



California Citrus Research Board Request for Proposals

For the funding period October 1, 2017 to September 30, 2018

Specific instructions for preparing and submitting new proposal concepts, full proposals, continuing research proposals, and progress and completion reports

2017 Calendar

- **March 31:** Progress Report #1 Due (FY 2016-17 funded projects)
- **April 7:** New Project Pre-Proposal Form Due
- **May 1:** Requests for New Project Full Proposals sent out
- **May 31:** New Project Full Proposals Due
- **July 14:** Continuing Project Full Proposals Due
- **July 21:** Progress Report #2 Due (FY 2016-17 funded projects)
- **July 25 & 26:** Oral Presentations of New Project Proposals
- **July 31:** Notify PIs for New Projects Moving Forward
- **August 14-18:** Presentations to Full CRB Board for New and Continuing Projects in Davis, California
- **September 26:** Annual CRB Meeting to Finalize Research Project Funding Decisions
- **September 29:** Notify Principal Investigators (PIs) of Award Decisions
- **November 29:** Completion Reports Due (FY 2016-17 funded projects)

Last updated: March 10, 2017

Introduction

The mission of the California Citrus Research Board (CRB) is to ensure a sustainable California citrus industry for the benefit of growers by prioritizing, investing in and promoting sound science.

The CRB annually evaluates its research priorities for possible funding. Whereas the Board will consider all proposals submitted for the upcoming fiscal year, the current areas of greatest concern are surviving and finding solutions to Huanglongbing (HLB) and maintaining market accessibility.

The Board is soliciting both new and continuing research proposals for funding consideration in the 2017-2018 Fiscal Year. This document highlights areas of particular industry need, guidelines for the submission of project proposals and the progress reports to be made during the tenure of CRB funding. Final decisions on projects to be funded will occur at the Annual CRB Budget Meeting in September.

Scope of Research

Research must be *outcome-based*; that is, the “need” or the end result is determined ahead of time, and research is developed in line with the desired outcomes. Projects must result directly in a product, technology, solution or method that would benefit the California citrus industry.

Therefore, each researcher who intends to apply for CRB funding must be able to clearly articulate how his/her project will significantly contribute to the improved production, vitality and economic sustainability of the California citrus industry. Furthermore, researchers must explain how this information will be transferred to or shared with growers. (NOTE: If your response is through University of California Cooperative Extension [UCCE], then you must already have made arrangements with a UCCE individual and must adequately describe your plan).

1. Research Categories

There are five research categories that align with the strategies determined by the board members. These include:

- **5100 – Production Efficiency:** Irrigation and fertigation management, plant and canopy management, sensory characteristics (flavor and nutrition), regulatory compliance, labor saving devices, economics, worker health and safety.
- **5200 – New Varieties Development:** Breeding, selection and evaluation of new varieties.
- **5300 – Insect-Vectored and Related Post-Harvest Diseases:** Including but not limited to HLB, *Citrus tristeza virus* (CTV), leprosis, stubborn and citrus variegated chlorosis.
- **5400 – Non-Vectored and Related Post-Harvest Diseases:** Septoria spot, viroids, Phytophthora root and brown rot, green and blue mold, storage decay, pre- and post-harvest controls.
- **5500 – Pest Management:** Regulatory, endemic and invasive pests including but not limited to Asian citrus psyllid (ACP), fruit flies, thrips, Fuller rose beetle, scales, katydids and mites.

NOTE: Genome projects should be submitted within the category that applies to the organism, e.g., if you intend to propose research on the ACP genome, you would submit your proposal under 5500, the Pest Management category.

Detailed information for each research category is provided below. For new projects, multi-lab, multi-interdisciplinary interactions and industry collaboration are highly recommended, when possible.

5100: Production Efficiency

The goal of this category is to deliver timely and validated information on horticultural factors impacting fruit quality and production efficiency to California growers to keep them competitive in the domestic and international markets.

