to pathogen-tested/pathogen-free propagative and breeding materials for citrus and date palm breeders, research scientists, and producers. Associated information will be made available to customers through the Genetic Resources Information Network, stakeholder meetings, and publications. The specific objectives are: 1) Develop and apply new methods for conserving and propagating citrus and date genetic resources which improve genebank operating efficiency and effectiveness and which enable pathogen-tested materials and associated information to be distributed worldwide. 1A) Efficiently and effectively maintain the National Plant Germplasm System collections of citrus and date palm genetic resources and associated information. Distribute accessions upon request to researchers and breeders world-wide. 1B) Develop and apply cryopreservation, in cooperative research with the National Center for Genetic Resources Preservation, Ft. Collins, as an alternate and efficient means of conserving and distributing citrus, citrus wild relatives, and date palm. 1C) Develop, validate, and apply alternative means, such as cryotherapy, to free citrus germplasm from graft transmissible pathogens. 2) Elucidate patterns of genetic divergence and diversity in citrus, dates, and related taxa, and apply that knowledge to strategically expand the collections and other facets of genetic resource management. Evaluate citrus and date genetic resources for priority genetic and horticultural traits. 2A) Characterize the genetic variability in citrus and citrus wild relatives by DNA sequencing to better classify accessions taxonomically. 2B) Evaluate horticultural quality and other important traits for priority accessions of date palm, citrus and citrus relatives. Incorporate the evaluation and characterization data in GRIN-Global and/or other databases. 2C) Rescue unique and valuable citrus germplasm exposed to Huanglongbing (HLB) and citrus canker for cleanup from known pathogens and incorporation into the collection. Sub-objective 2D. Evaluate citrus and citrus relatives for tolerance or resistance to psyllids and/or HLB. 3) Develop more accurate and high through-put diagnostic methods for priority grafttransmissible pathogens of citrus and for insect-vectored pathogens of dates, to enable the exchange of pathogen-tested accessions, and to more efficiently evaluate accessions for host-plant resistance.	USDA/ARS	USDA/ARS		Plant Improvement
305	5200-148	Zale, Janice	University of Florida	Micropropagation of mature citrus in temporary immersion bioreactors	$ 60,243	10/1/2014	9/30/2016	2	To develop protocols for the micropropagation of mature citrus scion and rootstock by culturing nodal and internodal explants in temporary immersion bioreactors (RITA) in liquid media. It will also determine whether the maturity and genetic integrity of the plants are maintained.	CRB	CRB		Plant Improvement
306	AGR DTD 08-01-2014	Gmitter, Frederick G, Jr	University of Florida	NEW CITRUS VARIETY DEVELOPMENT AT THE UF-CREC	$ 347,276	8/1/2014	6/30/2016	2		UF	NEW VARIETIES DEVELOPM MGMT	FL DEPT OF AG AND CONSUMER SER	Plant Improvement
307	940C	Beeson, Richard C.	University of Florida	Propagation of Rootstock Tree Production in Greenhouses by Seed, Stem Cuttings and Tissue Culture to Accelerate Budded Tree Production for Outplanting	$ 333,774	10/1/2014	9/30/2017	3	The overall goal of this research program is to accelerate the production of quality budded trees for outplanting in groves. Specific goals for the project proposed here are to develop methods for the production of rootstocks in a 3-tiered approach that will encompass all citrus nursery producers and provide "stepping stones" to for all producers to take advantage of future research results. (1) Develop guidelines for seed propagation that prevents contamination of seedling rootstocks with minimum loss of seed vitality. (2) Develop protocols for rooting of current citrus rootstocks from stem cuttings and optimize cultural practices to produce faster growth of rootstocks for budding. (3) Develop protocols for rooting of new citrus rootstocks from stem cuttings as they become available and optimize cultural practices to produce quicker rootstock growth for budding. (4) Develop protocols for large scale hardening of tissue culture produced rootstocks and guidelines for maximizing post-harden growth for budding.	CRDF	CRDF		Plant Improvement
