

Grants Program: CENTER FOR PRODUCE SAFETY 2010 Request for Proposals

Public Partners:

California Department of Food and Agriculture – Specialty Crop Block Grant Program (CDFA-SCBGP)
University of California, Agriculture and Natural Resources (UC-ANR) with funding from the United States Department of Agriculture, National Institute of Food and Agriculture (USDA-NIFA)
Washington State Department of Agriculture – Specialty Crop Block Grant Program (WSDA-SCBGP)

Other Industry Partners:

Almond Board of California
Cantaloupe Advisory Board / California Melon Research Board
California Leafy Greens Research Board
California Pistachio Research Board
California Walnut Commission
Florida Specialty Crop Foundation
Florida Tomato Committee
Taylor Farms
Washington Tree Fruit Research Commission

Request for Proposals Deadline: Proposals must be received by 5:00 pm (PDT) on April 30, 2010

Project Period: One-year and two-year proposals will be accepted

Total Funds Available: up to \$3,000,000

The Center for Produce Safety provides ready-to-use science-based solutions that prevent or minimize produce safety vulnerabilities.

OBJECTIVE

Research activities sponsored by the Center for Produce Safety (CPS) and partnering entities are to be directed to answering critical research questions that fill the gaps in our basic understanding in specific areas of food safety practices for fruit, vegetable, and tree nut production, harvest and post-harvest handling. The objective is to provide the produce industry with practical, translatable research data that can be used at all levels throughout the supply chain.

GENERAL RESEARCH GUIDANCE

Consumption of fresh fruits and vegetables is a key element in the health and nutrition of people worldwide. The variety of products and year-round availability has opened up many exciting new ways for consumers to enjoy fruits and vegetables as never before. Multiple consumer studies have shown that consumption is steadily increasing as consumers have adopted healthier life styles and taken advantage of new fruit and vegetable products that offer year round convenience, unique flavor combinations and nutritional balance. But along with this trend, the produce industry has faced numerous incidents over the last few years where outbreaks of foodborne illness have been traced to the consumption of fruits and vegetables. The produce industry has attempted to meet these food safety challenges with the development of commodity specific food safety programs centered on Good

Agricultural Practices (GAPs) at the raw or commodity finished product level and fully integrated processing food safety approaches anchored by HACCP-based programs for packaged products. As food safety guidance documents and standards for an array of commodities have evolved to become more measureable, industry scientists have struggled with a deficit of specific scientific knowledge on which to base metrics. This struggle has been further exacerbated by the ever increasing demand from multiple buying groups to have producers meet various microbial specifications for water, soil, raw and finished products, as well as food safety metrics that exceed industry standards without any real science-based direction.

The research activities coordinated by CPS are directed at answering critical research questions that fill the gaps in our basic understanding in specific areas of food safety practices for the produce industry. The objective is to provide the produce industry with practical, translatable research data that can be used at all levels throughout the supply chain.

RESEARCH PRIORITIES

Research Priorities are on pages 11 through 16 of this document.

PROJECT FUNDING

CPS has joined with partner organizations to sponsor research in specific areas. CPS will administer this RFP for the funding partners. After the review of all proposals, awards will be assigned to one or more funding source.

GRANT LIMITS

Awarded grants may not exceed \$200,000 in direct costs per year. Project term may not exceed two years.

FUNDING PERIOD

January 1, 2011 to December 31, 2011 for one-year projects.

January 1, 2011 to December 31, 2012 for two-year projects.

ELIGIBILITY

Projects should benefit the specialty crop industry and/or the public rather than a single organization, institution, individual, or commercial product. Funds will not be awarded for projects that directly benefit or provide a profit to a single organization, institution, or individual.

The following pertains to Specialty Crop Block Grant Program (SCBGP) funds that will be distributed through this program:

- To be eligible for a grant, the project must enhance the competitiveness of U.S. or U.S. territory grown specialty crops in either domestic or foreign markets. Please visit the USDA website at <http://www.ams.usda.gov/> to view a comprehensive list of eligible and ineligible specialty crops under the SCBGP.
- CDFA-SCBGP is seeking proposals from eligible non-profit organizations, local, state and federal government entities, for-profit organizations, and universities (including private colleges and universities) for projects that solely benefit the production of and access to California specialty crops.

- WSDA-SCBGP is seeking proposals from eligible non-profit organizations, local, state and federal government entities, for-profit organizations, and universities for projects that enhance the competitiveness of specialty crops in Washington State.
- Those entities that are non-profit or for profit, if awarded a grant, will be required to provide either verification of their non-profit status or a copy of a valid business license.