Researchable areas are prioritized for 2017-18 as follows:

1. Develop mechanical harvest technology and/or automated robots to reduce production cost and increase productivity. Develop accurate mechanical crop estimation approaches.
2. Conduct field trials to maximize fertigation and water use efficiencies in citrus orchards.
 - a. Confirm real crop usage or coefficients, taking into account fluctuations due to soil types, geographical locations and citrus varietal types.
 - b. Develop methodology or technology to better utilize reclaimed water for irrigation needs.

- c. Conduct field trials to address rules and regulations regarding irrigation and nitrogen cycling to optimize nitrogen and water usage.
- 3. Conduct field trials in citrus orchards to explore the causes of post-bloom and pre-harvest fruit drop.
- 4. Characterization of the citrus phytobiome.
 - a. Cooperative project determining the inter-relations of the citrus phytobiome, mineral and water uptake, and fertigation regimes.
 - b. Improvement of fruit quality and taste by manipulation of the citrus phytobiome.

5200: New Varieties Development

The goal of this category is to provide the California citrus industry open access to new varieties that will meet the ever-changing market demands, are resistant or tolerant to insect pests and diseases, and will improve production efficiency.

Researchable areas are prioritized for 2017-18 as follows:

1. Develop a solution to the physiological effects of '*Candidatus Liberibacter asiaticus*' (CLas) infection (which may include the role of the ACP in disease epidemiology) with an emphasis on important California citrus scions and rootstocks.
 - a. Develop field-relevant greenhouse evaluation methods for CLas tolerance or resistance.
 - b. Develop early flowering methods to speed the breeding cycle.
2. Develop a mechanism to transfer stable tolerance or resistance to the CLas bacterium from rootstocks to scions (with an emphasis on the Carrizo rootstock).
3. Develop new ways to effectively evaluate citrus varieties in multiple locations across California to determine production and market potential with an emphasis on grower collaboration and real world approaches.
4. Determine both domestic and export market preferences based on sensory (taste, appearance, feel, smell, etc.) and other factors (such as health benefits). Use this information to evaluate existing varieties and to identify genetic improvement needs within the breeding program.
5. Develop an understanding of the horticultural, handling and genetic levers to influence flavor and other sensory characteristics.
6. Determine quantitative methods to analyze flavor and evaluate post-harvest treatments for their effects on flavor deterioration and storage life.

5300: Insect-Vectored and Related Post-Harvest Diseases

The goal of this category is to provide California citrus growers timely and proven information on detection, eradication, control and management strategies and tools for diseases caused by insect-vectored plant pathogens in order to minimize crop damage and economic losses.

Researchable areas for new projects are prioritized for 2017-18 as follows:

1. Develop and commercialize technologies to detect CLas within citrus trees prior to qPCR detection of the bacterium.
2. Develop alternative technologies or methodologies to culture CLas and/or test the effectiveness of antimicrobials against CLas.
3. Identify and develop effective means to prevent CLas infection within productive California citrus groves.
4. Develop an effective CLas disease management system, incorporating both therapies (antimicrobial compounds) and therapy delivery systems.
5. Identify means to manage citrus flush in order to improve the efficiency and effectiveness of area wide treatments to manage ACP populations.

Priorities for ongoing research projects also include the following:

- Evaluate existing and newly developed tools to detect pathogens and/or diseases early in the epidemic, and diagnose diseases before the development of visual symptoms.
 - Cooperative project (working within USDA and CDFA regulations) to evaluate early detection technologies (EDTs) in comparison to qPCR methods using field-collected samples.
 - Expand volume of EDT data to increase ability to statistically analyze results.
 - Establish consistency in EDT results across all diagnostic laboratories.
 - Use canines to detect HLB infection early (pre-qPCR positive).
 - Characterize the canine olfactory receptor system and how it relates to detecting unique scents emitted by HLB-affected trees.
- Determine the interaction of mixed infections (e.g., CTV, *Spiroplasma citri* and Liberibacter) and the effect on tree productivity, yield reduction and the ability to detect individual pathogens.
- Investigate potential introduction of exotic insect-vectored or graft-transmissible pathogens that would threaten market access both domestically and internationally. Secure adequate data on pathogen and vector populations and spread to support industry positions dealing with trade activities and barriers.

