



GROWN IN CALIFORNIA

Buy California Marketing Agreement

\$2,231,000

California Grown: Always In Season

The Buy California Marketing Agreement will design and implement promotions to increase awareness and consumption of California grown specialty commodities which help consumers develop a better relationship with California grown agricultural products. Promotions are also designed to increase the value of California agricultural products while helping to build strong communities and a thriving California economy.

A multi-platform digital campaign and retail and foodservice promotions will be implemented to create strong support from the retail and food service trade and increase consumer demand for California specialty crops and specialty crop products. This multiplatform digital campaign will utilize contextually relevant media placements, deliver rich and engaging experiences within impactful media, integrate multiple influencer marketing programs, and utilize social media to reach consumers in shareable environments.

Retail trade outreach will be conducted, and promotional partnerships will be established with key California retailers to execute retail promotion programs both in-store and through digital extension. Promotional themes of California Grown: Always In Season include “The Sound of Good,” “Always In Season,” “Only In California,” “Eat the Season,” “What Grows Together, Goes Together,” “Go for the Gold with California Grown,” and “The Grateful Table.”

Performance will primarily be measured through sales increase and digital media analytics. Success will be measured through total sales performance and/or category lift for featured specialty crops during the promotional period. Success will be measured through increased sales and improved digital analytics including consumer connection with California Grown digital content via reach, time on site, video completion and click rates.

Tomato Products Wellness Council

\$500,000

Increasing High-Value Sales of California Processing Tomatoes in the United State Restaurant Industry

California grows 96 percent of all domestic processed tomatoes, a crop variety solely used in sauces, ketchup, and paste. Difficult growing conditions (heat and drought) have caused on farm declines in California processing tomato yields compared to the latest three-year averages (U.S. Department of Agriculture, National Agricultural Statistics Service) resulting in lower returns to growers, still recovering from 2022 soaring input costs. To remain viable, growers urgently need to build higher-value sales channels for their crop. As such, Tomato Products Wellness Council, representing 240



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California processing tomato growers and processors, seeks to build new high-value sales in domestic restaurants – a relatively untapped market – by sharing the benefits of California processing tomatoes as a key menu ingredient. Activities will include surveys to inform messaging development and a marketing campaign (videos, social media, a tradeshow printed toolkit mailed to restaurants in the United States), contributing to a 2 percent tomato crop price and sales increase, evaluated and measured by crop price reports.

Santa Cruz Mountains Winegrowers Association **\$498,428**

Driving Sales for Santa Cruz Mountains Winegrowers by Building Awareness Among Urban Bay Area Consumers

The Santa Cruz Mountains Winegrowers Association will elevate regional awareness among urban Bay Area consumers through, 1) a digital media campaign, 2) creation of an interactive region digital map, and 3) promotional consumer events. This project's goal is to increase regional wine sales by 3 percent by June 2027, measured by winery sales tracking. The challenge and opportunity for the 135 small, family-owned wineries, and vineyards across the 100-mile-long Santa Cruz Mountains American Viticulture Area is that 90 percent of their sales are direct-to-consumer, with the region's winegrape specialty crop producers relying heavily on consumer visits. Still, the elegant and distinctive wines that reflect the region's unique terroir are mostly unknown to the eight million Bay Area consumers for whom this idyllic mountain wine region sits right in their backyard. To move growing unsold inventory from stifled tourism and increase much-needed future wine sales for all regional winegrape specialty crop growers.

Sonoma County Local District 3 Winegrape Commission **\$494,435**

Developing New Market Opportunities and Partnerships to Increase Sonoma Wines Accessibility and Connectivity with Consumers

The wine consumption within the United States has declined for the second consecutive year in 2022, with direct consumer sales falling 10.3 percent over one year; industry experts predict further declines in 2023. After nearly 30 years of growth, the California wine industry is facing a mounting crisis: lack of consumer interest. With winegrapes the top Sonoma County crop, great need exists to better connect domestic wine consumers to Sonoma wine to drive demand for Sonoma winegrapes and wine. As such, Sonoma County Local District 3 Winegrape Commission, representing all 1,800 Sonoma winegrape growers, will launch a campaign to relate California wine to consumers of all drinking ages, sharing the compatibility of Sonoma wine with their lifestyles through, 1) a sports team partnership, 2) in-region immersions, 3) a young professional educational program, and 4) an advertisement campaign. The project outcome will be a 3 percent winegrape sales price boost, directly benefiting growers, evaluated and measured by crop and crush reports.



*The Regents of the University of California,
Agriculture and Natural Resources*

\$449,846

California Open Farm Passport: Engaging the Public and Supporting California Farmers through Open Farm Events

The California Open Farm Passport will open the gates to specialty crop farms around the state, inviting the public to learn, taste, and buy a diversity of crops. Agritourism—inviting the public onto farms for education, enjoyment, and product sales—increases awareness and sales of specialty crops by empowering the farmer to tell their own story, demonstrate their contribution to California agriculture, and sell their crops directly on their farms. This project partners with 7 groups in 9 counties to host 20 Open Farm events featuring 130 producers, reaching over 10,000 consumers. Through this project, the University of California, Agriculture and Natural Resources will foster a network of agritourism groups to build their capacity to support local farmers and to bolster the agritourism industry overall. Increases in knowledge and sales will be tracked by surveying participating producers and event visitors. The project will track consumer sales during and after the events to track the impact of visiting a farm on future purchasing behavior.



