

**California Department of Food and Agriculture
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A Continuous Leaf Monitoring System to Detect Plant Water Status to Assist in Irrigation Management of Specialty Crops \$285,906

The Regents of the University of California, Davis

Almonds and grapes are important crops in California and were worth about \$8.8 billion in 2012. Proper irrigation management is key to achieving this production. Increasing scarcity of water resources has become a challenge to growers. Studies have shown that measurement of plant water status provides the key information necessary to implement efficient irrigation management. A pressure chamber is often used to measure plant water status. However, this technique is labor-intensive, tedious and time-consuming. A continuous leaf monitoring system has been developed that consists of thermal infrared sensors along with environmental sensors (ambient temperature and relative humidity, wind speed and incident radiation) to successfully detect plant water status and integrate it with a wireless mesh network. In this project, a network of leaf monitors, controllers, and other sensors will be used to implement precision irrigation management to improve water use efficiency in the production of almond and grape crops.

Accelerating Adoption of Innovative Conservation and Sustainable Best Management Practices \$368,167

California Sustainable Winegrowing Alliance

California Sustainable Winegrowing Alliance seeks to grow implementation of its Sustainable Winegrowing Program for economic and environmental (soil/water/energy) viability. An Economic Cost/Return Tool will be developed to help growers assess costs and benefits of sustainable practices. Case studies, videos, and other business case resources will be developed for workshops, webinars, websites, newsletters, and trade articles aimed at the 4,600 California winegrape growers and 3,800 bonded wineries. Target is 80 percent statewide implementation (or 196,800 additional acres) and fuller implementation in approximately 240,000 currently assessed acres. Adoption of 181 sustainability practices is scored on a one to four scale, four being most sustainable; as current scores average (1) 17 percent, (2) 28 percent, (3) 29 percent, and (4) 26 percent, there is major room for improvement.

The Bagrada Bug Invades the Salinas Valley - the Salad Bowl of the World \$367,018

The Regents of the University of California, Davis

The Bagrada bug, *Bagrada hilaris*, is an invasive insect pest first found in June 2008 in Los Angeles County. This pest is problematic for California specialty crops in two ways: it is a major pest of crucifer crops, such as cabbage, kale, turnip, cauliflower, mustard, broccoli, and radish; and it also potentially damages other crops. Adults and nymphs damage plants by inserting mouthparts and removing plant juices, resulting in large stippled/wilted areas on leaves. The growing point can also be destroyed, distorting plant growth. California was the first United States find for this pest and now other states and countries have concerns about receiving this pest from California via commodity trade. Research has been conducted on this pest in the desert vegetable production areas of California and Arizona. However, the Bagrada

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bug range has spread to the Salinas Valley, a major producer of high value crucifer vegetable crops. Research will be done in this area on the biology, damage potential, and management of this pest.

Biology and Control of Euwallacea sp., the Vector of Fusarium Dieback Disease in California Avocado and Nursery Tree Production \$396,493

The Regents of the University of California, Riverside

The ambrosia beetle, *Euwallacea* sp., an undescribed invasive species very recently introduced into California, vectors the fungal pathogen causing a *Fusarium* dieback disease. The beetle attacks more than 200 host tree species, including avocado and many important nursery stock trees, including trees less than three centimeters in diameter. Infestation inoculates fungi that cause branch die-back and tree mortality. Research will focus on direct control of the insect that can be used by the avocado and nursery industries and describing the life history of the beetle. The University of California, Riverside will test insecticides for protecting uninfested hosts, and disinfestation of infested material in sanitation programs for elimination of beetles. Complementary studies will determine the temperature limits for the beetles, the temperature-dependent development rates, number of generations each year, and host selection, fecundity and survival of beetles and symbiotic fungi in potential hosts, including avocado and nursery host trees.

California, Always in Season – Building Community \$1,573,035

The Buy California Marketing Agreement

Building on the success of the 2013/14 “California, Always in Season” program, the Buy California Marketing Agreement (BCMA) and the California Travel and Tourism Commission (Visit California) will coordinate an integrated paid media program with Food & Wine, a national food and wine publication to highlight the seasonality, diversity, and uniqueness of “California Grown” specialty crop products. In addition, BCMA will engage stakeholders and consumers to build the CA GROWN community. CA Grown is uniquely qualified to showcase a multitude of Specialty Crops on a seasonal basis throughout the year (50+) through our marketing, public relations and advertising platforms. This year, Sunset will be included to deliver a local’s perspective on California travel and culinary culture. The media program will leverage the baseline culinary campaign that currently exists as part of Visit California’s domestic /global marketing efforts allowing for additional owned/earned media visibility through specialty crop specific content development. This campaign, “California, Always in Season- Building Community,” will continue to link the iconic imagery and marketing of California as a travel destination with the specialty crop products grown and harvested in the state. The “California, Always in Season – Building Community,” tagline will always be accompanied by a sub-heading highlighting a specific specialty crop item/grouping, examples include but are not limited to – ‘A Blueberry Summer, Fresh Fruits from the Central Valley, or Desert Dates.’ To leverage the campaign and create a lasting relationship with consumers and stakeholders, BCMA is investing in a strong social media, a refreshed online presence and a blog that focuses solely on specialty crops and developing partnerships with media outlets, retailers and restaurateurs.

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California Specialty Crop Export Promotion

\$293,858

Center for International Trade Development, Fresno

International market development programs have had a significant and positive impact on exports of California specialty crops. Ultimately, this influx of new programs is helping achieve the National Export Initiative goal of doubling all United States exports by the end of 2014. This project will support the California specialty crop industry by creating opportunities to export specialty crop products to global markets through trade missions and product promotions. The California Center for International Trade Development (CITD) will coordinate two reverse trade missions with 20 foreign importers of California specialty crops from six or more global markets, and one trade mission to China. During these missions, the CITD will facilitate one-on-one meetings between foreign importers and California suppliers of specialty crops, facility site visits, product demonstrations, and specialty crop awareness through product promotions. Projected export sales generated is \$3.5 million; a return on investment of \$11.50 for every allocated dollar.

California Specialty Crops for California Kids

\$388,131

Oakland Unified School District

Oakland Unified School District, Nutrition Services (OUSD NS) is proposing a comprehensive recipe development, staff training and marketing program to increase the amount of California specialty crops served in the district. This program will serve as a critical component in a strategy to prepare for the opening of a new central kitchen facility in 2016. OUSD NS goals are two-fold: 1.) Increase access to California specialty crops, thereby benefiting the local economy and specialty crop growers across the state; and 2.) Expand the market and marketability of California specialty crops. To accomplish these goals, OUSD NS will develop new recipes highlighting California specialty crops, revise salad bar program to feature only California grown specialty crops, research and develop an in-house produce processing program, convene peer-to-peer taste tests to evaluate recipes, train staff, and market California specialty crops to students and families.