5400: Non-Vectored and Related Post-Harvest Diseases

The goal of this category is to provide California citrus growers timely and scientifically valid information to develop and maintain foreign and domestic market accessibility, proactively develop data and information to maximize food safety and minimize trade barriers to satisfy trading partners. Specific targets are non-vectored, graft-transmissible, and post-harvest pathogens of citrus.

Researchable areas are prioritized for 2017-18 as follows:

1. Secure adequate data to support industry positions dealing with trade activities and barriers to the citrus export industry.
2. Evaluate existing and newly developed chemistries to minimize pre- and post-harvest fruit deterioration.
3. Develop data on food safety issues of citrus to mitigate regulatory action or to satisfy new regulations.

4. Determine the potential introduction of exotic non-vectorized or graft-transmissible pathogens of citrus that would threaten market access both domestically and internationally.
5. Develop new, non-chemical technologies to mitigate and/or minimize losses due to non-vectorized or graft-transmissible pathogens, e.g., irradiation, variable radio frequency electromagnetic methods.

5500: Pest Management

The goal of this category is to provide California citrus growers timely and scientifically valid information on eradication, control and management strategies and tools against insect pests to minimize crop damage and economic losses and to maintain market accessibility of foreign and domestic markets.

Researchable areas are prioritized for 2017-18 as follows:

Identify new and/or improve currently developed control strategies, including chemical, biological and cultural controls for both conventional and organic citrus.

1. Endemic pests including (but not limited to) thrips, scales, mites, earwigs, katydids.
 - a. Sampling methods and economic thresholds for mandarins.
 - b. Pesticide efficacy (pests) and selectivity (natural enemies).
 - c. Innovative, non-pesticide technologies to minimize losses.
2. Exotic pests including (but not limited to) Argentine ants and ACP.
 - a. Improve detection methods.
 - b. Determine pesticide efficacy for both organic and conventional situations.
 - c. Develop non-pesticide methods of control (biological and cultural).
 - d. Evaluate the efficacy of the California ACP treatment programs.
 - e. Monitor for and manage pesticide resistance.
3. Regulatory pests including (but not limited to) Fuller rose beetles, bean thrips, mites and fruit flies.
 - a. Develop post-harvest methods of disinfesting citrus fruit.

2. New Pre-proposals

A novel, innovative research project submitted to the CRB that addresses the needs of the California citrus industry can be considered in one of two ways: a well-defined, full-scale project or a scaled-down project that intends to develop a proof-of-concept. The CRB may request that a project demonstrate the potential applicability of a concept before considering a larger-scale project. The CRB process for new proposals includes:

- Completion of a pre-proposal application, to be submitted online by April 7, 2017.
- Pre-proposals will be reviewed by the Priority Screening Committee during April 2017.
- If accepted, the researcher will be invited to submit a full project proposal by May 1, 2017.

Submission Instructions:

Researchers should complete a Pre-proposal Form online for each new project concept. This pre-proposal will include basic information such as project title, name and contact information for the PI and collaborator(s). Researchers also need to provide information regarding:

1. ***Purpose and Rationale*** (1,600 characters*) a description of the project in layman's terms with background information to support the reason for conducting this research – what prompted this project.
2. ***Objectives, Timelines and Milestones*** (4,000 characters*) a work plan including goals and objectives, and a timeline of milestones for when each will be accomplished (bullet format is acceptable).
3. ***Expected Results and Practical Applications*** (3,000 characters*) a description of how this project will benefit the California citrus industry, including what potential products the industry will receive.

Please Note: For the 2017-18 RFP process, the CRB has converted to an online proposal submission format. Much of the formatting and questions are similar to last year's process, but rather than submitting a PDF or Word document, the information provided in the pre-proposal and full proposal forms only will be accessible online. Taking extra time to familiarize yourself with the online submission procedure is strongly recommended.