HEALTHY SPECIALTY CROPS FOR ALL CALIFORNIANS

Center for Ecoliteracy

\$485,200

California Flavors/Sabores de California: A Campaign to Promote Specialty Crops in School Meals

California students now have access to free breakfast and lunch, growing the \$5 billion school meal industry. Fresh fruits and vegetables can and should be at the heart of nourishing and culturally inclusive school meals that meet proposed federal nutrition standards for sugar and sodium. The Center for Ecoliteracy will increase access to and consumption of specialty crops in schools by, 1) providing school nutrition staff with culturally-inclusive specialty crop recipes that meet the new nutrition standards, procurement support, and hands-on culinary training; 2) increasing student demand for specialty crops through taste tests and promotional events; and 3) sharing resources with specialty crop stakeholders through a bilingual media campaign with short-form videos. Success will be measured through sales of specialty crops to five school districts, with an estimated increase of \$339,977 (10 percent), and surveys with 60 school nutrition staff and 500 students.

Humboldt County Office of Education

\$497,755

Creative Partnerships for Community Health: Schools as Hubs for Specialty Crop Education and Distribution

Via this project, the Humboldt County Office of Education (HCOE) will increase awareness of, demand for, and access to specialty crops among the staff, students, and families in Humboldt County school districts. First, the HCOE will increase student and school staff knowledge of specialty crops through culturally inclusive activities in school gardens and afterschool programs. Second, the project team will partner with North Coast Growers' Association (NCGA) to establish schools as distribution points for their Harvest Box program, a multi-farm Community Supported Agriculture program that aggregates seasonal specialty crops from NCGA farmer members. NCGA will provide workshops to small and beginning farmers to support their entry into the Harvest Box program. Staff will evaluate changes in student and educator knowledge of specialty crops, families' knowledge of how to access and prepare specialty crops, farmer income generated through Harvest Box sales, and the number of new farmers selling specialty crops through the Harvest Box program.



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Foodwise

\$452,543

California Crop of The Month

Fewer than 20 percent of Californians eat the recommended five to nine daily servings of fruits and vegetables and the percentage of dollars spent on food for home cooking has steadily decreased in the past 40 years, with 28 percent of Americans now reporting that they do not know how to cook. The California Crop of the Month (CCM) project will provide technical support to 65 plus farmers and introduce 25,000 plus farmers market shoppers and 6,000 students to California specialty crops. Foodwise will increase specialty crop consumption by providing culinary and nutrition education right where specialty crops are sold. Monthly CCM Festivals, weekly cooking classes, demonstrations, targeted outreach to chefs, and marketing assistance to farmers will result in participants: learning the breadth and deliciousness of California specialty crops and integrating the specialty crops for more regular inclusion in a healthy diet. Pre and post program surveys will measure increases in awareness, knowledge, consumption, and sales of California specialty crops.

Pacific Coast Producers

\$492,176

Increasing Awareness and Consumption of California Processing Fruit and Vegetables in Schools and Hospitals in the United States

A 2023 Centers for Disease Control and Prevention study found 50 percent of children in the United States do not eat a single vegetable daily, 33 percent do not eat a single fruit daily, and only 12 percent of adults eat enough fruit. With 5.8 million students in California K-12 schools and 15.1 million California hospital patient days reported, opportunity exists to boost needed fruit and vegetable consumption by reaching institutional foodservice buyers providing daily meals to these audiences. As such, Pacific Coast Producers (PCP), representing 322 California growers, will launch an educational campaign targeting schools and hospitals, driving sales or consumption of California processing peaches, pears, and tomatoes in the United States. Efforts include developing and sharing educational materials, on-site cooking demonstrations, outreach at conferences, and a Summer Harvest Tour and a Fruit Ambassador Program. The project goal is a one percent sales or consumption increase of California processing peaches, pears, and tomatoes, measured by internal PCP data. As a grower-owned cooperative, profits flow to and benefit specialty crop producers.

Pacific Coast Farmers' Market Association

\$491,242

Bringing the Power of Produce to Bay Area Farmers' Markets

The Pacific Coast Farmers' Market Association will bring the Power of Produce (POP) Club program to 30 Bay Area farmers markets. The POP Club uses fun, in-market activities to educate children about healthy eating and how food is grown, while encouraging kids to try fresh fruits and vegetables. The project will expand existing POP



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Club activities by adding Spanish language materials, introductions to more fruits and vegetables, and take-home activities, including child-focused video recipe demonstrations. The project will encourage parents to support their kids' healthy habits by purchasing farmers market produce. The project is a response to the sustained high rates of childhood obesity in California that is often linked to consumption of processed instead of fresh foods. The project will track the number of children participating in each event towards the goal of educating 3,900 children through 75 series of educational events at San Francisco Bay Area farmers markets. Surveys of parents and farmers will supplement these metrics, providing data on the number of families that learned about nutrition and ate more fruits and vegetables after participating in the events, and the number of farmers who sold more produce during the weeks of the POP Club events.

