HOW THE FLORIDA CITRUS PRODUCTION RESEARCH ADVISORY COUNCIL WORKS WITH OTHER INDUSTRY ORGANIZATIONS FOR SOLUTIONS TO THE GREENING CRISIS

Steven Rogers, PhD*
Scientific Coordinator
Florida Citrus Production Research Advisory Council
University of Florida – CREC
700 Experiment Station Road
Lake Alfred, FL 33850
Corresponding author

Abstract

The Florida Citrus Production Research Advisory Council (FCPRAC) *operates under the Florida Citrus Production Research Marketing Order which was approved in referendums in 1991, 1997, and 2004. This order allows growers to tax themselves up to 1 cent per box of fruit and direct those funds to help solve citrus production problems. Funds are awarded as competitive grants selected from proposals submitted each year to the 14 grower representatives of the FCPRAC. This year, the Florida Legislature and the Department of Citrus contributed to increase funds to $7.2 million, resulting in over 100 research projects being funded. The primary focus of recent research is greening (sometimes called HLB). With the urgency in controlling this disease, FCPRAC is reorganizing to make it easier to cooperate with outside entities for managing and funding projects. One new cooperator is the National Academy of Sciences, who will help ensure scientific quality in funded research. This paper discusses recent developments in FCPRAC activities and how scientists and other stakeholders can participate in its programs. A new real-time web reporting system is also presented that allows scientists to provide on-going information about their research programs.*

The author gratefully acknowledges the contributions of the following persons in assembling this paper: FCPRAC Council Chairman Peter McClure, Bob Norberg of the Florida Department of Citrus, John Jackson, Dr. Tom Turpen, and the 14 grower members of the FCPRAC. The administrative assistance of Barbara Thompson at the University of Florida Citrus Research and Education is greatly appreciated.

The Florida Citrus Production Research Advisory Council

The Florida Citrus Production Research Advisory Council (FCPRAC) operates under the Florida Citrus Production Research Marketing Order. This order was approved in referendums in 1991, 1997, and 2004. The order enacted regulations allowing growers to tax themselves up to 1 cent per box of fruitproduced and direct those funds to help researchers solve industry production problems. Funds are awarded as competitive grants selected from proposals submitted by the research community to the FCPRAC each year. The FCPRAC consists of 14 grower representatives who work under guidelines established by the marketing order. Representatives are selected from the state's major citrus growing areas and serve 4-year terms. Council member terms can be renewed. Funding for the FCPRAC originates with growers and the Council members determine the tax rate annually. Funds obtained from the tax, which is collected by the Florida Department of Agriculture and Consumer Services, historically raised around $1.5 million annually for research projects. This past year, however, the Florida Legislature and the Florida Department of Citrus contributed an additional several million dollars each to FCPRAC research programs making it possible to pursue new avenues of research into diseases attacking citrus trees in Florida.

Serious citrus diseases are becoming more prevalent across Florida. Citrus greening is considered one of the most severe citrus diseases (Gottwald et al., 2007). This disease (sometimes called huanglongbing or HLB) causes a catastrophic and rapid decline of citrus trees that is essentially impossible to contain once it is established in a planting. HLB is caused by the phloem-limited bacterium, Candidatus Liberibacter asiaticus. Citrus canker (Xanthomonas axonopodis pv. citri) attacks fruits, leaves, and stems (Gottwald et al., 2002). Unsightly lesions caused by citrus canker result in fruit not saleable in fresh markets. Tree health and crop quality are dramatically reduced in severe infections of citrus canker. Other serious diseases, such as CVC (citrus variegated chlorosis) (Beretta et al., 1997), are expected sooner or later in Florida as well. CVC is a bacterial disease caused by Xylella fastidiosa. To address these issues, FCPRAC recently approved $7.2 million in funding for HLB and canker research in entomology, genetics, pathology, and diagnostics. The hope is to find both short- and long-term management practices that will help contain the diseases so citrus can continue to be important and profitable in Florida. This paper discusses recent developments in FCPRAC operations and how scientists and other stakeholders can participate in its funding programs. One new cooperator is the National Academy of Sciences, who will help ensure scientific quality in funded research. This paper serves as a general, non-technical introduction to the FCPRAC and how it is working with other organizations to find solutions to important problems affecting the Florida citrus industry. A new real-time web reporting system is also presented that allows scientists to provide on-going information about their research programs.