308	5200-146	Moore, Gloria	Univeristy of Florida	Rapid cycling plant breeding in citrus	$ 218,063	10/1/2014	9/30/2016	2	In order to expedite citrus variety breeding (or rapid-cycle-breeding) and produce improved varieties, transgenic citrus plants expressing early-flowering (FT) gene from citrus are created via Agrobacterium-meditaed transformation. There are at least three FT genes in citrus, that are expressed differentially in different tissues. The goal is to overexpress FT3.	CRB	CRB		Plant Improvement
309		Walters/Christina; Volk/Gayle M; Richards/Christop	USDA, ARS - Plains Area, Center For Agricultural Resources Research, Plant Germplasm Preservation Research, Fort Collins, Colorado	RNA Integrity As A Sensitive, Quantitative Assay Of Seed Quality Changes During Storage					Test whether a quality monitoring assay of RNA integrity on a small number of seeds provides quantitative information that reliably describes the deterioration status of stored germplasm.	USDA/ARS	USDA/ARS		Plant Improvement
310		Bretting/Peter K	USDA, ARS - Office of National Programs, Crop Production And Protection, Beltsville, Maryland	Staffing And Operation For National Clonal Repositories For Plant Germplasm					Objective: To staff and operate units of the National Clonal Plant Germplasm Repository System thus providing for safe storage of national plant germplasm resources	USDA/ARS	USDA/ARS		Plant Improvement
311	5200-149	Vidalakis, Georgios	University of California, Riverside	Streamlining the introduction of license citrus varieties into California: A case study-Florida	$ 80,000	10/1/2014	9/30/2016	2	To introduce protected, patented and licensed citrus varieites into California with important characteristics such as resistance or tolerance to diseases and pests and easy to peel, seedlessness, and flavorful fruit.	CRB	CRB		Plant Improvement

	A	B	C	D	E	F	G	H	I	J	K	L	M
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312	15-033C	Orbovic, Vladimir	University of Florida	Support role of the Citrus Core Transformation Facility remains crucial for research leading to production of Citrus plants that may be tolerant or resistant to diseases.	$ 270,000	7/1/2015	6/30/2018	3	The most important result of this project will be availability of an efficient service for production of transgenic plants according to a variety of ideas representing different approaches to fight citrus diseases. Considering the magnitude of crisis Citrus industry is in, CCTF as a place that routinely produces transgenic citrus plants will encourage researchers not to abandon any scientifically sound idea but to test them through production of transgenic plants. Practical applications of this project are: 1) Cost-effective completion of important phase of research contained in many projects. Human resources as well as equipment in different research groups can be used for other activities while CCTF produces transgenic material for them. 2) Timely realization of ideas into life through production of transgenic plants that can be challenged by pathogens/vectors to test their susceptibility to diseases within short period of time.	CRDF	CRDF		Plant Improvement
313	5200-141	Thomson, James	USDA-ARS	The development of novel Blood and Cara cara like citrus varieties	$ 276,388	10/1/2012	9/30/2016	4	To create molecular constructs (promoters and genes) necessary for expression of anthocyanin (blood orange) and lycopene (Cara cara) compounds in the fruit of any citrus cultivar. These contructs will be available to other citrus researchers and are designed to be complementary with the RMCE 'Founder lines' research project (5200-140A).	CRB	CRB		Plant Improvement