California State Fair Extra Virgin Olive Oil Competition

\$115,000

California Exposition and State Fair

The California State Fair is seeking to support the California Olive Oil Council (COOC) to create an exciting new competition and corresponding marketing outreach display designed to identify and reward California olive oils demonstrating the highest industry standards. The California State Fair Extra Virgin Olive Oil Competition is designed to achieve sustainability within three years and is patterned after the successful State Fair Wine Competition. This competition will be open only to California produced olive oils and requires submissions meet the standards of COOC certification. The State Fair will create a marketplace display showcasing the olive oil industry. This interactive display will feature on site farmers, olive oil commodities available for purchase, educational components, interactive activities and marketplace décor to create an aesthetically pleasing atmosphere providing a potential link to over 700,000 fair visitors directly to olive oil products.

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California Wines Road Trip: A Marketing Program for Wine Tourism \$380,075

Wine Institute

Small and mid-size wineries depend heavily on tasting room sales, related wine club signups, and consumer loyalty; even the largest benefit from these opportunities to build value perceptions and loyalty. In conjunction with Visit California, a nonprofit formed to work jointly with the California Division of Tourism to increase visits to California, the project will focus on national media and trade attention to bring in wine tourists from around the United States. Wine Institute (WI) seeks funding for national promotions, advertising, and promotional events to attract national wine media, trade, and consumers. The project is forecasted to grow California winegrape grower returns by five percent; accordingly, it is supported by California Association of Winegrape Growers (CAWG). Together, WI and CAWG represent 1,000 wineries (85 percent of California wine sales) and 60 percent of California growers (representing 389,375 acres).

Characterizing and Breeding Drought Tolerance in Lettuce \$353,151

USDA, Agricultural Research Service

Supplies of irrigation water for leafy vegetable production in California are increasingly constrained due to both climate change and regulatory restrictions. Reduced water availability is a statewide problem affecting all major lettuce producing regions. A predicted rise in temperatures will lead to increased evapotranspiration that will increase the water requirement of lettuce. Thus, there is a pressing need to adapt lettuce production to the changing environment in order to protect and even increase current production levels. The purposes of this proposal are to identify traits underlying drought-tolerance in lettuce at both the physiological and molecular levels and incorporate these traits into new cultivars protecting yields. This project aims to contribute to water conservation, reducing production costs and increasing the profitability of the lettuce industry while simultaneously increasing the sustainability and protecting the future of lettuce production in California.

Colusa County Grown-Specialty Crop (CCG-SC) \$68,739

Colusa County Resource Conservation District

There are four specialty crops included in Colusa County's top ten commodities. The Colusa County Grown - Specialty Crop project will enhance the marketability and competitiveness of these and other specialty crops by instilling a greater public appreciation and increasing the producers' ability to market these crops. The farm to consumer connection will be strengthened through a range of educational outreach endeavors focusing on educating the public on the health and environmental benefits of specialty crop agriculture and expanding the producers' toolbox of marketing options. Colusa County Resource Conservation District staff will work with the County government to assist in the development of the Colusa County Grown Center, which will feature a commodity store, farm tours, and agriculture demonstrations. Staff will facilitate marketing and agritourism events and create professional publications, exhibits, and presentations.

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Community-Based Food Project in Underserved Sacramento \$344,804

International Rescue Committee, Inc.

The International Rescue Committee's New Roots program will address gaps in nutrition and specialty crop consumption for low-income residents of Sacramento through three main interventions: 1.) Urban agriculture training (Farm Academy); 2.) Community garden access; and 3.) Nutrition education and food secure programming. The program will target low-income immigrant and refugee populations who lack access to culturally appropriate specialty crops. The program will utilize food frequency questionnaires, surveys, and market research to inform program implementation and measure key impact points including: change in nutrition knowledge and resulting increase in culturally appropriate specialty crop consumption, increase in local specialty crop sales, increased marketing opportunities for Farm Academy participants, amount of specialty crops sales by Farm Academy participants and number of new specialty crop farm operators.

*Contamination of Leafy Green Crops with Foodborne Pathogens:
Are Wildlife a Problem?*

\$197,429

The Center for Produce Safety Foundation

The Center for Produce Safety Foundation will partner with the United States Department of Agriculture, Animal and Plant Health Inspection Service, Wildlife Services to develop mitigation measures to prevent contamination of produce fields by wildlife. This study will determine whether wildlife contribute to foodborne disease risk by contaminating leafy green produce during visits to agricultural fields. There have been several instances where foodborne disease outbreaks are thought to have been related to wildlife presence in crop fields, but these links are poorly understood. By collecting data on when wildlife enter agricultural production areas, what species enter, where they enter, and how many are present at a given point in time, it can be better understood if and where the introduction of pathogens causing foodborne diseases might occur. Fecal samples will be collected from wildlife visiting produce fields and tested for three of the top microbial pathogens causing foodborne disease. This information will provide needed insight into the magnitude of the problem and will determine if actions should be taken to limit this risk and what those actions should be. The results will help balance the coexistence of wildlife habitat with protection of agricultural producers and human health from foodborne pathogens.

Cultivating Community North Valley

\$399,870

California State University, Chico Research Foundation

Cultivating Community North Valley (CCNV) will train a new generation of farmers, strengthen food security and grow the (chiefly organic) specialty crop economy by expanding its piloted project serving low-income residents, growers, help agencies, and K-18 (kindergarten through graduate school) agriculture/farming students. In 2014 through 2017, CCNV will: 1.) Expand by 100 percent a stakeholder coalition to identify/address Butte's ongoing food system needs; 2.) Augment a three acre university student-run organic specialty crop farm; 3.) Expand CCNV's

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network of community and school specialty crop gardens; 4.) Increase fresh specialty crops to institutions, service agencies, and housing projects; 5.) Offer three tiers of workshop courses in bio-intensive specialty crop growing; 6.) Bring culinary preparation/preservation demonstrations to workshops and farmers markets; 7.) Provide community garden-to-CSA workshops, increasing the sustainability of urban farms and the number of local direct marketers; and 8.) Promote project model throughout the North State.

Data-Driven Targeted Education to Increase Adoption of BMPs by Almond

Growers

\$348,700

SureHarvest

California Almonds are a success story with an annual farm gate value over \$4 billion. Almond Board of California (ABC) efforts are driving success via research, education, outreach, and smart marketing. The California Almond Sustainability Program (CASP), an ABC and SureHarvest partnership, is the centerpiece of industry activities to promote, document, and adopt environmentally and socially responsible Best Management Practices (BMPs). CASP includes grower self-assessment of irrigation, nutrient, energy, air, and pest BMPs and the application of results for communications, targeted education, and continuous improvement. The recently produced 2014 Almond Sustainability Report details strengths and improvement opportunities for grower practices based on assessments of over 95,000 acres. This proposal takes the next steps: 1.) Apply assessment results to prioritize grower educational needs; 2.) Provide education via workshops and the CASP online system; and 3.) Measure progress in BMP adoption.