FCPRAC Web Site

FCPRAC activities are easily followed through its web page at fcprac.com *(Fig. 1)*. News, meetings, activities, and projects are published online there. In the Information Forum, people sign up to receive automatic email notices when new alerts are issued. One purpose of the web site (and the Information Forum in particular) is so the organization can have a "back-and-forth digital dialogue" with people interested in its programs. The idea is to get stakeholders engaged in an ongoing discussion of how industry research programs benefit their activities in the field. This makes it much easier for scientists and researchers from around the world to understand issues affecting the industry, become aware of funding opportunities, and contribute in a meaningful way to finding solutions to the industry's disease problems. The web site is updated about once a week and contains information on current tax rates, council member contact information, and currently funded project lists. The web site also has a Help Desk so growers can contact the organization if they need to see something that is not included on the site.

(Fig. 1) FCPRAC Website Home Page – http://www.fcprac.com/home.html

The web site is divided into several sections, including the aforementioned Information Forum, a Proposals Page and Report Page, and Help.

A Timeline link contains information about current and upcoming meetings and events. The Proposals and Reports pages guide researchers on obtaining funding for their programs and how to submit progress reports. The Help Desk, available through the Information Forum, is for growers and other stakeholders to contact the Scientific Coordinator for personal assistance or to request information for placement on the web site.

One of the most important sections of our web site for keeping up to date is the Information Forum. This Forum is where users register to receive automated alerts about organization activities. Recent news and announcements about our meetings, projects, and activities are presented in an online "forum" format, meaning that interested persons can participate in discussions by responding to posts that are important to them. For example, under Funded Project Lists, users will find listings of the projects funded during the 2007–2008 season. Total dollars awarded this year is about $7.2 million. As you can see, FCPRAC is making a substantial investment in coordinating a wide-ranging program to identify key issues early and find solutions fast using a variety of research activities.

Current Research Activities

The FCPRAC and its cooperating organizations are involved in a range of research activities to assist citrus growers in solving important industry problems. Currently, projects are funded in disease detection, insect management, laboratory culture of plant pathogens, field cultural practices, recombinant DNA, and more. Each of these research areas provides a unique part of the puzzle that will hopefully lead to a comprehensive approach to managing these problems. Detailed information about the projects described below can be found at fcprac.com.

Disease detection. Rapidly and confidently determining if a citrus tree is infected with disease is essential if the disease is to be effectively managed. Early detection helps reduce rapid spread of organisms that cause disease by allowing growers to target management activities. FCPRAC currently funds several research projects in disease detection, including a sophisticated but easy to use visual "wet-chemistry" test to identify potential disease. In this test, leaves are crushed in a special solution and examined under magnification for a positive reaction. Researchers are also looking into spectral devices to detect greening by subtle changes in tissue color. There is also a project to develop a "sniffer" to detect minute amounts of unique odors from infected trees. Tests involving DNA and other genetic markers are currently in commercial use, but improvements in these methods are always being considered.

Insect management. Some insects that attack citrus trees also transmit diseases. For example, a small insect called a "psyllid" carries the bacteria that cause HLB from tree to tree (Halbert and Manjunath, 2004). Although small, this insect is relatively easy to see, meaning that psyllid control measures are fairly easy to evaluate. FCPRAC has several projects evaluating