The following pertains to UC/ANR funds that will be distributed through this program:

- Any individual, group or legal entity affiliated with a university or governmental agency that has appropriate research capabilities is eligible and is encouraged to submit proposals.

PROPOSAL SCORING

Proposals will be evaluated by at least three experts drawn from the CPS Technical Committee, ad hoc reviewers and corresponding Partners in Research, as appropriate. The reviewers will use the following as the basis for their evaluation of the proposal:

<u>Section</u> (all sections are required)	<u>Maximum Score for Section</u>
Title Page	0
Layperson's Summary of Proposal	0
Proposal Proper (A-H, 10 page maximum):	
A. Technical Abstract	4
B. Background	2
C. Identification of Target Research Questions from RFP	1
D. Hypothesis	7
E. Statement of Research Objectives	10
F. Experimental Plan and Methods	30
G. Expected Results and Relevance to Produce Industry	15
H. Potential Pitfalls to Accomplishing Objectives	2
Proposal - Additional Information (I-P, no page limit):	
I. Program Timeline	5
J. Facilities and Equipment Available for the Research	5
K. List of Industry Cooperators and Role	4
L. Explanation of Related Research Funding	2
M. Literature Cited/Bibliography	0
N. Previous SCBGP Funding	0
O. Statement on Project Oversight	0
P. Performance Monitoring Plan	0
Additional Documents (separate files):	
Budget and Budget Justification	7
Current and Pending Support for PI and Co-PIs	3
CV for PI and Co-PI s	3
Letters of Intent for Co-PIs	0
Letters of Intent for Cooperators	0
Total	100

PROPOSAL FORMAT

Use a 12 point sans serif font (Calibri preferred) for the proposal, 1 inch margins on all sides, and number pages at the bottom center. The body of the proposal (Sections A through H) should not exceed 10 pages; reviewers will be instructed to stop reading after Page 10. The title page, layperson's summary, and Sections I through P are not included in the 10-page limit. The additional documents (budget and budget justification, current and pending support, CVs, and letters of intent) should be submitted in separate files and are not included in the 10-page limit.

Title Page

- Project Title
- Principal Investigator: Name, institutional affiliation, mailing address, phone number, and email address.
- Co-PIs: Name, institutional affiliation, mailing address, phone number, and email address.
- Academic, government or industry cooperators: Name, institutional affiliation, mailing address, phone number, and e-mail address.

Layperson's Summary of Proposal

- In non-technical language, summarize your proposal. Provide a description of the project, objectives and methods to be employed. Do not exceed 200 words.

Proposal Proper (Sections A-H, 10 page maximum)

- A. Technical Abstract (4 pts):** Do not exceed 500 words.
- B. Background (2 pts):** A concise statement of the research need.
- C. Identification of Target Research Questions from RFP (1 pt)**
- D. Hypothesis (7 pts):** Clearly state the hypothesis-driven approach that conveys the rational and biological or technological foundation for the proposed research.
- E. Statement of Research Objectives (10 pts):** Logically arrange the objectives.
- F. Experimental Plan and Methods (30 pts):** For each objective, discuss the procedures you propose to employ. Be specific enough to discuss relevant biological strains, experimental design or parameters of data collection, sampling and sample analysis protocols, and anticipated statistical analysis.
- G. Expected Results and Relevance to Produce Industry (15 pts):** If appropriate, describe your previous or current work directly related to objectives and the results that have been generated to date. For the proposed work describe the anticipated benefits to near-term food safety solutions for the produce industry. In your discussion address how this project will guide more specific and effective risk management practices for the industry.
- H. Potential Pitfalls to Accomplishing Objectives (2 pts):** Describe the pitfalls that may be anticipated and strategies for overcoming these pitfalls.

Proposal– Additional Information (Sections I through P, no page limit)

- I. Project Timeline (5 pts):** Clearly delineate the timeframe anticipated to achieve each objective within the total timeframe of the project. Include a 3-column summary table that includes (1) Project Activity; (2) Who (personnel involved in each activity); and (3) Timeline (months and years in which the activities will be accomplished).