*Developing and Implementing a Self-Assessment Program for Stewardship
Practices in California Cherry Production*

\$201,538

California Cherry Board

California cherry growers are using many sustainable farming practices in the production of cherries. However, they have no processes or methods by which they can document the level of implementation of these practices or identify where improvements can be made. This project will finalize a self-assessment workbook for the sustainable production of cherries initiated under 2010 Specialty Crop Block Grant Program Project 4 and incorporate the workbook into a web-based tool that will: allow growers to do confidential self-assessments on-line; allow for aggregation of self-assessments to report on the level of implementation of important practices through the industry; identify where improvements can be made and, through targeted education, bring about an increase in the use of key practices that will improve on the farm's economic and environmental performance.

*Developing Lettuce Cultivars with Resistance to Bacterial Leaf Spot and
Tospoviruses*

\$367,832

USDA, Agricultural Research Service

Lettuce is a valuable California crop, but the diseases bacterial leaf spot caused by *Xanthomonas campestris* pv. *vitiensis* (Xcv) and two related Tospoviruses, Tomato spotted wilt

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virus (TSWV) and Impatiens necrotic spot virus (INSV), reduce profits. This project will help growers reduce crop losses by developing cultivars with disease resistance. No known lettuce cultivars or accessions are TSWV and INSV resistant. A gene for Xcv resistance is known but is defeated by resistance-breaking Xcv strains. This project will identify and characterize lettuce accessions with resistance to TSWV, INSV, and resistance-breaking Xcv strains, develop greenhouse methods for testing TSWV and INSV resistance, determine the inheritance of resistance, and determine the diversity and prevalence of resistance-breaking Xcv strains in California. New genes, breeding lines, and scientific information will be released to private seed companies and the lettuce industry. This will increase the number and utility of resistance varieties, thereby reducing crop losses.

Development of a Solar Thermal Drum Dryer for Specialty crop Purees and Pomaces \$126,646

USDA, Agricultural Research Service

Specialty crop processors would benefit from an environmentally-friendly technology for quickly drying purees and pomaces. Drum drying is a well-established food processing unit operation that can dry large amounts of product in a matter of seconds; however, current drum dryer designs require high-pressure steam obtained from non-renewable energy sources, such as burning natural gas. In theory, solar thermal technology can provide the heat required for drum drying, but the combination of these two technologies has never before been explored. Thus, the objective of this project is to develop a processor-friendly solar thermal drum dryer that can be used to quickly dry specialty crop products such as apple, pear, berry, and vegetable purees and pomaces from tomatoes, grapes, olives, and carrots.

Development of a Statewide Spatial/Mapping Database for Almonds, Walnuts, and Pistachios \$290,378

Almond Board of California

Accurate data on acreage and changing location of nut crops is a critical need for environmental applications. Growers, industry and commodity groups of almonds, walnuts and pistachios will benefit from applying spatial data on land use change, nut type, location, age and density for management of environmental resources and proximity to sensitive areas of water quality, air quality, disease/pest vectors, etc. Environmental factors such as climate change and sensitive habitats influence how much and where these crops are grown. The goal of this project is to map 1.5 million acres of all almonds, walnuts, and pistachios statewide at 95 percent accuracy. This remote sensing approach provides unique results and has been supported/validated by Almond Board of California pilot studies against other alternatives. Independent validation will be a measure of success as this method is more accurate, timely, and cost-effective than any current land survey. The data are valuable for guiding environmental management and regulatory compliance.

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Development of an RNAi-Based Biological Insecticide Strategy for Management of the Mealybug Complex in California Grapes \$398,042

The Regents of the University of California, Davis

Multiple species of mealybug are important pests in California grapes. Mealybugs are destructive phloem-feeders that cause reduced plant vigor, are difficult to control, and serve as vectors of the grapevine leafroll-associated viruses. Although all mealybug species are pests, the vine mealybug is the most pestiferous because of its ability to rapidly reproduce and spread, and to efficiently vector grapevine leafroll-associated viruses. The vine mealybug is an invasive pest that was first found in California in 1994. Since then, it has continued to spread and is now found in 20 counties. In the laboratory, the Regents of the University of California, Davis (UCD) have identified a non-transgenic plant based RNA interference approach that induces nymphal mortality of the citrus mealybug, a close relative of the vine mealybug. UCD will build on this discovery and identify additional mealybug genetic targets, then develop tools that can help manage the mealybug complex in grapes. These studies will be conducted at the University of California, Davis within the Biosafety 3 Contained Research Facility.

Development of High Throughput Serological Assays for the Routine Detection of Grapevine Red Blotch Virus \$287,519

The Regents of the University of California, Davis

Grapevine red blotch virus (GRBaV) was discovered in 2008 and is correlated with leaf reddening and reduced sugar content in berries. Testing for this virus poses a significant challenge for individual growers and nurseries who must assess the status of infection in their vineyards to make management decisions. The current polymerase chain reaction (PCR) based detection methods are relatively expensive. The development of an inexpensive GRBaV detection assay would be of enormous benefit to the California grape industry. The University of California, Davis (UCD) proposes to develop highly specific antibody-based detection assays for GRBaV. Antibodies will be raised against peptides of the capsid protein. The antibodies will be used in serological assays for GRBaV, including enzyme-linked immunoassorbent assay (ELISA). UCD will confirm accuracy and specificity of the antibodies then develop high throughput assays (e.g., ELISA and in-field method). UCD will promote use of these assays through presentations at industry/grower meetings and symposia, and by distribution of pamphlets and e-newsletters.

Development of Rapid, Portable Molecular Diagnostics for Important Soilborne Pathogens in California Agriculture \$296,412

USDA, Agricultural Research Service

Soilborne pathogens have a significant effect on all crops throughout the state of California. Frequently, these pathogens are present in a disease complex and obtaining a timely and complete diagnosis can be problematic. Current detection techniques, including conventional isolation and DNA extraction followed by polymerase chain reaction (PCR), do not allow for a rapid diagnosis. New molecular isothermal amplification markers would simplify this process and allow for a more rapid detection without the need for DNA extraction. The goal of this

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project is to expand the capability to detect an array of economically important soilborne pathogens more rapidly by developing inexpensive and less technologically sophisticated diagnostic tools. There is currently an assay developed for Phytophthora that can provide results from field samples in as little as ten minutes. The strawberry and nursery production systems will serve as models initially, with other cropping systems being added as the project progresses.

Disease Forecasting of Spinach and Lettuce Downy Mildew to Foster Best Management Practices

\$348,977

USDA, Agricultural Research Service

Downy mildew of spinach and lettuce are diseases of major economic importance in California. Inoculum is dispersed as windborne spores that infect the plant, causing necrosis and influencing marketability. The primary aim of this project is to develop a forecasting model for these pathogens based on spore loads and environmental conditions favorable for infection to enable more efficient timing of fungicide application for disease management. United States Department of Agriculture, Agricultural Research Service already has a DNA detection assay for spinach downy mildew and for the past one and half years have used solar powered spore traps to assess the level of airborne inoculum. Data is also in hand for the validation of a molecular assay for lettuce downy mildew. Funding of this project will enable a more comprehensive assessment of pathogen inoculum density during the season and the relationship of environmental parameters on disease severity. This will enable more efficient timing of fungicide applications and improve the ability of growers to manage these diseases.