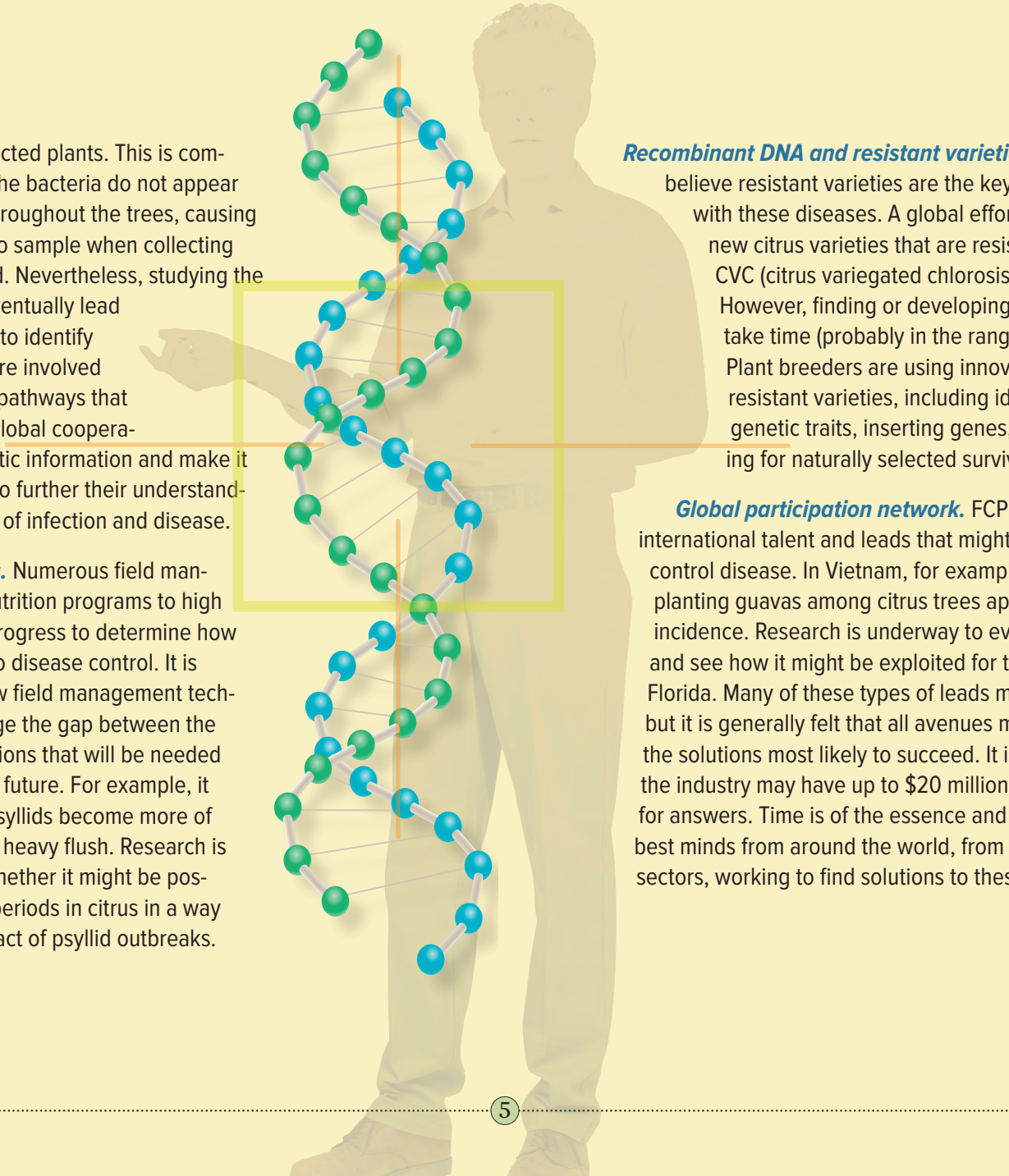
management strategies for this species. The most promising control techniques will ultimately be a combination of biological and chemical measures.

Isolating and culturing pathogens. Knowing the genetic code of citrus trees and the pathogens causing disease can unlock secrets to how and why infections occur. One key step to finding genetic markers of disease is to obtain the causal species in pure culture. This is not always easy, however. For example, it is relatively easy to culture the bacteria that cause citrus canker because the genus is well-studied. In contrast, the bacteria that cause HLB are confined to phloem tissue, making it difficult to find

Current Research Activities *(continued)*

and isolate them from infected plants. This is compounded by the fact that the bacteria do not appear to be evenly distributed throughout the trees, causing uncertainty about where to sample when collecting diseased tissue in the field. Nevertheless, studying the genetics of disease will eventually lead to researchers being able to identify specifically which genes are involved in regulating biochemical pathways that lead to disease. There is global cooperation to elucidate this genetic information and make it available for researchers to further their understanding of the basic pathology of infection and disease.

Field cultural practices. Numerous field management projects, from nutrition programs to high density plantings, are in progress to determine how they can best contribute to disease control. It is generally thought that new field management techniques like these will bridge the gap between the short- and long-term solutions that will be needed to remain profitable in the future. For example, it is recognized that citrus psyllids become more of an issue during periods of heavy flush. Research is underway to determine whether it might be possible to manage flushing periods in citrus in a way that helps reduce the impact of psyllid outbreaks.



Recombinant DNA and resistant varieties. Many growers believe resistant varieties are the key to long-term survival with these diseases. A global effort is under way to find new citrus varieties that are resistant to canker, HLB, CVC (citrus variegated chlorosis), and other diseases. However, finding or developing resistant varieties will take time (probably in the range of 10 to 20 years). Plant breeders are using innovative tools to develop resistant varieties, including identifying important genetic traits, inserting genes, and simply searching for naturally selected survivors in the field.

Global participation network. FCPRAC is tracking down international talent and leads that might lead to new ways to control disease. In Vietnam, for example, growers found that planting guavas among citrus trees appears to reduce disease incidence. Research is underway to evaluate this phenomenon and see how it might be exploited for the control of HLB in Florida. Many of these types of leads may not be productive, but it is generally felt that all avenues must be explored to find the solutions most likely to succeed. It is possible that next year the industry may have up to $20 million to expand its search for answers. Time is of the essence and the industry needs the best minds from around the world, from the public- and private sectors, working to find solutions to these disease problems.