- J. Facilities and Equipment Available for Research (5 pts):** Briefly describe the facilities and equipment available to you to achieve the proposed objectives.
- K. Co-PIs and Cooperators and Role (4 pts):** List the names and affiliations of all Co-PIs and Cooperators listed on the title page (do not repeat contact information). Briefly specify their role in the project objectives, any facility infrastructure or in-kind support.
- L. Explanation of Related Research Funding (2 pts):** Identify current or pending research funds (listed in the current and pending forms for PIs or Co-PIs) that have relevance or overlap with the proposed research. Briefly discuss how the objectives for this proposal are unique or complement previous or ongoing research.
- M. Literature Cited/Bibliography (0 pts)**
- N. Previous CDFA, WSDA or USDA Specialty Crop Block Grant Program Funding (0 pts):** If you have received SCBGP funding for other projects, briefly describe the project and the amount of funding.
- O. Project Oversight (0 pts):** Describe the oversight practices that provide sufficient knowledge of grant activities to ensure proper and efficient administration. Who will oversee the project activities? How will oversight be performed? Include timelines.
- P. Performance Monitoring Plan (0 pts):** How will performance toward meeting the outcomes be monitored? Define your data sources. Who will collect data? Where will data be collected? How will data be collected? If using a survey, provide information on the nature of the questions that will be asked, the methodology to be used, and the population to be surveyed. If a draft questionnaire is available, consider including a copy with the grant proposal solicitation.

Additional Documents - files to be uploaded separately

- **Budget and Budget Justification (7 pts):** Prepare a detailed budget which reflects your needs for the length of the proposed project on the forms provided. Complete requirements for the Budget and Budget Justification may be found on pages 7-9.
- **Current and Pending Support for PI and Co-PIs (3 pts):** Use the form provided for this purpose. Include this proposal under pending support.
- **CV for PI and Co-PIs (3 pts):** Include your publications most relevant to this proposal. Maximum of 2 pages for each investigator.
- **Letters of Intent for Co-PIs (0 pts):** Include a signed letter of intent for each Co-PI specifying their role in the project objectives.
- **Letters of Intent for Cooperators (0 pts):** Include a signed letter of intent for each cooperator specifying their role in the project objectives and any facility infrastructure or in-kind support.
- **Suggested/Restricted Reviewers (optional):** You may submit a short list of suggested reviewers for consideration. Likewise, a short list of persons to whom the proposal should not be sent for review may be included. In both cases, list specific names, titles, affiliations, addresses, email addresses, and phone numbers. Send this list to bfernandez@cps.ucdavis.edu by the submission deadline.

SUGGESTIONS FOR A SUCCESSFUL PROPOSAL

- The technical abstract should offer a concise summation of the proposal to the reviewers. The abstract should conclude with a clear impact statement derived from the anticipated outcomes.
- Review the Proposal Scoring guidelines to gain an understanding of how the reviewers will be asked to evaluate each proposal. This will give you a road map to areas of the proposal that are most important to the review and ranking process and where to spend the most time in preparation.

- The review process will focus on the scientific merit of the proposed research and the relevance of the proposal to the produce industry as described in the RFP's research priorities and specific questions.
- It is not necessary for a successful proposal to address all aspects of a specific question listed in this RFP's research priorities. These questions are guidelines as to what the industry has identified as priorities but it is understood that they are broad in scope and may be beyond the reach of a single research proposal.
- The most common criticisms when reviewing research proposals are "vague," "overly ambitious" or "unfocused." Present clear objectives, well founded hypotheses and work plans that address the stated objectives. Clearly address potential pitfalls or experimental dependencies and how the experimental plan will modulate the occurrence or impact on successful execution of the project plan.
- A key function of CPS is to fund research that can be used by growers, harvesters, shippers and processors to solve critical food safety problems, to provide new insights to optimization of processes, or to establish a novel directional basis for future research. Be sure your proposal aims to advance a near-term solution to a specific food safety problem.
- Careful proofreading is essential for professional evaluation of the proposal. In addition to the expectations for professional organizational style, spelling and grammar, give careful attention to correct citations and the quality of any imbedded images, figures, or graphs.

BUDGET REQUIREMENTS

Budget

Use the budget template provided. Complete a separate budget for each institution named in the project. If funding is requested for more than one year, complete a budget form for each year and a summary budget for the entire period.

Budget Justification

Use the budget justification template provided. Sufficiently detailed budget justifications are required for all categories for which funds are requested. The format of the budget justification should follow that of the budget and should contain headings that match the respective budget categories.