314		da Graca, John	TAMUK-Citrus Cen	The Texas Citrus Budwood Certification Program 2015-2016	$ 134,050	9/16/2015	8/31/2016	1	1.Continue to provide the citrus industry with high quality, pathogen free, true-to-type budwood and maintaining 6 month testing frequency of all trees to meet USDA and TDA requirements. 2. Meet the changing needs of the commercial industry as demand shifts to different varieties. 3. Prepare to meet the demands of citrus nurseries establishing individual Increase budwood collections. 4. Continue building the Texas citrus collection introducing new varieties from California and Florida. 5. Establish the Texas Germplasm Introduction Program, with shoot-tip grafting and indexing for providing new clean, pathogen free citrus varieties specific to the Texas industry. 6. Initiate project for removing old Increase trees from the screen structures; renovating the structures and populating with new scion trees from the Foundation collection.	TCPB	TCPB		Plant Improvement
315		Stover, Ed	USDA-ARS	USDA-ARS Citrus Breeding Trust	$ 79,719	6/30/2015	6/20/2016	1	Priority Objectives: • Establish and maintain priority seedlings on the juvenility trellis. Trees of each are also planted in the field to permit a first look at response to HLB, canker, alternaria, scab etc. Seek to accelrate movement through juvanility phase. • Germinate and grow seeds of 500+ mandarin hybrids, 500+ orange-like hybrids produced in 2015 crosses many of which will segregate for genetic seedless from using Kishu hybrids as pollen parents. Bud or graft trees into screenhouse/juvenility trellis as soon as possible. • Continue screening existing hybrids at both the Ft. Pierce and Leesburg Farms. There are thousands of hybrids planted over the last few years. Select buds of priority selections (irradiated and conventional hybrids) and pass throughDPI's shoot-tip grafting program and establish material in the parent-tree screenhouse at USDA Whitmore Farm as well as coordinating second tests in collaboration with NVDMC and Dr. McCollum. • In 2016, a major focus will continue to be evaluation of advanced hybrids in coordination with Greg McCollum. Hybridizations will focus on creating new hybrids which capitalize on advanced USHRL selections, especially with HLB-tolerance, as seed parents and Kishu-Hybrids as pollen parents. Mandarin, sweet orange-like and grapefruit-like progeny are targeted.	NVDMC	NVDMC		Plant Improvement
316	5200-142	Thomson, James	USDA-ARS	Utilization of founder lines for improved citrus biotechnology via RMCE	$ 331,114	10/1/2013	9/30/2016	3	To implement use of genetically engineered (GE) cirus founder lines containing a plantform that will allow the precise insertion of desired traits (disease resistance, higher yield, drought tolerance, etc.) , via site-specific recombination and removal of unneeded sequences such as antibiotic resistance marker genes (marker-free or 'clean' GE citrus plants).	CRB	CRB		Plant Improvement
317	2013-67021-21074	Burks, Thomas Francis	University of Florida	NRI: AN INTEGRATED MACHINE VISION-BASED CONTROL FOR CITRUS FRUIT HARVESTING USING ENHANCED 3D MAPPING....	$ 647,965	9/1/2013	8/31/2016	3		UF	US DEPT OF AGNATL INST FOOD & AGRICULTURE		Harvesting
318	5400-150	Xiao, Chang-Lin	USDA-ARS	Control of postharvest diseases of citrus	$ 138,687	10/1/2014	9/30/2016	2	To develop preharvest fungicide programs not only for decay control but also for management of fungicide resistance in postharvest pathogens. Major pathogens causing postharvest rots in mandarin fruit will be identified throguh a large scale survey.	CRB	CRB		Post Harvest
319	5400-103	Adaskaveg, James	University of California, Riverside	Evaluation of new postharvest treatments to reduce postharvest decays in packinghouse operations	$ 439,900	10/1/2008	9/30/2016	8	To evaluate new fungicides such as EXP-13 which is a broad spectrum biopesticide with low resistance potential to control postharvest decays of citrus.	CRB	CRB		Post Harvest