Participating in Council Activities

There are three general ways to participate in FCPRAC programs: as a researcher, grower, or member of the general public. Researchers are guided on how to apply for funds and submit reports through the organization's home page at fcprac.com. Growers are provided information about current projects and how to obtain researcher reports through the real-time reports page at the same web site. Members of the general public can obtain information about FCPRAC activities and funding through flyers and brochures available directly from the organization's home page.

Council selection. Members of the FCPRAC Council are growers appointed by the Commissioner of Agriculture. The members represent the major citrus-growing areas in the state and serve 4-year terms. Nominees are forwarded to the Commissioner by industry grower organizations. The Florida Citrus Production Managers Association is the grower organization that founded FCPRAC and it takes the lead role in requesting regional grower organizations to submit nominees to the Commissioner. The best way to become a FCPRAC member is to be active in FCPMA and also your regional grower association.

Attending council meetings. The FCPRAC is a public organization operating in the "sunshine" in Florida. As such, FCPRAC meetings are open public meetings and may be attended by anyone. The meetings are required to be announced in the Florida Administrative Weekly (https://www.flrules.org/).

The Council also announces meeting dates, times, and places on its web site and communicates this information to grower organizations for distribution to their members. Recently, most meetings have been held at the Agri-Civic Center in Sebring, Fla. because of its central location. However, the sessions can be held anywhere appropriate for the particular meeting's purpose. Members of the public wishing to attend any of the Council meetings need only show up at the designated time and place. The public is offered an opportunity to make a statement at the session if they so desire.

Funding FCPRAC projects. The FCPRAC is funded through grower dollars. As discussed earlier, these funds are collected from a tax on each box of citrus sold by growers. This tax in 2007-2008 is 1 cent per box. Other organizations can contribute to the funding reservoir based on industry needs. These organizations may also contribute to how funds are allocated. Briefly, ideas and suggestions for research are provided by industry stakeholders and these ideas are conveyed to the Florida Citrus Industry Research Coordinating Council (FCIRCC). The FCIRCC works with the industry and the FCPRAC to prioritize these ideas into important research directions. The FCPRAC then invokes a general four-step approach to evaluate and arrive at recommendations for which projects receive funds.

Four-step funding process. There is a general four-step funding process that may be modified based on the participation of other organizations, such

Participating in Council Activities *(continued)*

as the Florida Department of Citrus and the National Academy of Sciences. First, the Council issues a "Request for Proposals" that is distributed to researchers around the world through various outlets and organizations. Second, the proposals undergo scientific review by a panel that provides rankings on relative merit. Historically, an in-state panel of scientists with expertise in citrus and related technologies performed this activity. Beginning in 2008, however, the scientific review will be administrated by panels convened by the National Academy of Sciences in Washington. The National Academy of Sciences was contracted by the Florida Department of Citrus for this purpose. Third, the FCPRAC meets to discuss the proposals and arrive at recommendations for funding. Finally, these recommendations are forwarded to the Florida Department of Agriculture and Consumer Services, which then issues contracts for the projects to the entity that originally submitted the proposal. Depending on the circumstances, there may be different steps involved in arriving at the final contracts (e.g., negotiating intellectual property rights), but the four-step approach generally applies to projects that go through the FCPRAC for funding.

Recipients of FCPRAC funds. Most approved funds are provided to public-sector research institutions such as the University of Florida and the United States Department of Agriculture. A smaller portion of funds are provided to private-sector businesses if they demonstrate a clear plan of study that can benefit the Florida citrus industry. Other organizations that obtain FCPRAC funds include the Division of Plant Industry within the Florida Department of Agriculture and Consumer Services and the California Research Board. It is anticipated that the funding base will expand to more global organizations as the need for innovative solutions to complex disease issues increases.

Web reporting system. Progress reports on FCPRAC-funded research going back to 1998 are archived on the FCPRAC web site at fcprac.com. Future reports will be presented using a real-time web reporting system. This web system, developed by the University of California at Davis, will provide an account management interface that allows researchers to upload progress reports and have them appear in a web-based directory. Persons interested in obtaining information about ongoing and historical projects will be able to browse the report database and find information regarding project timelines, funding amounts, due dates, related publications, and commercial applications resulting from the research.

Citrus Industry Strategic Research Plan

Historically, funding for FCPRAC projects fell in the general range of about $1.5 million per year. It is clear that level of funding is not sufficient to maintain the research needed to find rapid solutions to critical disease problems such as canker, HLB, and CVC. To address this concern, a number of organizations are working together to arrive at a Strategic Research Management Plan (Table 2). Canker and HLB are the urgent concerns, but it is recognized that other problems (e.g., CVC) should be factored as well. An important feature of this research management plan is that accountability and responsibility for results be built into the system. Accountability helps ensure that spending is as efficient and effective as possible. Accordingly, research projects and results will be actively communicated to stakeholders.