**To that point, if you copy text from Word documents and paste directly into sections, you may encounter an error message that you've exceeded character limits. Character count is calculated differently with the online form because the application uses web coding (HTML). The greater the amount of text formatting (bold, italics, etc.), the higher the character count. Character limits have been increased from past applications to accommodate this formatting change.*

Pre-proposal forms must be completed and submitted **online by April 7, 2017**. You will find the link to begin this process on our website: <http://www.citrusresearch.org/research>

To start the submission process, you must create an account with the CRB Proposal and Contracts website using your email address and current contact information. After account creation, you immediately will receive notification to verify your email address. (Please do not use a general email account. You will want to use your specific email address when setting up your account. i.e. *jane.smith@citrusresearch.org*)

Please note that if you add collaborators to your pre-proposal and that individual has not previously created an account on the system, a new account will be created at this time for them. Once you submit their names and e-mail addresses, each collaborator you add will IMMEDIATELY be notified by email that you have initiated an account on his/her behalf.

Once you have verified your email address and logged into the system on the CRB website, you can create and edit your pre-proposal(s). Once you have completed all edits and are ready to send the pre-proposal for review, click SUBMIT.

NOTE: **Once you click SUBMIT, you will be unable to make any further changes.** Your pre-proposal will be provided to the CRB Research Priority Screening Committee for review. Upon completion of the review, an email will be sent to the PI to notify him/her of the committee's decision regarding the pre-proposal.

3. New Full Proposals

Researchers invited to submit a full proposal for a new project must complete and submit a full proposal for each project online according to the guidelines specified in **Section 5 Guidelines for Full Research Proposal** (below). The CRB review process for new full proposals is as follows:

- New, full proposals are received by the CRB Research Department, reviewed by both the Research Priority Screening Committee and an Ad Hoc Scientific Review Panel.
- The PI gives an oral presentation by telephone and WebEx to the Research Priority Screening Committee on either July 25 or 26, 2017.
- The Research Priority Screening Committee reviews and evaluates full proposals and presentations.
- If approved, PIs will give an oral presentation to the full CRB board, including Research Committees, during the week of August 14-18, 2017, in Davis, California.
- Proposals are reviewed by Research Committees, who make a funding recommendation to the full board.
- A final funding decision is made by the full board at the annual CRB budget meeting in September 2017.

Submission Instructions: All new full proposals must be completed and submitted **online** at <http://citrusresearch.org/research>.

4. Continuing Project Proposals

Regardless of the anticipated duration of the project, all researchers currently receiving CRB funding must re-apply each year. The Full Project Proposal Form for 2017-18 should be completed and submitted **online** at: <http://citrusresearch.org/research> for each project according to the guidelines specified in Section 5 below. **PIs will need to create user accounts following the instructions presented above on page 7.** The window to submit a continuing project proposal will be open *between June 14 and July 14, 2017.*

If an ongoing CRB funded project is currently in its final year of funding, the CRB strongly supports that the project reach completion as scheduled. Any related new projects will need to go through the new project proposal pathway.

Researchers currently funded by the CRB with an ongoing project that has not yet reached its final year are invited to submit a Full Project Proposal Form for each project online according to the guidelines specified in **Section 5 Guidelines for Full Research Proposal** (below). The CRB review process for continuing project proposals is as follows:

- PIs complete and submit online a Full Project Proposal Form by July 14, 2017. The Full Project Proposal Form can be found at: <http://citrusresearch.org/research>.
- PIs present a 10-minute oral presentation of proposed research to the full CRB board, including Research Committees, during the week of August 14-18, 2017, in Davis, California.
- Proposals are reviewed by Research Committees, who make a funding recommendation to the full board.
- A final funding decision is made by the full board at the annual CRB budget meeting in September 2017.

5. Guidelines for Full Research Proposals

Every full proposal must include the following *contact information for each PI, collaborator(s), contracts officer and financial officer*:

- name,
- affiliation (physical address including Department),
- email address,
- telephone number, and
- mailing address if different from physical location.

For each identified collaborator, you must provide a letter from that person, submitted as an online attachment, certifying that he/she:

- read the proposal,
- outlined their specific role as collaborator in the proposed research,
- has been adequately briefed about the proposal, and
- can meet the milestones of this project.