Effectiveness Study of Multiple Off-Farm Water Treatment Practices for Specialty Crop Farmers

\$344,437

San Jose State University Foundation on behalf of Moss Landing Marine Laboratories

This project will construct, study and compare four different beneficial management practices with three replicates each to quantify the nitrate load reduction capacity of each type, for use by specialty crop farmers within the Salinas Valley. The Central Coast Wetlands Group (CCWG) and partners have documented the load reductions of numerous pilot systems. Data, however, are difficult to compare because pollutant load, flow and retention time, and climate characteristics are inconsistent among studies. CCWG will create an "outdoor laboratory" to test the decay rate constants for nitrates within 12 treatment chambers using standard flow rates, retention times, and nutrient inputs. CCWG and partners will use these data to develop load reduction models and evaluate the functional constraints of each technology. These data will enable growers to reduce nitrate levels in farm runoff through application of techniques best suited for the specific specialty crops and drainage conditions.

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Engaging Agriculture within the Local Community: A Project Addressing Food Access, Agricultural Education and Outreach \$278,188

California Department of Food and Agriculture, Division of Inspection Services, Farm to Fork Office

Agriculture is an important component within local communities – positively impacting issues associated with food insecurity, education, nutrition and overall health. This project focuses on developing the incorporation of specialty crop products and producers into local community efforts to combat hunger, enhance agricultural education in schools, and to better connect consumers to specialty crop growers.

Enhancing the Marketability of California Persimmons \$220,794

USDA, Agricultural Research Service

Although California produces 99 percent of the United States crop of persimmons, total acreage has decreased substantially, with the United States Department of Agriculture reporting a 16 percent drop from 1997 to 2007. In contrast, pomegranates, another California specialty crop, have seen cultivation increase by 424 percent in the same time period. This increase in cultivation and profitability has been propelled by two factors, one: marketing based upon nutritional factors including the presence of bioactive compounds, and two: the availability of a minimally processed product year round. We propose to evaluate fresh persimmons, develop the conditions for producing a dried persimmon product (at the home and cottage level), and evaluate resulting dried product for its nutritional content and consumer acceptability. Results from this study will be shared with growers, producers and consumers, and ultimately compiled into a glossy flyer detailing the home drying process and nutritional benefits to be displayed and distributed at the point of sale.

Ensuring Grape Grower Viability by Driving Sales for Sonoma County Wines \$377,282

Sonoma County Local District 3 Winegrape Commission

Sonoma's winegrape growers face rising costs but flat prices. 2012's three year average farm gate price was only \$7 per ton higher than 2002's three year average; cumulative 2002 through 2012 inflation was 33 percent. The purpose of this project is to increase grape prices by boosting sales of premium-priced Sonoma wines (over \$15 per bottle) to United States consumers and the trade (higher premium demand leads to higher grape prices; increased returns help ensure grower viability). This project capitalizes on a new California law requiring conjunctive "Sonoma" labeling on bottles produced in the county, jointly promoting Sonoma wines with grower videos, website improvements, local/regional/national print and digital ads, printed materials, radio ads, and newsletters. Sonoma County Winegrape Commission represents over 1,800 growers, basis of a \$13.4 billion wine industry. Promoting Sonoma wine grows awareness for all California wines. This project is supported by the California Association of Winegrape Growers and the Wine Institute. The targeted outcome is a price increase of \$50 per ton per year (total grower returns approximately \$10.45 million).

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Enteric Viruses as New Indicators of Human and Cattle Fecal Contamination of Irrigation Waters

\$219,879

The Center for Produce Safety Foundation

The Center for Produce Safety Foundation will partner with the University of Arizona to provide a more accurate quantitative assessment of the presence of human and cow fecal contamination associated with irrigation water for fresh or ready-to-eat produce. The standards used by the produce industry to detect fecal contamination in irrigation waters are based on tests developed for drinking waters and include risk threshold levels established by the Environmental Protection Agency for recreational waters. This contamination threshold may not be appropriate for determining if there is a “risk relevant” level of contamination for crops irrigated with waters tested in this manner. To improve these regulations, novel viral targets will be used that have shown to better correlate with the presence of fecal material and evaluate them for potential as more sensitive and specific detection methods for evaluating the safety of irrigation waters. This work will evaluate the accuracy of these novel indicator viruses and optimize the methods required for field use. This information may allow the produce industry valuable exposure data on the presence or absence and quantity of fecal contamination present in irrigation waters and provide needed improvements to the use of indicator organisms for evaluating irrigation water quality.

Evaluation of an Alternative Irrigation Water Quality Indicator

\$218,056

The Center for Produce Safety Foundation

The Center for Produce Safety Foundation will partner with the University of California, Davis to develop data to support academic, industry, and public health evaluations for the replacement of non-functional quantitative irrigation water standards with a simpler semi-quantitative threshold. Water used in pre-harvest production of edible horticultural foods, fruits and vegetables is universally recognized as a key potential hazard for crop contamination with human foodborne pathogens. Industry guidance, standards, microbiological and sampling interval metrics uniformly identify nonpathogenic *Escherichia coli* (*E. coli*) as the practical and cost-effective indicator of fecal contamination of a water source. Drawn from recreational water quality standards, numbers of *E. coli* can be associated with the presence of human pathogens. Experience and thousands of irrigation water tests demonstrate that the accuracy of current metrics to predicting risk to consumers following consumption of uncooked produce is very poor. The project objective is to develop an initial baseline of comparative data for indicator *E. coli*, Total Bacteroides (an alternative and more robust indicator) in surface water sources to the presence of human pathogenic *E. coli* and *Salmonella* in water used for irrigation management, ag-chemical sprays, and pre-harvest applications. Studies will be conducted in Arizona, California, Oregon, Washington, and selected regional production districts.

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Expanding Markets for California Olive Oil

\$352,948

California Olive Oil Council

The California Olive Oil Council (COOC) is a non-profit organization representing more than 90 percent of California's olive oil growers, and the only one representing solely California olive oil growers. Olive olives are California's fastest growing specialty crop; growers will harvest three million gallons of olive oil in 2013, projected to reach 5.8 million gallons by 2017 as new acres come in to production (University of California Davis). It is essential to increase the market share of California growers. Consumers must be shown the value of California olive oil. Great opportunity exists to market superior California oil but education of consumers, retailers, and influencers (chefs, media, food bloggers) is needed. For the purpose of growing California olive oil sales to absorb coming production increases, COOC will execute a marketing campaign, host "tree to table" and other similar events, and attend food shows to promote California olive oil in three target markets: California, the mid-Atlantic and the Pacific Northwest.