There are three basic steps involved in getting the Strategic Research Management Plan underway: 1) engage scientific advisors, 2) hire technology transfer agents, and 3) establish information transparency. Independent and objective scientific advisors will be engaged to review the proposals that are submitted to the FCPRAC. (This is part of the NAS scientific review mentioned previously.) These scientific advisors will be unbiased and presumably without vested interests in the industry. This will allow them to identify and recommend the most promising projects that use the best science. Technology transfer agents will develop plans to manage intellectual property and move scientific discovery from the laboratory to the field as efficiently as possible. Information transparency will provide the infrastructure for communication, discovery, and accountability. The web reporting system being licensed from the University of California at Davis will help establish and maintain that information transparency. This reporting system is being customized with an identity appropriate for the FCPRAC and it is being populated with information from current FCPRAC-funded scientific projects. Once fully online, researchers themselves will maintain the database using sign-in accounts that allow them to update their research information accordingly.

A timeline was developed to help get the Strategic Research Plan underway and get funding to researchers as quickly as possible. vBriefly, new contracts are expected by about Oct. or Nov. 2008, but the specifics of this timeline might vary as the program matures. Updated timeline information is always available at fcprac.com. Reoccurring IFAS and ARS resources and directed appropriations bring matching resources and expertise to these research projects. These matching resources will be factored into the program as research priorities and gaps are evaluated. This will help ensure most effective use of the funds while avoiding unnecessary duplication in research activities. Funds other than those originating from FCPRAC and FDOC might become available and could go directly to research institutions. An example of this might be if a private organization wanted to make a contribution to a research program underway in a particular laboratory.

Conclusion

There are many factors influencing the success of research programs. It is likely that many projects now underway will not lead to immediately practical and useful information. Alternatively, it could be a single breakthrough experiment that unlocks the door to rapidly finding solutions to a particular problem such as HLB. It might require several interrelated projects to provide the key to controlling certain diseases. Complicating these issues is the possibility that some control strategies might work in some parts of the state and not others. For example, proximity to schools and houses could preclude the use of certain tactics for pest control (e.g., aldicarb for psyllid control). Clearly, cooperation and communication to an extent that has never before happened in the Florida citrus industry will be required if rapid solutions are to be found.

The progress of industry research will be communicated to growers and other stakeholders in a number of ways. Classical methods, such as working with grower organizations to distribute information about recent research findings, will be a priority. Extension services also serve a valuable role in educating growers about new management techniques that emerge from research programs. The FCPRAC itself will enact an aggressive communication program to inform stakeholders about research meetings and progress. The primary way this is done is through the Information Forum and the web reporting system. Researchers from other disciplines and countries will be made aware of citrus industry issues through their association with the National Academy of Sciences. Industry and global outreach programs will serve an important role is sourcing talent and getting results applied in the field.

The Florida citrus industry faces challenges in the future unlike any it has seen before. The ability of the FCPRAC to help the industry depends on the dedication of the growers and researchers involved in the front lines of handling these problems. Success will also depend on funds that are available to address these concerns. It is not known what level of funding will have to be sustained to find solutions within the time frame growers feel is needed, but the industry is probably looking to at least $7 to $10 million per year for the next several years. That estimate may even be low, because projects like genomics, transgenics, bacterial culturing, and early detection can easily require an additional $3 million or more per year. Clearly, it will require many people and numerous organizations working together to achieve the ambitious goals of getting serious diseases such as canker and HLB under control. The FCPRAC and its partner organizations are well-positioned to help the industry succeed in these efforts.

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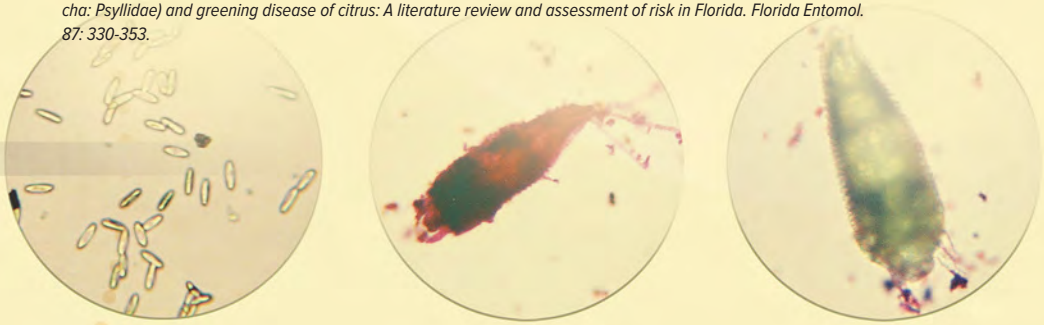

Table 1.