- A. *Salaries and Wages:*** PIs and Co-PIs who are paid a salary by their institution are not entitled to receive salaries from the CPS grant. Support personnel can receive salaries and benefits proportional to the time devoted to the research project.
- **Required element:** For support personnel provide their title, calendar months or FTE committed to the project and their corresponding salary for that period. If more than one investigator will engage personnel please break out per investigator. Provide subtotal for Salaries and Wages.
- B. *Fringe Benefits***
- **Required element:** Provide the benefit rate percentage and amount of fringe benefits attributable to each of the personnel listed above. Provide subtotal for Fringe Benefits.
- C. *Total Salaries, Wages, and Fringe Benefits (A plus B)***
- D. *Nonexpendable Equipment:*** Funds for nonexpendable equipment will only be considered under special circumstances when the equipment is essential for completion of the proposed work.
- **Required element:** Detailed supporting information should be attached for any requests for nonexpendable equipment.
- E. *Materials and Supplies:*** Expendable supplies to conduct the research are allowed to be purchased with grant funds.
- **Required element:** Provide an itemized list of materials and supplies by type and purpose, plus the estimated dollar amount. If more than one investigator involved in the project will require materials and supplies, please break out per investigator.
 - Rental costs of special purpose equipment should be included here. List each item of equipment separately, its intended use and rental cost.
 - If the project includes an outreach component, please itemize mailings, postage and other costs as appropriate.
- F. *Travel:*** The type and extent of travel and its relationship to the project should be specified. Funds may be requested for field work or for travel to professional meetings.
- Include one trip each project year to present research results to the CPS Advisory Board and Technical Committee. One-year projects should include budget estimates for travel to the West Coast; two-year projects should include budget estimates for travel to the West Coast for Year 1 and Southeast for Year 2.
 - **Required element:** For each trip, provide the following information:
 1. **Origin and Destination:** Provide the origin and destination of the trip, e.g. Raleigh, North Carolina to Davis, California.
 2. **Purpose of Trip:** Provide the purpose of the trip, e.g. attend briefing of the CPS Technical Committee.
 3. **Who is Traveling:** Provide the names of the people traveling.

4. **Number of Travel Days:** Provide the total number of travel days for the travelers, i.e. the total number of people traveling x number of travel days.
 5. **Estimated Airfare Costs:** Provide estimated coach airfare cost for each traveler. Provide subtotal for category.
 6. **Estimated Ground Transportation Costs:** Provide estimated ground transportation costs by type, e.g. transportation to airport, parking, tolls, train, rental car and rental car fuel. Provide subtotal for category.
 7. **Estimated Lodging and Meals Costs:** Provide estimated lodging cost and meal cost for each traveler by travel day. Provide subtotal for category.
 8. **Estimated Mileage Costs:** Provide estimated mileage costs for each non-rental vehicle, e.g. using private vehicle to travel or private vehicle transport to airport. Current federal rates are \$0.50/mile. Provide subtotal for category.
 9. **Estimated Total Budget for the Trip:** Please provide the estimated budget for each trip.
- G. Publication Costs/Page Charges:** Costs of preparing and publishing the results of a project conducted under the award, including costs of reports, reprints, page charges or other journal costs, and necessary illustrations may be included.
- H. Computer Costs:** Computer-based retrieval of scientific and technical information may be requested if such services are required for completion of the project objectives and it is the normal policy of the recipient institution to charge for the use of such facilities. A justification based on established computer services rates at the proposing organization should be provided in the Budget Justification.
- I. Student Assistance/Support:** Scholarships, fellowships, stipends, tuition, cost of education, etc. should be itemized with a dollar amount provided for each item. In addition, the number of students to be supported should be indicated for each item.
- J. All Other Direct Costs:** Other anticipated direct costs not included above should be included in this category. These costs must be itemized and the cost per item or service must be provided. Include subcontracts to Co-PIs or Cooperators at other institutions here. Co-PIs or Cooperators at other institutions need to prepare a separate budget and budget justification following the same format as for the PI. Subcontractors should also include a brief explanation of their scope of work on the project.

Budget Restrictions

Please note that some sponsors have restrictions on allowable costs. If an awarded project is receiving funds from one of the sponsors with specified restrictions, PIs will be required to modify their budgets and budget narratives accordingly. During the proposal stage, Budgets and Budget Justifications should be prepared with the assumption that all costs will be allowable.