Farm to Seniors: Improving the Vitality of Specialty Crop Farmers and Senior Adults

\$77,586

California State University, Chico Research Foundation

Small specialty crop farmers have limited market channels in rural areas. Few retail channels exist for locally grown produce in the project area, rural Northern California (Glenn County). The senior adult population in rural areas has difficulty accessing healthy meals due to the few grocery stores and restaurants in these areas, transportation constraints, and lack of motivation to prepare meals. The Senior Nutrition Program (SNP), which prepares daily hot meals served at a community center or delivered to the home, provides an important service and will be the vehicle by which specialty crops will be promoted to seniors. The goal of this project is to improve the vitality of both small specialty crop farmers and senior adults by training kitchen staff to prepare specialty crops in ways that appeal to the seniors and adapt these recipes for home meal preparation. The Farm to Seniors project determine the feasibility of this market channel for the farmers and increase the consumption of specialty crops by seniors.

Improved Detection Methods for Tuta Absoluta, a Potential New Pest of Tomatoes

\$296,172

The Regents of the University of California, Davis

Tuta absoluta (T. absoluta) is a key pest of tomatoes and is spreading rapidly through tomato growing regions of the world, despite strict plant pest regulations designed to stop its spread. T. absoluta larvae and damage resembles that of other tomato pests found in California, such as the tomato pinworm, and positive identification of adults currently requires dissecting the genitalia of male moths. This project will develop a detection method based on DNA that can be used with all life stages of T. absoluta, not just adult moths. Such methods will allow large numbers of insects to be screened in a short period of time. Educational programs for T. absoluta will also be developed for tomato growers in an attempt to improve early detection of

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this pest should it enter California. The ability of *T. absoluta* to use solanaceous weeds found near California tomato fields will also be evaluated to determine the overwintering potential of this insect.

Improved Sampling and Analytical Methods for Testing Agricultural Water for Pathogens, Surrogates and Source Tracking Indicators \$196,569

The Center for Produce Safety Foundation

The Center for Produce Safety Foundation will partner with the Centers for Disease Control to develop sampling and testing procedures for analysis of large-volume irrigation water samples for alternative microbial water quality parameters. New rules proposed under the Food Safety Modernization Act establish monitoring frequencies and *Escherichia coli* concentrations for characterizing agricultural water quality. In addition to monitoring for *E. coli*, other strategies for collecting and testing irrigation water can provide farm operators with a better understanding of the quality of water used in crop production. These strategies include collecting source water samples during times of greater potential risk for contamination and testing for pathogens and alternative water quality surrogates. This project will use ultrafiltration to collect large-volume irrigation water samples from three farms in Georgia to investigate the benefits of collecting such samples for microbial water quality testing. Baseline and precipitation-impacted samples will be collected to enhance the comparison of large- versus small-volume collection procedures. Samples will be tested for traditional indicators of fecal contamination (*E. coli* and enterococci), alternative surrogates of fecal contamination (F+ coliphages), pathogens (*Salmonella*, *Cryptosporidium* and *E. coli* O157:H7), and analytes that can be used to identify sources of fecal contamination affecting agricultural water quality.

Improvement of Grapevine Health Monitoring \$82,571

The Regents of the University of California, Davis

To keep vineyards free of disease in California, imported grapevine stocks are now monitored by Animal and Plant Health Inspection Service (APHIS) and California Department of Food and Agriculture (CDFA) before release to the field. New accessions undergo a lengthy bioassay certification process, using indicator plants. The University of California, Davis proposes a technological improvement to this certification, a genomics assay more sensitive and less expensive than the current standard. It would allow grape growers to avoid the current multi-year delays in putting new accessions into profitable production. The goal of the project is to facilitate a change in the APHIS and CDFA regulatory standard for certification of imported grapevine varieties that growers seek to bring into production in California. This project will provide to the regulatory decision makers the data that will substantiate the call for a new certification procedure. When the new technology replaces the old, there will be many measurable improvements in the prevention and management of grapevine diseases in California.

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*Improving Irrigation and Nitrogen Management of Strawberry
Production in California*

\$219,851

The Regents of the University of California, Parlier

Strawberry growers along the coastal regions of California are under severe regulatory pressure to limit off-site movement of nitrate into ground and surface water. This project proposes to develop data on nitrogen uptake patterns and crop coefficients needed to create comprehensive recommendations of nitrogen fertilizer and water for the Ventura/Oxnard and Santa Maria areas, and to expand data for the Watsonville area. Aboveground biomass, canopy coverage, root depth, soil nitrogen content, marketable fruit yield, and water use data will be collected from six representative commercial fields in each study area. Additionally, collected data will be used to conduct comparative/validation field trials during the second year of the project and to expand CropManage (ucanr.edu/cropmanage), an online decision support tool for nitrogen and water management.

*Improving Nutrition and Increasing California Specialty Crop Sales:
Implementing Collective Buying in K-12*

\$286,654

The Regents of the University of California, Santa Cruz

This project will increase nutritional intake and the percentage of California fresh fruits and vegetables purchased and consumed through K-12 institutional markets in Monterey, San Benito and Santa Cruz Counties, as well as statewide. The project will work with Food Service Directors from fifteen school districts to identify and implement collective buying strategies of California fresh fruits and vegetables to reduce costs that can then be re-invested in specialty crop procurement. The Regents of the University of California, Santa Cruz (UCSC) will supply partner districts with technical assistance for multi-district collective buying of specialty crops, menu planning, and marketing support. By documenting this and other similar efforts, UCSC will provide the best practices statewide to allow the project to scale-up. This project will increase the purchase and consumption of California fresh fruits and vegetables in operations that serve over 125,000 meals per day (including breakfast, lunch, and supper programs) and support nutrition for vulnerable populations and children.

*Improving Pasteurization Validation Methods for Pistachio
Processing*

\$179,859

The Center for Produce Safety Foundation

The Center for Produce Safety Foundation will partner with Michigan State University to produce guidelines for methods to validate preventive control measures for pistachios. Microbial safety of low-moisture foods is a difficult challenge, as reflected in recent outbreaks and recalls associated with Salmonella-contaminated nuts and other low-moisture products. Processing interventions are an emerging imperative to reduce the risk of Salmonella in low-moisture products, including pistachios. The Food Safety Modernization Act (FSMA) proposed Preventive Controls Rule will mandate that the low-moisture food industry implement and validate interventions against identified hazards, such as Salmonella. Although a number of pathogen-reduction technologies are available to the pistachio industry (dry heat, steam, radio-

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frequency), there are several significant problems: 1) No single technology will be universally applicable, so that product-specific/scalable solutions are needed; 2) The cost of stand-alone pasteurization technologies is an impediment to small processors; and 3) Robust validation protocols have not been widely tested or disseminated. The overall goal is to improve the methods for validating pathogen-reduction processes for pistachios, with particular attention to improving existing processes and enabling any processor to reliably validate those processes. The work plan includes laboratory-scale and pilot-scale experiments with Salmonella-inoculated pistachios, and a process validation demonstration at the commercial-scale.