320		Cameron/Randall G; Manthey/John A; Luzio/Gary A	USDA, ARS - Southeast Area, U.S. Horticultural Research Laboratory, Citrus And Other Subtropical Products Research, Fort Pierce, Florida	Enhancing Utilization Of Citrus Processing Co-Products					1. Enable, from a technological standpoint, new commercial products from pectic hydrocolloids derived from citrus processing. 2. Characterize and quantify bioactive flavonoid compounds from byproducts of citrus processing, determine their in vivo pharmacokinetics and bioavailability; and enable a new commercial delivery of bioactive flavonoids in food and feed by encapsulation with pectic hydrocolloids. 2A. Characterize and quantify bioactive flavonoid compounds from byproducts of citrus processing, determine their in vivo pharmacokinetics and bioavailability. 2B. Enable a new commercial delivery of bioactive flavonoids in food and feed by encapsulation with pectic hydrocolloids. 3. Enable a novel immunologically-based assessment of structural quality and functional properties of citrus pectin in raw and processed foods and industrial products.	USDA/ARS	USDA/ARS		Processing

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321		Orts/William J; Lee/Charles C; Wong/Dominic; Wagschal/Kurt C; Offeman/Richard D; Holtman/Kevin M	USDA, ARS - Pacific West Area, Western Regional Research Center, Bioproducts Research, Albany, California	Technologies For Improving Industrial Biorefineries That Produce Marketable Biobased Products					This project provides technological solutions to the biofuels industry to help the U.S. meet its Congressionally mandated goal of doubling advanced biofuels production within the next decade. The overall goal is to develop optimal strategies for converting agricultural biomass to biofuels and to create value-added products (bioproducts) that improve the economics of biorefining processes. Specific emphasis is to develop strategies for biorefineries located in the Western United States by using regionally-specific feedstocks and crops, including sorghum, almond byproducts, citrus juicing wastes, pomace, municipal solid wastes (MSW), and food processing wastes. These feedstocks will be converted into biofuels, bioenergy and fine chemicals. Objective 1: Develop commercially-viable technologies for converting agriculturallyderived biomass, crop residues, biogas, and underutilized waste streams into marketable chemicals. Research on converting biogas will involve significant collaboration with one or more industrial partners. Sub-objective 1A: Provide data and process models for integrated biorefineries that utilize sorghum and available solid waste to produce ethanol, biogas and commercially-viable coproducts. Sub-objective 1B. Convert biogas from biorefining processes into polyhydroxyalkanoate plastics. Sub-objective 1C: Apply the latest tools in immobilized enzymes, nano-assemblies, to convert biomass to fermentable sugars, formaldehyde, and other fine chemicals. Objective 2: Develop commercially-viable fractionation, separation, de-construction, recovery and conversion technologies that enable the production of marketable products and co-products from the byproducts of large-scale food production and processing. Sub-objective 2A: Add value to almond byproducts. Sub-objective 2B: Apply bioenegineering of bacteria and yeast to produce diacids, ascorbic acid and other value-added products from pectin-rich citrus peel waste. Sub-objective 2C: Convert biomass into commercially-viable designer oligosaccharides using combinatorial enzyme technology.	USDA/ARS	USDA/ARS		Processing
322		Brandon/David L; Cheng/Luisa W; He/Xiaohua; Hernlem/Bradley Jay; Rasooly/Reuven; Stanker/Larry Hen	USDA, ARS - Pacific West Area, Western Regional Research Center, Foodborne Toxin Detection And Prevention Research, Albany, California	Advance The Development Of Technologies For Detecting And Determining The Stability And Bioavailability Of Toxins That Impact Food Safety And Food Defense					The overall objective of this project is to advance the development of technologies for detecting toxins that impact food safety and food defense and to determine their stability and bioavailability. Specifically, the