- **Indirect costs:** Prepare all proposal budgets using a 5% Indirect Cost Rate. However, based on specific funding entities' requirements, indirect costs may be restricted or not allowable. Once the funding source is identified, the Budget and Budget Justification will be revised to reflect the sponsor's indirect cost rate restrictions:
 - Awards funded by CDFA-SCBGP will allow an indirect cost rate of 5% Total Costs.
 - Awards funded by WSDA-SCBGP may not include indirect costs. If your project is funded from this source, all indirect costs will be unallowable.
 - Awards funded by USDA-NIFA / UC-ANR may not include indirect costs. If your project is funded from this source, all indirect costs will be unallowable.

- Awards to University of California investigators under the Agreement between the California Marketing Program and The Regents of the University of California may not include indirect costs. If your project is funded from this source, all indirect costs will be unallowable.
 - Costs that are a part of the institution's indirect cost pool (e.g., administrative or clerical salaries), may not be reclassified as direct costs for the purpose of making them allowable.
- **Tuition Remission:** Once the funding source is identified, the Budget and Budget Justification will be revised to reflect the sponsor's restriction on Tuition/Fee Remission.
 - Tuition/Fee Remission is unallowable on UC-ANR / USDA-NIFA funded projects.
- **Capital Expenditures:** Award funds cannot be used for the renovation or refurbishment of research spaces; the purchase or installation of fixed equipment in such spaces; or for the planning, repair, rehabilitation, acquisition, or construction of a building or facility.

All budgets must be approved by CPS and the corresponding funding agency. Budgets and Budget Justifications must be sufficiently detailed and approved by the funding agency prior to execution of an agreement. Budget revisions requested must be submitted in a timely manner or funding may be delayed or rejected.

PROPOSAL SUBMISSION

- **Upload the complete proposal** to the CPS Grant Site, <https://ucanr.org/cpsgrants>, no later than 5:00 pm (PDT) on April 30, 2010.
- **Send one hard copy** to:
Bonnie Fernandez-Fenaroli, Executive Director
Center for Produce Safety
279 Cousteau Place, Suite 100
Davis, CA 95618.
- The hard copy must be postmarked no later than April 30, 2010.
- **Signature pages** should not be included in the online proposal. Signature pages may be sent as PDF attachments to bfernandez@cps.ucdavis.edu or faxed to (530) 757-5717. Separate signature pages must be submitted by each institution, and must be signed by all participating scientists (PI or Co-PIs) and an authorized official at that institution. The signature page form may be downloaded from the website.

EVALUATION

Proposals will be evaluated by a review panel of at least three experts drawn from the CPS Technical Committee and/or ad hoc reviewers, as appropriate. A written review of each proposal will be prepared and provided to each PI.

AWARD NOTIFICATION

The CPS Executive Director will notify successful applicants after a peer review of all proposals and approval of projects by specific funding entities. The announcement of awards is expected in October-November 2010, pending commitment of USDA funds to the 2010 Specialty Crop Block Grant Program. PIs awarded grants may be asked for additional information.

REPORTING

- Mid-year report (2 pages) will be submitted to the CPS office by email. The format will be provided by CPS.
- All publications must identify CPS and the specific funding agency; grant funding will acknowledge both entities.
- All research results reported in the mid-year and final reports will be public information and posted on the CPS website.
- Final report will be due 30 days after end of the project term. The format will be provided by CPS.
- Funding entities may have additional reporting requirements.
 - Specialty Crop Block Grant Funds: Grant recipients will be required to complete Biannual Progress Reports to provide the status of the project, identify milestones, results achieved, potential concerns, as well as other pertinent information in layman's terms. The Biannual Progress Report will be available in template form. Grant recipients are expected to provide all information pertinent to their project based on the data available.

CPS CONTACT

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Phone (530) 757-5777 / Fax (530) 757-5717
Email: bfernandez@cps.ucdavis.edu

INVESTIGATORS

Principal Investigator (PI) is that person whose name appears first on the title page of the proposal. The PI is mutually agreed upon by the cooperating scientists and is responsible for the submission of scientific reports, administration of the grant, notification of changes in the work plan and maintaining contact with CPS. The affiliated institution of the PI becomes the *principal institution* and signs the research agreement.

Co-principal Investigators (Co-PIs) are those persons whose names appear after the PI on the title page of the proposal.

Cooperators are all other investigators, who are listed on the title page and are neither PI nor Co-PI.

2010 CENTER FOR PRODUCE SAFETY RESEARCH PRIORITIES

Section 1. Core Food Safety Research Needs. These research areas were identified via produce industry risk assessments and prioritized by the CPS Technical Committee. The subject areas cut across all fruit and vegetables as we endeavor to better *understand risk potentials* and *develop more effective food safety management tools*. The descriptions are purposely broad.