Projects approved by the FCPRAC for funding during 2007-2008.

IFAS: *Institute of Food and Agricultural Sciences*
USDA: *United States Department of Agriculture*
CCRB: *California Citrus Research Board*
TIG: *Technology Innovation Group*

IFAS	Entity	Project	Approved
Brlansky	**IFAS**	Effects of Insecticides on Pathogen Transmission by the Asian Citrus Psyllid	$55,000.00
Hoy	**IFAS**	Improved Control of Psyllid, with Silwet L-77 and Reduced Rates of Insecticides	$52,000.00
Keyhani	**IFAS**	Development of a Citrus Psyllid Tissue Culture Cell Line	$62,860.00
Rogers	**IFAS**	Citrus Psyllid Population Dynamics	$60,000.00
Rogers Brlansky	**IFAS**	Investigation of Psyllid Transmission of the Citrus Greening Pathogen and Methods for Preventing Disease Transmission	$95,000.00
Rogers	**IFAS**	Development of Psyllid Baseline Toxicology Information	$65,000.00

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Table 1. *(Continued)*

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IFAS: *Institute of Food and Agricultural Sciences*
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IFAS	Entity	Project	Approved
Stelinski	**IFAS**	Development of Attractants for Asian Citrus Psyllid	$95,000.00
Stelinski	**IFAS**	Determine the Movement Patterns of Asian Citrus Psyllid Within and Between Groves	$75,000.00
Ritenour	**IFAS**	Grove Practices That Increase Fresh Fruit Quality and Reduce the Development of Peel Disorders	$58,918.00
Ehsani	**IFAS**	Early Detection and Mapping of (HLB) Using Ground-Based and/or Aerial Hyperspectral or Other Imaging	$100,000.00
Obreza	**IFAS**	Improving Micro-Element Management for Easier Detection of HLB Symptoms	$26,310.00
Salyani	**IFAS**	Spot-Treatment of Young Leaf Flushes for Chemical Control of Psyllid	$75,000.00

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Table 1. *(Continued)*

Projects approved by the FCPRAC for funding during 2007-2008

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IFAS	Entity	Project	Approved
Salyani	**IFAS**	Optimizing Spray Parameters for Psyllid Pesticide Applications	$83,500.00
Schumann	**IFAS**	Determine If HLB Symptoms Can Be Distinguished from Other Leaf Symptoms to Be Used in Early Detection Studies	$50,000.00
Spann	**IFAS**	Timing of Hedging to Reduce Susceptibility to HLB Infection and Improve Psyllid Management	$15,048.00
Browning	**IFAS**	Provision of Office, Computer and Clerical Support for Dr. Steve Rogers, Scientific Coordinator for FCPRAC	$5,000.00
Muraro	**IFAS**	Economic Assessment of Impacts of New Diseases on Florida Citrus	$210,000.00
Graham	**IFAS**	Improving Control of Citrus Canker with Existing and Novel Chemical Compounds	$62,552.00

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Table 1. *(Continued)*

Projects approved by the FCPRAC for funding during 2007-2008

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IFAS	Entity	Project	Approved
Brlansky	**IFAS**	Research on Improved Diagnostics for Citrus Greening for Use in Florida	$105,000.00
Brlansky	**IFAS**	Evaluate Potential for Alternate Hosts for HLB	$25,000.00
Brlansky	**IFAS**	Pathogen Acquisition and Transmission by Psyllids from Symptomatic and Asymptomatic Trees in the Field	$100,000.00
Brlansky	**IFAS**	Distribution and Symptom Induction in Citrus Hosts	$55,000.00
Chung	**IFAS**	Evaluation of Compounds to Suppress HLB	$100,000.00
Davis	**IFAS**	Development of Light Microscope to Detect and Monitor HLB	$50,000.00

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Table 1. *(Continued)*

Projects approved by the FCPRAC for funding during 2007-2008

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IFAS	Entity	Project	Approved
Dawson	**IFAS**	Sequencing of HLB Genome	$200,000.00
Dawson	**IFAS**	Examination of Multiplication, Movement, Distribution, and Pathogenicity of HLB and its Interaction with CTV in Different Citrus Varieties and Relatives	$75,000.00
Gabriel	**IFAS**	Development of High Throughput Technologies for Rapid Detection of Citrus Huanglongbing (Greening) in Florida	$59,952.00
Etxeberria	**IFAS**	Development of Detection Methods for Greening in Citrus	$40,000.00
Gmitter	**IFAS**	Sequencing of Liberibacter Genome by Another Approach	$85,000.00
Graham	**IFAS**	Does Induced Systemic Resistance Control Greening Disease Development?	$49,784.00