project will focus on the following four objectives: Objective 1: Advance the development of structure- and activity-based detection methods for protein toxins. Subobjective 1A: Develop new antibodies (Abs) to botulinum neurotoxin (BoNT) serotype F, with serotypes C, D, and G as secondary priorities. Subobjective 1B: Determine the impact of different types of accessory proteins on the detection of BoNTs. Subobjective 1C: Develop activity-based detection methods for staphylococcal enterotoxin (SE) serotype E. Subobjective 1D: Develop monoclonal antibodies (mAbs) to Shiga toxin (Stx) subtypes and variants, including those from non-E. coli. Objective 2: Advance the development of detection methods for non-bacterial toxins. Subobjective 2A: Develop new detection methods for plant-derived protein toxins such as abrin. Subobjective 2B: Develop new detection methods for mushroom toxins such as amatoxins. Objective 3: Assess foodborne risks through examination of toxin stability and bioavailability in relation to intrinsic and extrinsic stresses. Subobjective 3A: Use activity-based assays to assess impact of food processing, matrices and accessory proteins on toxin activity. Subobjective 3B: Determine the factors that affect the bioavailability of toxins using rodent bioassay. Objective 4: Advance the development of instrumental, portable, and field-deployable testing methods. Subobjective 4A: Develop platforms such as optical array technologies to detect toxins. Subobjective 4B: Utilize instrumental methods to detect toxins based on mass spectra and/or other physicochemical characteristics.	USDA/ARS	USDA/ARS		Food Safety
323	58-6618-4-023	Ritenour, Mark A	University of Florida	CHARACTERIZATION AND MANIPULATION OF THE COLOR FRESH CITRUS FRUIT ESPECIALLY REGARDING TO IMPROVE FRUIT APPEARANCE.....	$ 83,160	6/1/2014	5/30/2016	2		UF	US DEPT OF AGAGRICULTURAL RESEARCH SERVICE		Fruit Quality
324	16-015C	Irey, Mike	US Sugar Corp/Southern Gardens	Enhanced Fruit Quality Assessment from Field Trials. RSA	$ -	3/1/2016	6/30/2017	1	As the data is collected, intend to conduct more than just a simple analysis of variance: 1) PCR for quality (2 sets of primers); 2) Limonin and nomilin by HPLC; 3) Electronic tongue with 7 sensors mapped to the following sensory descriptors: a. Salty; b. Sweet; c. Umami; d. Sour; e. Bitter; f. Metallic; g. Spiciness. All of the data above in addition to brix, acid, and ratio will be analyzed together using Principal Component Analysis, Cluster Analysis and possibly Discriminant Analysis. Depending on the trial, treatments, time of year, etc., every analysis will be a little different so more data is better.	CRDF	CRDF		Fruit Quality
325	5200-150	Guinard, Jean-Xavier	University of California, Davis	Optimizing sensory quality and consumer acceptance of citrus fruit through horticultural practices	$ 101,114	10/1/2015	9/30/2016	1	To investigate the preferences of California adult and child consumers for Navel oranges and mandarins using a combination of quantitative and qualitative sensory evaluation and consumer research approaches. The ultimate goal is to increase fruit sales and consumption.	CRB	CRB		Fruit Quality
326		Ritenour, Mark	University of Florida	Postharvest Evaluations of Promising New Fresh Citrus Fruit Selections: 2015-16 Season	$ 17,750	6/30/2015	6/20/2016	1	To determine the ability of fruit from promising new fresh citrus selections, developed by the UF/IFAS breeding program, to maintain excellent quality through simulated commercial harvest and postharvest degreening (when necessary), packinghouse, transportation, and marketing processes. A new device will be utilized that we developed to continue objectively evaluating the ease of peeling. There are currently no other sources of funding to support this work.	NVDMC	NVDMC		Fruit Quality

	A	B	C	D	E	F	G	H	I	J	K	L	M
1	**Project No#**	**Principal Investigator**	**Performing Institution**	**Project Title**	**Contract Total**	**Start Date**	**End Date**	**Total # of Years**	**Objectives**	**Information Provided By**	**Financial Sponsor or Project**	**Flow Through Sponsor**	**HLB Host/ Pathogen/ Vector -- Other**