1.1 Compost, Soil Amendment Fertilizer Use and Cultivation Practices. Produce growers use an array of organic nitrogen sources (e.g. cow, sheep, pig or chicken manure, fish emulsions, bird or bat guano, expended mushroom mulch, super-heated chicken pellets, green mulch, etc.) in both organic and conventional farming operations.

- Can critical factors be defined for use in evaluating application of organic nitrogen sources to fruit and vegetable crops? What is the influence of crop, region, season, source, pathogen, and treatment or application time/method and can these differences be quantified?
- What practical improvements in composting process control or handling practices might result in more consistent inactivation of human pathogens that can be validated and monitored?

Much of our science-based knowledge to define survival or environmental capacities of human pathogens in soil is based on static model systems or non-cultivated land.

- How do different *cultivation practices* (e.g., soil preparation (pre-plant and postharvest) and crop rotation) impact the fate of foodborne pathogens and/or indicator organisms in various soils?

1.2 Buffer Zones from Domestic Animals to Fruit and Vegetable Production. Domesticated animals are recognized as a potential reservoir or source of foodborne pathogens that directly or indirectly results in contamination of fruits and vegetables. “Buffer” zones between domesticated animal operations (dairy, feedlot and grazing lands) and crop production are often set without adequate data to help define appropriate distances for diverse situations. This task is made difficult by a lack of knowledge regarding the movement of pathogens by wind or air currents, insects, runoff water, birds or other potential vectors.

- Can foodborne pathogens be transferred from animal operations to fruit or vegetable crops by the wind, insects, and wildlife?
- What factors influence the efficiency of this transfer and can they be controlled?

1.3 Practices Used to Reduce Animal Intrusion versus Practices Used to Improve Water Quality Leaving the Farm. Vegetative strips and riparian areas next to crop production are thought to provide habitat for wildlife which may then move into the production area. Environmental and water conservation groups have suggested that certain practices that remove vegetation next to crop production have a negative impact on water quality by eliminating areas that may serve to “filter” water leaving the farm.

- Can foodborne pathogens be transferred by wild animals, birds, or insects from riparian areas or vegetative strips? What factors influence the efficiency of this transfer and can they be controlled?
- Do riparian areas or vegetative strips impact movement of foodborne pathogens from crop production to the environment?

1.4 Water. Growers use a variety of water sources for field operations and irrigation (e.g. wells, on-farm reservoirs supplied by wells, municipal reservoirs, canals, natural ponds, water reclamation projects, lakes, rivers and springs). Often the choice of water source is driven by availability and sometimes by local water districts or boards.

- What factors (source of water, use, and delivery method) impact the risk for contamination of harvested product? Can these risks be quantified?
- What mitigation steps can be employed to diminish these risks?

1.5 Wildlife Risk Factors. Wild birds, animals, and insects may carry foodborne pathogens. However, it is likely that the risk for crop contamination prior to harvest varies significantly among species.

- What factors impact the risk for contamination of fruits and vegetables among the potential pathogen vectors?
- By what means can these risks be evaluated at the farm level and what best practices might be employed to effectively control vectors of significance?

1.6 Vegetable Cooling Methods. Many vegetables are cooled after harvest to preserve quality. Commercial cooling is generally accomplished via vacuum cooling, hydro-vacuum cooling, hydro-cooling or forced air cooling depending on the crop, season and availability of equipment.

- What are the factors that impact the potential for postharvest cooling to influence contamination (either prevalence or numbers) of the final product shipped to retail with foodborne pathogens?
- What strategies could be employed to reduce that risk?

1.7 Harvest Practices. Growers and harvesters have adopted a number of practices to improve the safety of their raw products. Often, these practices have been put in place based on common sense but with very little scientific data to support them.

- There has been an increased use of workers using rubber gloves in field environments. Does glove use reduce the potential for transfer of soil and pathogens to hand harvested products? Can pathogens be transferred from gloves to products? Is this transfer impacted by glove composition, frequency of changing gloves, dipping gloved hands in sanitizer, etc.?
- Growers have been moving away from wooden harvest containers and switching to plastics over the last several years because plastic is easier to clean and sanitize between uses. Can pathogens survive on the surfaces of plastic bins and totes? Can pathogens be transferred from plastic bins or totes to raw products? What cleaning and sanitation methods can reduce the potential for pathogen transference?
- A potential risk factor for pathogen transfer is harvest equipment that has become contaminated. If a tractor or harvest machine passes over a farm area where pathogen contamination may be present, e.g. field ditch containing run-off water or puddle water in a field, can this equipment transfer pathogens to any plant material it contacts? Does ditch water or puddles of water found in fields represent contamination risks?