Increasing the Awareness and Profitable Use of High-Performing Grafted Varieties by California Fresh Market Tomato Growers \$143,532

The Regents of the University of California, Davis

Field trials throughout the United States and around the world have shown the multiple economic and environmental benefits of grafted fresh market tomato plants: higher yields; reduced water, fertilizer and pesticide inputs; and tolerance to pathogens, saline soil, heat or cold. Yield and economic performance vary with variety and growing conditions. Grafted tomatoes have not been field tested in conventional commercial production in California, and existing commercial rootstocks have only been tested with fresh market varieties. This project will use the extensive field trial results obtained elsewhere regarding grafted fresh market tomatoes to choose rootstocks for field trials in Merced County and San Joaquin County in 2015 and 2016. Yield and economic data from the literature and field trials will be disseminated to California tomato stakeholders through workshops and publications in an effort to help stakeholders understand the profit increase and environmental impact reduction (i.e. water/pesticide/fertilizer use) potential of grafted tomato plants in California.

Investigation of Risk Criteria and Foodborne Pathogen Reduction Practices for Irrigation Water \$152,344

The Center for Produce Safety Foundation

The Center for Produce Safety Foundation will partner with Virginia Polytechnic Institute to provide data to reduce the contamination risks of foodborne pathogens during irrigation and achieve the new requirements of the Food Safety Modernization Act on produce safety. Irrigation water is considered to be one of the main contamination sources of foodborne pathogens on produce. Salmonella enterica, Escherichia coli O157:H7, and Listeria monocytogenes are three common enteric pathogens that may exist in irrigation water and are reported to be associated with produce contamination. Science-based data are needed to generate practical and accurate prediction methods and to establish effective strategies about decontamination of irrigation water to improve produce food safety. This research project will investigate practical criteria for the prediction of foodborne pathogens in irrigation pond and well water; evaluate the efficacy of commercial sanitizers on the decontamination of three common foodborne pathogens (Salmonella spp., E. coli O157:H7, and L. monocytogenes) in irrigation well and pond water; and provide education and training to stakeholders on improved agricultural practices to reduce the food safety risks in irrigation water.

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Lake Farm to School Project

\$397,899

North Coast Opportunities, Inc.

North Coast Opportunities will work with Lake County schools to address barriers to utilization of specialty crops in school meals. The Lake Farm to School Project will assess school needs, upgrade equipment and adapt kitchen space; train food service staff in procurement and processing of local produce; build farmer capacity to comply with school purchasing requirements; and link farmers to food service directors, so that they can plan production around school needs. The target population will be local specialty crop producers, food service staff and students. Anticipated outcomes include increased capacity to incorporate local specialty crops into school meals, increased school purchase of local specialty crops; increased utilization of specialty crops in school meals, resulting in increased consumption of fresh specialty crops and improved nutrition for 6,000 students; and increased farm income generated through sales to local schools and businesses.

Los Angeles Farm to School: Developing a Network of Local Practitioners

\$390,823

Occidental College

The Los Angeles Farm to School initiative will support the development of robust and sustainable Farm to School (F2S) programs in Los Angeles County by providing training and technical assistance, developing a network of local practitioners, and expanding traditional F2S models to new settings. As the founder of the National F2S Network, co-leader of the California F2S Network, and head of the California Farm to Preschool (F2P) Taskforce, the Urban and Environmental Policy Institute at Occidental College has extensive expertise in addressing F2S barriers and building dynamic networks for coordination and resource sharing. The Urban and Environmental Policy Institute at Occidental College is uniquely positioned to connect local practitioners to State F2S players. By providing training and technical assistance, webinars, piloting new resources and providing resource sharing opportunities, the project will increase consumption of specialty crops, improve nutrition education, and build an appreciation for local agriculture among Los Angeles County students.

Market Enhancement for Small Organic Farmers (MESOF)

\$172,916

Agriculture and Land-Based Training Association

The Market Enhancement for Small Organic Farmers (MESOF) project builds on Agriculture and Land-Based Training Association's (ALBA) legacy of supporting beginning, limited resource farmers in establishing family farm businesses. ALBA's specialty crop (organic produce) sales have grown from \$500,000 in 2008 to \$5 million in 2013. However, their internal systems have not kept pace with this growth. In order to continue growth and economic impact in the specialty crop industry for the next five years and beyond, ALBA must formalize their marketing operations. In 2014, ALBA will invest in excess of \$1 million dollars to expand its cooler space to accommodate future sales growth which will drive the viability, profitability and competitiveness of the small scale specialty crop produce farmers whom ALBA

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serves. MESOF would supplement this investment by helping finance the market research, systems and personnel that will further enable this growth.

*Market Tours for Small, Ethnic, Beginning Specialty Crop Growers:
Creating New Marketing Channels for Buyers and Sellers* \$162,217

The Regents of the University of California, Davis

Urban consumer demand for specialty crop products that authentically communicate values of local, regional or sustainable is creating a new market niche for the produce industry. To meet demand, wholesalers are seeking appropriately prepared farmers who can reliably provide safe, quality products. Similarly, small, ethnic and beginning farmers are seeking market access that includes proper packing, Good Agricultural Practices certification, and branding. This project will use four wholesale market tours in Los Angeles and the San Francisco Bay Area to train 150 small, beginning and ethnic growers from four California regions. Tours will introduce them directly to buyers. At two farmer-to-farmer meetings following the tours, growers will share information and explore sustainable marketing partnerships. In Year 2, project partners will convene a summit among organizations that conduct grower training to share best practices and assure sustainability beyond the project period.

*Measuring Evapotranspiration, Water Balance and Depth of Water Uptake to
Improve Efficiency of California Tree Crops* \$370,359

The Regents of the University of California, Davis

The lack of reliable tools to quantify evapotranspiration within and across crops represents a major limitation to optimize productivity and promote adaptation of tree crops to climate change. In addition, the rapid adoption of micro-irrigation systems requires a reevaluation of evapotranspiration indexes to ensure efficient irrigation water use efficiency. This project proposes a method for the integrated analysis of irrigation management to determine water balance and depth of water uptake at different irrigation levels in almond orchards. The method is based on the relationship between crop physiological response and isotopic composition (¹³C and ¹⁸O) of plants, which will be pioneered as a proxy to establish optimum irrigation. Results will be used to refine crop-specific (K_c) coefficients for evapotranspiration calculation and recommendations for orchard zoning and practices to increase yields while enhancing water use efficiency.

Melon Powdery Mildew Race Variation in California \$272,676

USDA, Agricultural Research Service

Cucurbit powdery mildew is a chronic and major disease problem of cantaloupe and honeydew (Cucumis melo L.; melon) production worldwide. Early infection can kill plants or reduce fruit yield; late infection reduces fruit quality. Three fungi cause cucurbit powdery mildew, but only *Podosphaera xanthii* (P. xanthii) is present in the United States. Two races of P. xanthii were known in California until 2003 when a new race, S, was observed in Imperial Valley. Race 3.5 was observed there in 2012. Race SD, first isolated from Imperial Valley cucurbit powdery mildew samples, is currently predominant in a Salinas greenhouse. Cucurbit powdery mildew

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racess on melon in the Central Valley have been geographically and seasonally variable in recent years. Race variation compromises genetic host plant resistance to cucurbit powdery mildew in melon. This project will characterize *P. xanthii* race variation on melon in California, and identify and characterize unique sources of resistance to the most prevalent and virulent races.