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Table 1. *(Continued)*

Projects approved by the FCPRAC for funding during 2007-2008

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IFAS	Entity	Project	Approved
Powell	**IFAS**	Develop a Rapid Screening Process for Chemical Control of HLB	$55,000.00
Reyes	**IFAS**	Identification of Metabolite Changes in Citrus Leaves Induced by Citrus Huanglongbing (Greening) Disease. A First Step Towards Developing a Rapid and Inexpensive Assay for Early Detection of the Disease	$33,150.00
Tatineni	**IFAS**	Development of Simple, Sensitive and Rapid Diagnostic Methods for Large Scale Detection of the Citrus Greening Pathogen	$20,000.00
Tatineni	**IFAS**	Exploration for Natural Resistance for HLB and Mild HLB Isolates for Control of Greening Disease in Florida	Withdrawn
Triplett	**IFAS**	Reducing HLB in the Plant by Inoculation with an Antibiotic-Inducing Rhizobium Strain	$35,000.00
Wang	**IFAS**	Alternate Approaches to Culturing Liberibacter	$57,000.00

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Table 1. *(Continued)*

Projects approved by the FCPRAC for funding during 2007-2008

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IFAS	Entity	Project	Approved
Gmitter	**IFAS**	The International Citrus Genome Consortium (ICGC) Sequencing Project	$250,000.00
Dawson	**IFAS**	Develop Non-Transgenic Resistance to HLB	$70,000.00
Gmitter	**IFAS**	Identification and Characterization of HLB Survivors	$70,000.00
Gmitter	**IFAS**	Assessment of Genetic Transmission of HLB Tolerance from Citrus Species	$15,000.00
Gmitter	**IFAS**	Development of Transformation Techniques for Murraya, to Engineer a Deadly Trap Plant	$25,000.00
Moore	**IFAS**	Gene Expression in HLB Infected Citrus Trees	$60,000.00

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Table 1. *(Continued)*

Projects approved by the FCPRAC for funding during 2007-2008

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IFAS	Entity	Project	Approved
Moore	**IFAS**	Evaluate Differences in Response to HLB by Scions on Different Rootstocks	$55,000.00
Dawson	**IFAS**	Engineering Antibacterial Compounds into Citrus	$200,000.00
Gmitter	**IFAS**	Surviving HLB and Canker: Genetic Strategies for Improved Scion and Rootstock Varieties	$500,000.00
Rogers	**IFAS**	Development and Evaluation of Citrus Grower Psyllid Management Programs	$168,041.52
Stansly	**IFAS**	Development and Extension of Comprehensive Asian Psyllid Management in Commercial Citrus	$139,729.00
Stansly	**IFAS**	Management of Greening at SWFREC and in Commercial Groves in SW Florida	$316,410.00

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Table 1. *(Continued)*

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IFAS	Entity	Project	Approved
Browning	**IFAS**	UF IFAS Citrus Greening and Canker Research and Education Phase Four	$500,000.00
Graham	**IFAS**	Canker Management in Florida Citrus Groves: Control on Highly Susceptible Early Orange Varieties	$100,267.56
Graham	**IFAS**	Development of Promising New Rootstocks and Scions for Florida Citrus	$15,000.00
Halbert	**FDACS-DPI**	Measuring Flight Activity of Diaphorina citri, the Vector of Citrus Greening Disease and Determining Seasonality of Transmission	$37,904.00
Seiburth	**FDACS-DPI**	Risk Reduction for Citrus Budwood Pathogen Testing	$25,000.00
US Sugar	**US Sugar**	Support for USSC HLB Testing Laboratory	$9,352.47

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Table 1. *(Continued)*

Projects approved by the FCPRAC for funding during 2007-2008

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IFAS	Entity	Project	Approved
Ecostat	**Ecostat**	Scientific Coordinator	$51,975.00
Athena	**Athena**	Enzyme Enhanced Cultivation™ to Grow Asian HLB	$102,648.00
Jackson	**FCIRCC**	Participation in National Area	$25,000.00
US Sugar	**US Sugar**	Additional Support for Southern Gardens Diagnostic Laboratory	$16,000.00
Turpen	**TIG**	Technology Innovation Group/Consultant and Innomap™	$10,000.00
CCRB	**CCRB**	Novel Immunocapture Technology for Field Deployable Nucleic Acid-Based Detection of Plant Pathogens	$180,000.00

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Table 1. *(Continued)*

Projects approved by the FCPRAC for funding during 2007-2008

IFAS: *Institute of Food and Agricultural Sciences*
USDA: *United States Department of Agriculture*
CCRB: *California Citrus Research Board*
TIG: *Technology Innovation Group*