1.8 Pathogen Transfer from Wash Water during Processing. The control of wash water quality has been an industry focus for many years. HACCP plans always identify the level of sanitizer and pH measurements as CCPs. Still, it is important to gain a better understanding of wash water quality and tools that might be used to improve pathogen control.

- Organic load can impact the efficacy of many wash water sanitizers. What tools are available to reliably monitor organic load and how might these be used to give operators better control over wash water sanitation?

1.9 Significance of “Positive” Product Test Results and the Capacity to Cause Illness. As raw and finished product testing programs become more common in the produce industry we have seen a low frequency of positive tests based on the use molecular methods. Many methods for testing employ an initial enrichment step in complex media that permit target pathogens to “recover” from the ambient conditions on the surface of a fruit or vegetable.

- How is the physiological state of *Salmonella* and/or *E. coli* O157:H7 on fruits or vegetables impacted by the pre-harvest environment? What factors impact that state?
- How is the virulence of *E. coli* O157:H7 or *Salmonella* on fruits or vegetables altered in the pre-harvest environment?
- Can cost-effective methods be developed or adapted that would allow for quantification of pathogens on fruits or vegetables rather than yes/no tests?

Section 2. One of the objectives of CPS is outreach and education. Specifically, CPS has a focus on training programs that benefit growers and processors of all sizes who deal with a range of food safety issues every day.

2.1 Risk Assessment and Management Tools. Increasingly, risk assessment and management is being recognized as the central focus in the development of effective food safety programs along the entire produce supply chain. Food safety audits, product and environmental testing, sanitation programs, worker training and other components of food safety programs are important foundational elements to be sure, but each needs to be built around solid, operation-specific risk assessment. However, the task of conducting a risk assessment program for a specific operation and the development of effective risk management practices can be a daunting task. This may be especially true for smaller operators who often feel they do not have the technical sophistication or resources to develop risk-based food safety programs. CPS is specifically seeking a proposal to develop a curriculum that can be used to train food safety professionals and agricultural extension specialists in risk assessment at the farm level and/or in Hazard Analysis Critical Control Point (HACCP) for processors of fruit and vegetable products. A successful proposal would need to include specific plans for outreach to small to medium-sized growers. The successful proposal would be expected to contain a discrete number of training sessions to test and fine tune the training tool and messaging. Collaborations between universities in various areas of the country would also strengthen the proposal and further guarantee national outreach.

Section 3 - Partners in Research – CPS partners with various commodity groups and organizations to help identify and fund research programs to improve our understanding of specific food safety issues for targeted commodities.

3.1 The California Walnut Commission (CWC) is seeking to take a leadership role in developing a program to educate the walnut supply chain as it pertains to product handling and safety. Although walnuts have never been implicated in any foodborne illness; preventative food safety plans and

supporting prerequisite programs are necessary to ensure that all members of the walnut industry have effective food safety management programs in place. The CWC is seeking proposals to address the following needs and will collaborate with the PI and provide source materials and access to growers and processors:

- The development of a comprehensive training program for walnut producers to include, but not limited to: Good Agricultural Practices (GAP), Good Manufacturing Practices (GMP), Good Laboratory Practices (GLP), Homeland Security (HMLS), Product Protection and Defense and Safety, Hazard Analysis and Critical Control Point (HACCP) practices and any other foundational food safety programs pertinent to the walnut industry. Where appropriate, the program should reference resource information from the FDA, USDA, DFA, County Farm Advisors and University of California Davis Cooperative Extension and any other recognized institution.
- Identify methods to implement education/training for employees, disseminating information to every level of the various stakeholders to ensure their knowledge, understanding and role in the food/supply chain process, right down to the day to day nuances of their job that contribute, not only to the safety of walnut industry, but California agriculture at large. Identify and/or develop educational materials to support industry-wide training programs.
- A successful proposal must include traceability of products as a key subject matter. Develop training materials for plant management and employees to ensure traceability of all products sent into the consumer market.

3.2 The California Melon Research Board is interested in research programs on treatments that can be used, within the framework of current harvest, cooling and transport of fresh melons, to reduce pathogen growth on the melon surface.