A brief CV (*two pages maximum*) should be submitted as an attachment for the PI and each identified collaborator. The CV should include name, affiliation and relevant experience (employment, relevant publications, etc.).

An appropriate contact outside of this project should be provided so that CRB staff may communicate with them for additional information and/or an explanation of this type of research. The contact should not be a current co-PI or collaborator in any other CRB-funded project(s).

Project Impact Statement (*700 characters**) The impact statement:

- briefly identifies the issue or problem,
- describes how the work proposed will significantly help solve the issue or problem, and
- highlights the benefit of the proposed research to California citrus growers.

Executive Summary (*3,500 characters**) Provide a clear and concise executive summary of the project in layman’s language. Include the following **using bullet point format**:

- overall goal and specific objectives of the project,
- summary of the work plan or methodology, and
- expected outcomes and/or functional product or solution.

Background Information/Relevant Literature (*2,000 characters**) Provide background information and a brief review of pertinent literature. What prompted you to propose this research? List relevant peer-reviewed publications, including your own.

Pertinent Questions Provide answers to the following questions:

- Who will be the end user of the results of this project? (*400 characters**)
- How will California citrus growers or others benefit from your results? (*500 characters**)
- Will this research result in a product that will require commercialization or further development by another entity? If so, please describe. (*250 characters**)

Gantt Chart of Progress Complete the chart template found at:

<http://citrusresearch.org/research>. The “objectives” and tasks you intend to complete should be clearly and succinctly stated. You must assign milestones to each task. “Milestones” should indicate the time necessary to complete or achieve success of a task. Do this accurately as this will be a major criterion used by the board when evaluating projects for continued funding. Once completed, the Gantt Chart must be uploaded as a PDF to your proposal.

Work Plan/Procedures (*6,000 characters**) Elaborate on your stated objectives, tasks and milestones in the “Work Plan and Procedures” section. You must explain how they will be achieved, describe your experimental design and, if appropriate, list site locations for proposed trials.

NOTE: For projects involving basic or discovery research, include any potential issues concerning intellectual property rights and identify the steps needed for ultimate use by growers (e.g., federal approval to test a genetically-modified plant in the field for evaluation or the registration of a new chemical). Identify any potential involvement of UCCE personnel and/or resources.

Budget Section While the Research Proposal form allows investigators to include budget requests for up to three years, the PI is still required to submit an annual Full Proposal Form and fulfill progress reporting milestones. Complete the budget form as specified.

- For projects involving multiple researchers who will be receiving a sub-award, the PI must prepare a project budget to include both PI and collaborator funding.
- For continuing projects, include funding levels for the current year (FY 2016-17). Indicate whether you expect to have any carry-over funds from the current funding year in the Budget Justification section.
- Board and the Committee Members prefer that PIs give oral presentations in person rather than by telephone. To accommodate the additional expense, a separate budget line for travel to CRB-related meetings is provided.
- The Lindcove Research and Extension Center (LREC) provides Land, Labor and Facilities (LLF) for projects approved by the UC Research Advisory Committee. On the 'LREC Charges' budget line of the CRB proposal, the PI should estimate the expenses that the research project will occur at LREC, and if the project is approved, those charges will be directly billed on a monthly basis to the CRB.
- **NOTE:** If you anticipate that additional time will be necessary to complete the proposed research, you will be required to complete and submit a "request for unused funds" form by August 31, 2018. The extension period will be decided by CRB staff based upon funds remaining and progress made toward proposed research goals.

Budget Justification (2,000 characters*) Describe how funds will be used. You may want to include details such as type of equipment necessary and staffing needs, travel for conferences or contract research efforts required to complete the proposed work.

Other Funding Sources (2,000 characters*) Identify the sources and amounts of all current and pending non-CRB sources of support for this project. Include any in-kind contributions, and describe how other funds may enhance and/or impact the timing of this project or if CRB project funding can be used as matching funds for other funding sources.