IFAS	Entity	Project	Approved
CCRB	**CCRB**	A Generalized Reagentless Sensor To Detect Citrus Plant and Fruit Responses	$120,000.00
CCRB	**CCRB**	Cultivation and Rapid Detection of the Casual Agent of HLB Disease in Citrus	$23,950.00
CCRB	**CCRB**	Identification of Candidatus Liberobacter-Induced Small RNAs for Early Diagnosis of HLB Citrus Greening	$23,295.50
CCRB	**CCRB**	Genetic Diversity and Fingerprinting of Candidatus Liberobacter asiaticus Strains	$16,935.00
Bowman	**USDA**	Development of Promising New Rootstocks and Scions for Florida Citrus	$184,000.00
Hall	**USDA**	Comprehensive with DOC	$624,857.00

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Table 1. *(Continued)*

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IFAS	Entity	Project	Approved
Gottwald	**USDA**	Comprehensive W/FCPRAC	$609,684.00
Duan/Hall	**USDA**	Molecular Characterization of the Causal Agents of Citrus Huanglongbing - Genome Sequencing Project	$148,190.00
Bowman	**USDA**	Production of Transgenic Commercial Citrus Varieties Resistant to HLB	$150,000.00
Turpen	**TIG**	InnoMap	$48,000
Total			**$7,227,313.05**

Table 2.

Roles and responsibilities of various organizations involved in the greening and canker research project management. In addition to the organizations shown below, industry-based greening and canker oversight committees meet as needed to discuss and help prioritize research directions.

FCPMA	**Florida Citrus Production Manager's Association:** *Founded FCPRAC; lead role in working with grower organizations.*
FCIRCC	**Florida Citrus Industry Research Coordinating Council:** *Set overall industry research priorities/Confirm critical priorities; support greening/canker task forces for enhanced communications.*
FDOC	**Florida Department of Citrus:** *Engage National Academy of Sciences (NAS); support efforts to secure non-grower funding; fund portion of FCPRAC approved projects.*
NAS	**National Academy of Sciences:** *Develop Scientific Advisory Panel; review issue/research status and formulate research strategy; recommend research proposals and potential investigators; provide for proposal review and rank proposals.*

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Table 2. *(Continued)*

Roles and responsibilities of various organizations involved in the greening and canker research project management. In addition to the organizations shown below, industry-based greening and canker oversight committees meet as needed to discuss and help prioritize research directions.

FCPRAC	**Florida Citrus Production Research Advisory Council:** *Hire research management consulting companies (TIG, BCG, and Ecostat); provide final approval of research plan, projects, and proposals; develop contract deliverables, including IP ownership; allocate available funding; manage and administer research contracts.*
FCM	**Florida Citrus Mutual and other industry organizations:** *Lobby State and Federal governments for IFAS and ARS base research funding, as well as specific appropriations and grants.*
TIG	**Technology Innovation Group:** *Connect innovation to societal needs; transforming knowledge into wealth with science and technology as drivers of economic development internationally; accelerate development of knowledge-based growth enterprises and economies through public private partnerships; technology commercialization assessments with a focus on life sciences; diverse group of technology transfer specialists.*

Table 3. General time line for 2008

Spring 2008:	*The Department of Citrus engages the National Academy of Sciences.*
Spring 2008:	*The FCPRAC engages a professional research management consultant.*
Spring 2008:	*Web Reporting System is developed.*
May 30:	*Draft Request for Proposals (RFP), Timeline and Priority List.*
May 31:	*RFP Outline to FCPRAC, FDOC and NAS for review.*
June 8:	*RFP Draft to FCPRAC, FDOC and NAS.*
June 9:	*Post NAS Priority List on FCPRAC Home Page.*
June 12:	*Final RFP to NAS for distribution.*
June 16:	*Solicitation announcement.*
July 14:	*Due date for Letter of Intent and Preproposal.*
August 1:	*Proposal guidance and review planning period ends.*
September 5:	*Full proposal due date.*
October 17:	*Proposal reviews completed by NAS.*
October 31:	*Recommendations for funding approval from NAS go to FCPRAC.*
November 21:	*Contracts approved by FCPRAC/FCC and initiated by applicants.*

Figure Legend

Fig. 1. FCPRAC Home Page.

The Home Page for the web site of the Florida Citrus Production Research Advisory Council contains information about organization activities, meetings and research programs. Communication resources are provided for those interested in helping convey this information to other groups. See text for more detailed information about each of the web site features.

If you'd like more information contact:

Steven Rogers, PhD
Scientific Coordinator, FCPRAC
University of Florida–CREC
700 Experiment Station Road
Lake Alfred, FL 33850
steve@fcprac.com
863.956.1151 phone
863.956.4631 fax

FCPRAC