Nitrate Leaching Risk from Specialty Crop Fields During On-Farm Managed Floodwater Recharge in the Kings Groundwater Basin \$280,678

Sustainable Conservation

The future of specialty crop farming in the San Joaquin Valley is at risk due to severe groundwater overdraft and declining water quality. On-farm floodwater capture and recharge can significantly replenish groundwater and may improve groundwater quality by seasonally applying floodwaters to extensive areas of cropland suited to infiltration. Uncertainty remains as to whether recharge on active cropland may degrade groundwater quality through increased leaching of current and legacy agricultural nutrients and salts, or may improve groundwater quality through dilution. This project will employ modeling tools, coupled with field trials, to assess the risk of exacerbating groundwater nitrate and salt levels, and identify farm management and groundwater recharge strategies for specialty crops that reduce regulatory liability for specialty crop farmers. The increase in farmer acceptance of on-farm floodwater application following access to reliable leaching risk information will be surveyed during outreach events.

Novel Lye-Curing Replacement Process for California Olives to Eliminate Toxic Waste Chemicals and Conserve Water Resources \$367,500

The Regents of the University of California, Davis

The curing process for California-style ripe table olives has not been improved since the development of the process in the late 1800s. The curing process requires soaking the olives in a lye solution to leach out the natural bitterness, followed by a series of water rinses to remove every trace of lye solution. Lye treatment removes much of the nutritional value of the fruit, requires vast amounts of washing water, and imposes high mitigation costs for the disposal of chemicals, brines, and wastewater. This project will use innovative technology to engineer a new debittering enzyme to eliminate lye treatment, which would reduce water usage, remove toxic chemical wastes, and decrease environmental mitigation costs. In addition, by eliminating the lye treatment, natural antioxidants would remain in the fruit, thereby increasing the nutritional value and consumer attractiveness of California-style olives.

Old Routes, New Paths \$109,094

Hopland Band of Pomo Indians

Old Routes, New Paths is a build-upon program supporting emerging Native farmers and food producers from Sonoma, Lake, and Mendocino Counties in their production of specialty crops, bringing foods to reservations and tribal schools by coordinating workshops that give producers needed certifications (Safe Serve, Good Agricultural Practices, etc.), and utilizing a

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mobile farm stand as a demonstration outlet promoting crops. Hopland Band coordinated sustainable agriculture workshops for three years with over 200 participants from 10 tribes. Development of specialty crops such as Hopland black walnuts and organic dry farm heritage grapes for vinegar and jelly was supported in the workshops. The Coyote Valley and Potter Valley Tribes grow vegetables and Stewards Point grows heirloom apples. The farm stand will showcase specialty food crops from tribes such as acorn flour, hazelnuts, huckleberries, blackberries and more, supporting a healthy food system for the tribes and community.

*Plant Something! Inspiring Consumers to Plant and Garden with California
Nursery Plants*

\$367,034

California Association of Nurseries and Garden Centers

The California Association of Nurseries and Garden Centers want to bring the highly successful Plant Something! campaign to California. Through previous out-of-state grants, the basic tools have been developed and promoted, and the campaign has recently been expanded into a regional promotion. This campaign continues to have a significant impact on the long-term success of the Arizona nursery industry, which has realized an annual average increase in retail sales of 11 percent between 2010 and 2012. This grant will allow California nurseries to benefit from the Plant Something! campaign. An 11 percent increase in retail sales of California nursery plants would amount to an additional \$380 million. Implementation of this campaign in California would get consumers excited about nursery products and gardening. This will be accomplished through a targeted radio and social media campaign in the Los Angeles, San Francisco, and Sacramento areas that reaches consumers of traditional media outlets.

Profiles in Stewardship

\$114,143

American Farmland Trust California

Building on its Ecosystem Services Interactive Database, American Farmland Trust proposes to work with the California Department of Food and Agriculture and other partners to identify and document at least 100 outstanding examples of actual, on-the-ground use of environmentally beneficial management practices by California specialty crop growers by preparing a series of case studies. American Farmland Trust completed 45 two-page profiles in December 2013, of which 25 were of specialty crop growers (<http://www.farmland.org/programs/campaign/california-voices.asp>). Initial response has been highly favorable. The profiles would serve as marketing materials to consumers to better promote California specialty crops, enhancing the California Grown Brand as identified by California Agricultural Vision. Profiles would serve to inform policy makers and be used as educational materials for other growers. They would provide a foundation for detailed quantitative documentation of environmental benefits so growers can participate in emerging ecosystem services markets.

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Random Acts of Flowers - Getting Social

\$396,000

California State Floral Association

As consumers move online and look to bloggers and social media for lifestyle tips and purchase recommendations, it is critical for the California flower industry to have a voice in this medium. The top three blogging websites, Blogger, Wordpress, and Tumblr combined had 80 million unique visitors in October 2011, reaching more than one in four active users. The time is right for the California flower industry to take advantage of this fast-growing, cost efficient medium. As Generation X and Millennials grow older and begin their own family traditions, the California State Floral Association wants to ensure that flowers are a part of that process. Working with bloggers to write sponsored posts about California flowers, this project will encourage readers to purchase flowers. Facebook, Pinterest, and Instagram are all visually driven, which makes California flowers the perfect item to feature. Consumers already like flowers and buy them for special occasions, this program aims to show them how to incorporate flowers into their everyday lives.

Rapid Bacterial Testing for On-Farm Sampling

\$270,624

The Center for Produce Safety Foundation

The Center for Produce Safety Foundation will partner with the University of Massachusetts to develop a rapid detection dipstick. Due to the sensitive nature of fresh produce, bacteriological safety tests that require days for results are not practical tools for food safety. A testing plan must be low-cost, reliable, robust, and deliver rapid results. Diagnostics are being developed for use in non-laboratory settings by utilizing bacteriophages. These viruses can attack specific bacteria, replicate within them and then lyse the host while releasing hundreds to thousands of additional viruses. This project proposes the development of a dipstick for the rapid detection of Salmonella spp. in agricultural samples. Following a sample pretreatment, the bacteriophages will be used to infect Salmonella spp. in the sample. Within 45 minutes, the increase in bacteriophage can be quantified with a simple lateral flow device. Preliminary results for an Escherichia coli sensor suggest a very low limit of detection (<10 CFU/mL). This project will perform the additional development, optimization, and validation steps needed. If successful, the detection system will empower farmers to perform tests on-farm with rapid results and at low-cost. This ability will then enable more risk-based testing of agricultural waters following heavy rains or high flow.