327		Follett/Peter A; Wall/Marisa M	USDA, ARS - Pacific West Area, Daniel K. Inouye U.S. Pacific Basin Agricultural Research Center, Tropical Crop And Commodity Protection Research, Hilo, Hawaii	Pre-And Postharvest Treatment Of Tropical Commodities To Improve Quality And Increase Trade Through Quarantine Security					The long-term goals of our research program are to develop and protect U.S. export markets for fresh tropical commodities. An emphasis is placed on expanding and diversifying agriculture and agricultural exports in Hawaii and other states by providing environmentally sound, economically viable systems, treatments, or processes that control quarantine pests, ensure product quality, and increase product value while safeguarding the agriculture of other states. Our research will address four broad objectives over the next 5 years: Objective 1: Develop new or improved postharvest treatments or technologies for fresh tropical commodities to ensure security against quarantine pests, including new irradiation treatments for western flower thrips, and various ants on fresh fruits. Sub-objective 1A. Develop quarantine irradiation treatments for western flower thrips, coffee berry borer, rough sweetpotato weevil, and red imported fire ant. Sub-objective 1B. Develop a quarantine cold treatment for melon fly in citrus. Sub-objective 1C. Determine the effectiveness of hypobaric treatments against surface pests. Objective 2: Develop new or improved postharvest treatments or systems (such as hypobaric storage and modified atmospheres) to improve quality and extend shelf life of tropical horticultural crops subjected to quarantine treatment. Sub-objective 2A. Determine hypobaric storage conditions that retain quality and extend storage life of fresh tropical fruit. Sub-objective 2B. Develop combination treatments of modified atmosphere packaging and irradiation to retain quality of exported fresh papaya. Objective 3: Develop or improve preharvest methods for surveillance, detection, and control of invasive tropical plant pests of quarantine significance, such as coffee berry borer. Sub-objective 3A. Study the ecology of Cathartus quadricollis and other predatory flat bark beetles and explore ways to increase their role in suppressing coffee berry borer populations in coffee. Objective 4: Develop multiple-component systems approaches to decrease the severity of or need for commodity treatments. Sub-objective 4A. Quantify systems approaches for quarantine security of melon fly.	USDA/ARS	USDA/ARS		Fruit Quality
328		Plotto/Anne; Bai/Jinhe; Baldwin/Elizabeth; Manthey/John A; Cameron/Randall G; Luzio/Gary A	USDA, ARS - Southeast Area, U.S. Horticultural Research Laboratorycitrus And Other Subtropical Products Research, Fort Pierce, FL	Quality, Shelf-life and Health Benefits for Fresh, Fresh-cut and Processed Products for Citrus and Other Tropical/Subtropical-grown Fruits and Vegetables					Objective 1: Establish bioactive and sensory characteristics of new marketable genotypes (citrus, tomato, strawberry) and new Florida crops (avocado, blueberry, peach). Objective 2: Enable real-time, commercial pre- and postharvest treatments to optimize shelf life of new genotypes and new Florida crops using packaging, coatings, and maturity markers. Objective 3: Identify new sensory targets, enable new sensors, processing methods and management strategies to predict and mitigate HLB disease effects on citrus juice nutritional and flavor quality. Sub-Objective 3a: Identify chemical and biological markers that characterize the effect of HLB on fruit/juice quality. Sub-Objective 3b: Develop methods to mitigate the effect of HLB on citrus juice quality. Sub-Objective 3c: Develop methods to mitigate the effect of HLB on citrus fruit quality.	USDA/ARS	USDA/ARS		Fruit Quality