- Following harvest and field packing, palletized boxes of melons are cooled (primarily by forced air) and shipped shortly thereafter by truck to distribution centers. Can melons be effectively treated during cooling or shipping with antimicrobials applied via circulating forced air to reduce natural populations of spoilage organisms and/or human pathogens? Any treatment should not damage the product or significantly slow distribution of the product.

3.3 The Florida Tomato Research Committee wishes to better define the potential for pathogen transference during specific harvest and packing operations. Initial evidence of potential transfer of pathogens from soiled reused boxes or dirty cleaning cloths indicated likely unsatisfactory transfer of microorganisms to tomatoes. We need additional well-designed scientific studies to prove or disprove initial observations.

- It has been a common practice to re-use tomato cartons in repacking operations. Can pathogens be transferred from used tomato cartons to tomato fruits?
- Cloths have been used to wipe off dirt or other debris from tomato fruits in field pack operations. Can pathogens be transferred from these types of cloths to tomato fruits?
- It has been suggested that animals native to Florida and co-existing with tomato production could be sources of pathogen contamination in tomatoes. What is the frequency of contamination among various species that might pose a contamination risk? How might transference occur?

The Florida tomato industry is also interested in the development of a written comprehensive review covering food safety research and tomatoes.

3.4 The Washington Tree Fruit Research Commission and the apple industry in the Pacific Northwest are interested in a research program to investigate the risk of pathogen contamination on fresh market apples.

- What is the frequency of natural foodborne pathogen contamination on Washington fresh market apples in orchards, packinghouses, and during storage and shipping? The Washington Tree Fruit Research Commission will facilitate access to Washington growing/packing operations or will provide samples from them to support a research program on this topic.
- What are the potential sources of contamination with foodborne pathogens in orchards, packinghouses, storage and shipping?
- What mitigation steps could be used to manage risks from contamination with foodborne pathogens on Washington fresh market apples?
- What are the specific risks of contamination through water used in irrigation and overhead cooling for Washington apples?
- The Washington Tree Fruit Research Commission is interested in supporting the development of an outreach program to train apple growers regarding potential risk factors for foodborne pathogens in their operations and management practices that can be implemented to reduce these risks.
- Can existing public and private datasets be collated and utilized to help establish baseline levels of microbial contaminants and common mitigation procedures? The Washington Tree Fruit Research Commission will facilitate access to Washington growing/packing datasets to support a research program on this topic.

3.5 The Almond Board of California, in addition to core research areas 1.1 and 1.5 above regarding composting and irrigation water, is also interested in the following areas of research.

- Almonds are harvested from the ground and are hulled and shelled in specialized facilities. These facilities are very dusty and difficult to clean and sanitize, particularly during the harvest season. Little is understood about the impact of removing the hull and shell with respect to microbial levels on the kernel. Factors such as almond variety, conditions during harvest and storage conditions, may influence microbial loads on kernels. Data on the potential for cross contamination of pathogens from one lot to another is also needed particularly with respect to airborne dust as a vector. The Almond Board of California will facilitate access to hulling/shelling facilities or provide samples from them to support a research program on this topic.
- Cleaning and sanitizing equipment and facilities where low-moisture foods are processed is challenging due to restrictions in water use. Guidelines for design of sanitary equipment are needed as are rapid means to validate the efficacy of sanitation procedures.
- In many instances equipment must be validated for reduction of pathogens on-site. Usually, it is inappropriate to use pathogen-inoculated product for this purpose. While a surrogate has been identified for use with almonds and dry and moist thermal processes validated surrogates are needed for other treatments (e.g., PPO, ozone).

3.6 The California Pistachio Board is interested in a research program focused on defining a validated process for the use of propylene oxide (PPO) on raw pistachios. In recent years, a number of treatments have been tested with raw pistachios to reduce microbial populations, but many producers are most familiar with PPO. Yet, the industry does not have a validated process that producers can use in their operations. The pistachio industry will work with prospective researchers to provide access to facilities and raw product samples.

- What are the parameters for PPO use on raw pistachios to achieve a 3-5 log reduction in microbial population on the surface of raw product?

3.7 California Leafy Greens Research Program. As a component of leafy greens production, the un-harvested portion of the crop (e.g. root materials, outer leaves, product that does not meet quality criteria, etc.), is turned back under the ground in preparation for the next crop. How is pathogen persistence impacted in crop residue under field conditions and typical ground preparation for planting of subsequent leafy greens crops?