*Rapid Tests to Specifically Differentiate Clinically Significant from
Environmental Shiga Toxin-Producing Escherichia Coli (STEC) Towards
Reducing Unnecessary Crop Destruction*

\$325,951

The Center for Produce Safety Foundation

The Center for Produce Safety Foundation will partner with the University of California, Davis to better define the role of wildlife as vectors of pre-harvest contamination. Though exceptionally rare events, there is ample evidence that produce samples sometimes contain pathogens of serious potential human health consequences. A group of bacterial pathogens, Shiga toxin-producing Escherichia coli (STEC) from diverse fresh produce were recovered

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from multi-year sampling programs conducted by the United States Department of Agriculture, largely at wholesale distribution centers. Leafy greens, herbs, and spinach were singled out for concern due to a STEC prevalence rate exceeding 50 percent of the total isolates recovered. Not all producers pre-screen leafy greens for bacterial pathogens. Not all testing platforms rapidly distinguish STEC likely to cause human illness from those that lack the genetic traits necessary for infection. Due to the high perishability of these commodities, testing can lead to destruction of a field due to false association with dangerous STEC. The combined objectives of protecting consumers, reducing food waste, and improving sustainability can be enhanced by applying new advancements proposed in this research in specific detection of clinically relevant STEC to risk management decisions and better defining the role of wildlife as vectors of pre-harvest contamination.

Revealing the Epidemiology of Grapevine Red Blotch-Associated Virus, an Urgent Need for California Grape Growers \$271,211

USDA, Agricultural Research Service

Grapevine red blotch is a new disease of grapevines impacting winegrape production in Napa and Sonoma Counties and elsewhere. It is of urgent concern to stakeholders in the grape industry. Red blotch symptoms resemble those of leafroll disease and potassium deficiency, thus it remained unrecognized until recently. Berries on diseased vines show delayed ripening and reduced sugar. United States Department of Agriculture, Agricultural Research Service has identified a new DNA virus, "Grapevine red blotch-associated virus (GRBaV)," consistently associated with diseased grapevines of several red varieties. The virus has been found in grapevines in several states in the United States and in Canada. Tests done by private laboratories have also detected GRBaV in white varieties, e.g., Chardonnay and Riesling. Being a new disease, little is known on the epidemiology of the virus; however, surveys to date indicate the virus is widespread in California and elsewhere in the United States. This project will determine potential vectors and alternate hosts to develop red blotch management guidelines.

Shade Cloth Benefits for Apples \$313,707

California Apple Commission

California apples are well known for their taste and size but lack of color. Unfortunately, the lack of color in California apples is a direct result of the sun and heat that allows for greater taste and size. The California Apple Commission (CAC) is seeking funding for research on different types of shade cloth and the effects it will have on apples grown in California. The grant will also determine the economic viability of applying shade cloths in California. Improving color on California apples will dramatically improve their marketability. The grant will be over a two and one half year span with almost 400 to 500 tons of apples used as a sample size each year. Research in shade cloth has demonstrated good results in other areas but none has been conducted in California. Individual California growers have been requesting information on shade cloth; however, due to a very limited budget, CAC has been unable to initiate the research.

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*Specialty Crop Education and Entrepreneurial Development for
Transition-Age Youth (SeedTRAY) Project*

\$229,823

Noyo Food Forest

Noyo Food Forest (NFF) will develop an experiential training program to inspire youth to pursue careers in the specialty crop industry while increasing utilization of local specialty crops in Fort Bragg school cafeterias. The Specialty Crop Education and Entrepreneurial Development for Transition-Age Youth (SeedTRAY) project will create a career pathway for high school age and older youth, who will learn to produce specialty crops, which will be purchased by the school for use in school meals; teach nutrition to younger students; and earn stipends as they prepare to enter sustainable agricultural training programs. SeedTRAY will expand NFF's successful youth programming by training 120 youth over the grant period while incorporating more specialty crops into school meals and providing nutrition education to 1,900 Fort Bragg students. SeedTRAY will also refine its existing curriculum and make it available to school-based farm training programs nationwide.

*Specialty Crop Farmer Training and Toolkit for a Sustainable
Future*

\$283,986

The Regents of the University of California, Santa Cruz

This project builds on over 40 years of organic specialty crop production and training of beginning farmers at the 30 acre farm and three acre market garden of the Center for Agroecology & Sustainable Food Systems (CASFS) at the University of California, Santa Cruz. It also builds on a CASFS-led regional collaboration for beginning farmer training and the CASFS online curriculum for agriculture educators. This new project will produce a specialty crop Toolkit featuring eight to ten Grower Guides in English and Spanish on specific crops grown using organic and sustainable production practices. These crops will be demonstrated at the CASFS farm, with distinct blocks of mixed vegetables and cut flowers providing data for publications covering varietal choices, production practices, and economic analysis. Specialty crop classes, workshops, and mentoring sessions using these materials and demonstration blocks will be delivered to over 250 new and beginning small-scale farmers during the project.

*Testing Decision Support Tools for Evapotranspiration Based Irrigation
Management of Cool-Season Vegetables*

\$328,237

University Corporation at Monterey Bay

Cool-season vegetables are highly sensitive to water stress and tend to be heavily irrigated to reduce production risk. Yet, Central Coast growers now operate under water quality regulations addressing nitrate contamination of groundwater, partly caused by long term over-irrigation and drainage of nutrients through the soil profile. The CropManage decision-support tool is designed to help growers better match irrigation events to actual crop need. Recent tests by the proposers clearly showed that irrigation could be reduced 23 to 34 percent below the typical amount for head lettuce and broccoli, without penalty in marketable yield.

CropManage is now being extended to new cool-season vegetables such as leaf lettuce and cabbage, and this study will perform replicated irrigation trials in those crops. Measurements

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include applied water, crop development, soil water balance, and marketable yield. The project will enable growers to better use the state's existing California Irrigation Management Information System network to improve water efficiency.

Ventura County Farm to School

\$397,751

Ventura Unified School District

Building on the success, momentum and leadership of a unique United States Department of Agriculture funded five-district pilot program, this project will expand and institutionalize local specialty crop access, consumption and education in public schools throughout Ventura County by: 1.) Facilitating production planning, marketing, ordering, and distribution of specialty crops from growers in the region; 2) Providing school food service staff training and development to increase utilization of specialty crop products in school menus; and 3.) Developing and disseminating educational tools to increase students' and families' awareness and consumption of fresh, seasonal, locally grown California specialty crops.

Water Use Efficiency for Fruit Quality, Ecosystem Benefits and Resilience in Fresh Market Tomato Production

\$381,558

The Regents of the University of California, Davis

Climate change may increase irrigation demand in California by up to 30 percent by 2100. To maintain the competitiveness of the greater than \$200 million fresh market tomato crops, new strategies are needed for water use efficiency effecting the ability to maintain yield and quality, minimize pest damage, and improve resilience in market value and ecosystem services. Field trials in Merced, Yolo, and Santa Cruz counties will test plant density and irrigation treatments for these factors on farms of mature green, heirloom, and dry-farmed hybrids, respectively. To analyze tradeoffs between management strategies, indicators will be evaluated on several farms in each area for inputs, ecosystem services for soil and water quality, and market value and stability. Scenarios will be developed to achieve the greatest benefits in each type of system. System comparisons will be presented to growers in all three areas, through various organizations, to provide and exchange ideas for innovations and increase climate change preparedness.