6. Guidelines for Written Progress Reports

There will be two written progress reports due for projects funded by the CRB in FY2017-18. The first progress report will be due **March 30, 2018**, and the second one on **July 20, 2018**. Both reports must be prepared online using the CRB Progress Report option to be made available at <http://www.citrusresearch.org/research>

The report should document progress and accomplishments made to date during the current funding period (October 1 - September 30). Restate project objectives and milestones as discussed in the accepted proposal. Summarize activities that were undertaken to accomplish each objective, and explain progress made toward each goal. Include comments on collaboration, and provide data summaries and graphs as appropriate. Relate accomplishments to practical application for the California citrus industry.

7. Guidelines for Oral Presentations

In August 2018, it is expected that PIs with ongoing research projects will give an oral presentation in person to the CRB Board and Research Committees to explain intended research plans for the following fiscal year. **Presentations must follow the “Presentation Template,”** which will be made available on the CRB website. Presentations must accurately indicate the planned objectives and timeline necessary to complete each. Participation in the entire subject session is required, as it provides an opportunity for collaboration among research groups and helps prevent duplication of efforts.

8. Expectations of Funded Principal Investigators

It is expected that every funded PI will do the following:

- Give an in-person oral presentation to the Research Committees during August 2018 to present intended research plans for the following fiscal year.
- Submit two written progress reports using the CRB Progress Report Form – one in March and the second one, along with your proposal for continuing research, in July (see Guidelines for Written Progress Reports). This report is used by the CRB Research Committees and the Board to review the status of all projects. **Failure to submit timely and quality progress reports may result in premature termination of project, cessation of funding and a request for return of unspent funds.**
- Submit a Project Completion Report form when projects complete their final year or when funding has been terminated. The Project Completion Report Form and summary of research data collected for the project must be submitted electronically to the CRB using the Project Completion Report form available on the CRB web site: <http://www.citrusresearch.org/research>.
- For each project, you must submit one full-length Progress Report article (1,500-word maximum) written in **lay language** for publication in *Citrograph* or as a Research Report in *Citrograph* online. *Citrograph* is the CRB’s quarterly magazine written specifically for the California citrus growers to share with them the purpose and actionable results of the research that their tax dollars funded. This report is NOT geared toward other researchers, and *Citrograph* is NOT a peer-reviewed journal. A final Completion Report article (2,000 words) will be needed once the project is completed. **It is required that you adhere to the *Citrograph* Author Guidelines**, available at:

<http://citrusresearch.org/citrograph/guidelines>. *Citrograph* editorial staff will inform you when your articles are due. Publication of CRB-funded work in any other magazine outside of *Citrograph*, with the exception of peer-reviewed journals is strongly discouraged and must receive prior official written permission from CRB Staff. **Failure to meet the requirements listed in this bullet point may result in the CRB withholding funds and termination of the project.**

- As part of its mission, the CRB sponsors informational meetings for members of our industry and the general public. As a benefit of attending these meetings, we offer California Department of Pesticide Regulation (DPR)-approved Continuing Education (CE) Units of value to certain licensed professionals working in our state. As a CRB-funded researcher, you may be asked to make a presentation of your research at one or more of these meetings. To receive DPR approval of the CE units, we must describe how your presentation will discuss pest management or pesticide-related topics. Acceptable topics also may include pesticide laws and regulations. Upon award of your research contract, you will be asked to describe in 150 words or less in layman's terms how your proposed research is directly relevant to pesticide laws and regulations, pesticides, or the management of one or more citrus pests. Note that these descriptions may be subject to revision prior to the date of your actual presentation.
- When you have completed your project, you must complete a "Project Completion Report Form" that can be found on the CRB website at <http://www.citrusresearch.org/fa>. Publication in peer-reviewed journals is highly encouraged. **The PI must acknowledge the CRB as the funding source along with the CRB research project number in all relevant presentations, press releases and publications where research findings are disclosed.**
- Sign a contract of funding acceptance and abide by all terms, including all bullets above. The CRB reserves the right to modify the deliverables indicated in this RFP and will so state in the research contract.