329	14-12	Arola, Lluis	CENTRE TECNOLOGIC DE NUTRICIO I SALUT (Technology Center for Nutrition and Health), Reus, Spain	Benefical impact of orange juice consumption on risk factors associated with cardiovascular diseases: Randomized, parallel, double-blind, placebo controlled Study evaluating both the acute and chronic roles of hesperidin consumption in 100% orange juice	$ 536,819	4/1/2015	4/15/2018	3	The aim of the study is to compare the effect of different doses of hesperidin in 100% orange juice when regularly or postprandially consumed on cardiovascular risk markers; In addition the plausible role and mechanism of the hesperidin will be investigated.	FDOC	FDOC		Medical
330		Hotchkiss/Arland T; Qi/Phoebe X; Renye Jr/John A	USDA, ARS - Northeast Area, Eastern Regional Research Center, Dairy And Functional Foods Research, Wyndmoor, Pennsylvania	Bioactive Food Ingredients For Safe And Health-Promoting Functional Foods					1: Develop strains of dairy lactic acid bacteria (LAB) that excrete bioactive peptides and proteins which inhibit the growth of food-borne pathogens (Listeria), and/or the bacteria associated with non-food related diseases of the oral-pharyngeal cavity (streptococci), skin (propionibacteria) and gastrointestinal tract (clostridia). 1a. Characterize the broad spectrum antimicrobial activity of bacteriocins produced by dairy lactic acid bacteria, and investigate methods for optimizing their production for use in food and non-food applications. 1b. Investigate the molecular structures of bacteriocins produced by dairy lactic acid bacteria and elucidate mode of action pertaining to their antimicrobial activities. 2: Identify prebiotic and probiotic combinations which influence human health through interaction with bacteria from the gut microbiota and/or intestinal epithelial cells. 3: Identify dietary fiber and prebiotics from pectins and hemicelluloses in sugar beet, citrus, cranberry and energy crop biomass with additional bioactivity including anti-adhesion of pathogenic bacteria to epithelial cells and immunomodulation (antiinflammation, cytokine expression).	USDA/ARS	USDA/ARS		Medical
331	15-05	Kauwell, Gail P	University of Florida	OPTIMIZING HEALTH WITH CITRUS NUTRIENTS THROUGHOUT THE LIFE SPAN COLLABORATIVE	$ 271,500	7/1/2015	6/30/2017	2		UF	FL DEPT OF CITRUS		Medical
332	15-10	Dye, Louise	University of Leeds, UK	A study of acute and chronic effects of 100% Florida Orange Juice consumption on the cognitive performance and gut microbiota in 7-9 year old UK school children	$ 368,838	10/1/2015	3/31/2017	2	The overall aim of this study is to examine the effects of acute (1-day) and chronic (10-weeks of daily consumption) effects of 100% Florida Orange Juice comapred with a placebo on the cognitive performance and gut microbiota in 7-9 year old UK school children	FDOC	FDOC		Nutritional
333	5400-149 & 5050-010	Walse, Spenser	USDA-ARS	Breaking critical pest-related trade barriers for California citrus exports	$ 386,639	10/1/2014	9/30/2016	2	To develop postharvest treatments to facilitate the movement of Cailfornia citrus through trade and marketing channels. The current trade barriers include Fuller Rose Beetle and California red scale to Korea, Phytophthora to China and bean thrips & Asian citrus psyllid to Australia/New Zealand.	CRB	CRB & FEDERAL-TASC GRANT		Trade
334	5050-010b	Godfrey, Kris	University of California, Davis	Breaking Critical Trade Barriers for California Citrus Exports	$ 108,217	10/1/2014	9/30/2015	1	To conduct research proving that key pests can be controlled or eliminated from the respective trade and marketing channels of fresh California citrus exports.	CRB	FEDERAL-TASC GRANT		Trade
335	5050-010c	Grafton-Cardwell, Beth	University of California, Riverside	Breaking Critical Trade Barriers for California Citrus Exports	$ 179,755	10/1/2014	9/30/2016	2	To conduct research proving that key pests can be controlled or eliminated from the respective trade and marketing channels of fresh California citrus exports.	CRB	FEDERAL-TASC GRANT		Trade
336	5050-010d	Morse, Joseph	University of California, Riverside	Breaking Critical Trade Barriers for California Citrus Exports	$ 97,012	10/1/2014	9/30/2016	2	To conduct research proving that key pests can be controlled or eliminated from the respective trade and marketing channels of fresh California citrus exports.	CRB	FEDERAL-TASC GRANT		Trade

	A	B	C	D	E	F	G	H	I	J	K	L	M
1	**Project No#**	**Principal Investigator**	**Performing Institution**	**Project Title**	**Contract Total**	**Start Date**	**End Date**	**Total # of Years**	**Objectives**	**Information Provided By**	**Financial Sponsor or Project**	**Flow Through Sponsor**	**HLB Host/ Pathogen/ Vector -- Other**
337	5050-010e	Adaskaveg, James	University of California, Riverside	Breaking critical trade barriers for California citrus exports	$ 297,122	10/1/2014	9/30/2016	2	To conduct research proving that key pests can be controlled or eliminated from the respective trade and marketing channels of fresh California citrus exports.	CRB	FEDERAL-TASC GRANT		Trade
338	14-09	House, Lisa Ann Offenbach	University of Florida	CITRUS MARKET RESEARCH 3	$ 645,325	12/1/2014	6/30/2017	3		UF	FL DEPT OF CITRUS		Trade
339	PO NO 216204119	Gran, Stephen M	University of Florida	CITRUS EXTENSION AGENT SERVICE AGREEMENT	$ 12,228	10/1/2015	9/30/2016	1		UF	HILLSBOROUGH CNTY		Education
340	15-8448-1794	King, Raina	Texas Citrus Pest and Disease Management Corporation	HLB Prevention and Reposnse Program	$ 181,274	5/15/2015	5/14/2016	1	1. Encourage growers to step up their own psyllid monitoring, HLB survey and treatment activities. 2. Develop a comprehensive systematic treatment regiment and provide intensive education on these treatment guidelines. 3. Educate residents, especially "winter Texans" on what they can do to help prevent ACP spread.	TCPDMC	USDA- CHRP		Education
341	22635	Morgan, Kelly T	University of Florida	OUTREACH AND EDUCATION IN SUPPORT OF AGRICULTURAL BEST MANAGEMENT PRACTICES IMPLEMENTATION	$ 154,000	9/18/2015	6/30/2016	1		UF	FL DEPT OF AG AND CONSUMER SER		Education
342	SC-1617	King, Raina	Texas Citrus Pest and Disease Management Corporation	Protection of the citrus industry through increased area-wide participation: Grower Advisement in psyllid control	$ 200,000	12/15/2015	3/31/2017	1	Reduce ACP infestation levels in the Texas citrus production area by expanding the area wide ACP control program to include additional monitored groves and treatment of residential and abandoned groves in HBL infected areas.	TCPDMC	Texas Department of Agriculture		Education
343	5300-156	Stansly, Phil	University of Florida-IFAS	The citrus greening bibligraphical database	$ 35,636	10/1/2014	9/30/2016	2	To organize and centralize in a signle location all information relavant to HLB or citrus greening, the caual agents "*Candidatus* Liberibacter" species and the vectors, *Diaphorina citri* and *Trioza erytreae* .	CRB	CRB		Education
344	5050-041	Willey, Dan	Fruit Mentor	Using the internet to train citrus hobbyists to order budwood from CCPP and not to spread HLB	$ 20,000	10/1/2015	9/30/2016	1	Using internet to raise awareness among citrus hobbyists about the threat of HLB to citrus industry in California and how to avoud spreading the disease by ordering pathogen-free budwoods from Citrus Clonal Protection Program at UC Riverside.	CRB	CPDPP		Education

US National Citrus Research Inventory

Code	Sponsors / Institutions
APHIS	**USDA/Animal and Plant Health Inspection Service and Farm Bill 10007**
CHRP	**USDA/APHIS- Citrus Health Response Program**
CPDPP	**Citrus Pest and Disease Prevention Program, California**
CRB	**Citrus Research Board, California**
CRDF	**Citrus Research and Development Foundation, Inc., Florida**
Farm Bill	**USDA/APHIS- Farm Bill**
FDOC	**Florida Department of Citrus**
Fed TASC	**USDA, Technical Assistance for Specialty Crops Program**
MAC	**USDA/APHIS- HLB Multi Agency Coordination Group**
NIFA	**USDA/ National Institute of Food and Agriculture**
NVDMC	**New Varieties Development & Management Corp., Florida**
TAMU	**Texas Agri Life Science**
TCPB	**Texas Citrus Producers Board**
TCPDMC	**Texas Citrus Pest and Disease Management Corporation**
UF	**Univeristy of Florida**
USDA/ARS	**United States Department of Agriculture/Agricultural Research Services**