Groundwork San Diego, Chollas Creek

\$249,149

Specialty Crop Access and Education in Southeastern San Diego

This project will increase specialty crop consumption and knowledge in the underserved neighborhoods of Southeastern San Diego. Groundwork San Diego, Chollas Creek (Groundwork) will provide hands-on education on specialty crop production to third through eighth grade students and their families (1,020 participants) in communities denied access to nutritious produce and experiencing food insecurity-related chronic disease. Groundwork staff will be trained in the management of a hydroponics farm on a school-site featuring seasonal culturally relevant crops. Students will receive four hands-on nutrition, cooking, and farming instruction each semester. Weekend activities will provide cooking and nutrition instruction, as well as crop maintenance and harvesting for school-aged children and their families. Aligned with California's Agriculture and Culinary Career Technical Education, instruction will be provided on how to set up backyard growing systems and advance career pathway interest and opportunity for participants. Content acquisition will be measured by pre- and post-surveys; in-school participants will be tracked by class rosters; and out-of-school participants will be tracked by attendance.

Food Literacy Center

\$250,000

Food Literacy for Kids in Title One Elementary Schools

This project targets Title One elementary students from North Sacramento and South Sacramento who are at highest risk for diet-related disease. Sacramento has a 40 percent childhood obesity rate, and only four percent of children protect their health by eating their daily vegetables, while only 25 percent eat their daily fruits. These children experience high rates of health disparities. This project will leverage specialty crops grown in the Sacramento region to inspire kids to eat healthy and develop habits to protect their health through hands-on food literacy field trips to either Food Literacy Center or Oak Park Farmers' market. The field trips will increase participants'



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knowledge, attitude, and behavior towards healthy specialty crops. Over two years, the Food Literacy Center will host 40 total field trips to Food Literacy Center's cooking school and student gardens, reaching 1,200 students and 160 adults, and 20 field trips to the Oak Park Farmers' Market reaching over 400 students and 200 parents. By the end of the grant term, 70 percent of students will try a new specialty crop, and 70 percent will go home with recipes to continue eating specialty crops. Testimonials and success stories will be collected from both students and parents. Post-test and attendance tracking will be used to evaluate and measure the success of the project.

*California State Polytechnic University,
Humboldt Sponsored Programs*

\$249,671

Food Sovereignty Lab Specialty Crop Initiative

The Food Sovereignty Lab, a fiscally sponsored program of Cal Poly Sponsored Programs, provides a space that supports tribal communities in ongoing revitalization of traditional food practices and cultural knowledges. Food Sovereignty Lab (FSL) project staff will improve the environmental sustainability of specialty crops through hands-on engagement with tribal partners and farms as well as at FSL's indigenous garden and gathering site. The project will provide programming for native specialty crop farmers that includes technical assistance, resource sharing, an e-learning platform, and access to leading research opportunities. FSL will also host a month-long food summit featuring workshops for native specialty crop farmers, culminating in an Indigenous Foods Festival. The festival is a one-day event that in the past has included more than 500 participants. By hosting a yearly food festival that features indigenous food producers, this project will help current and future native farmers, gardeners, producers, and practitioners identify new market opportunities, increasing access to and consumption of specialty crops. Staff will survey adults and youth at the festival to understand who gained knowledge about specialty crops, traditional foods, and food sovereignty. The project will also develop a collection of short video interviews and survey native farmers to track their increased knowledge about environmental sustainability best practices based in cultural knowledges.



EQUITY, OPPORTUNITY, AND EDUCATION FOR ALL CALIFORNIA SPECIALTY CROP FARMERS

*State Center Community College District,
Training Institute*

\$498,881

Cultivating Success: Empowering California's Specialty Crop Industry for the Future

This project addresses critical needs within California's specialty crop industry by providing comprehensive training. The State Center Community College District, Training Institute, will enhance food safety compliance, promote efficient water usage, and cultivate technical skills of farm workers. Anticipated outcomes include bolstered industry resilience, heightened competitiveness, and the widespread adoption of sustainable practices. Success will be evaluated through both pre- and post-training assessments, monitoring the integration of newly acquired practices, and conducting long-term evaluations of implementation of growers and supervisors. Adoption of more efficient food safety handling practices and harvesting techniques by farm workers will also be monitored. By envisioning safer, more efficient, and sustainable practices, the project aims to fortify the specialty crop sector's future, contributing to its economic vitality and environmental stewardship.

Orange County Fair and Event Center

\$362,861

The Centennial Farm Story of California Specialty Crops

The Orange County Fair and Event Center seeks to address the ongoing critical need to connect the region's youth to locally grown California specialty crops and how these crops get to their plates. Through storytelling and first-hand, experiential learning, the Centennial Farm Story of California Specialty Crops seeks to inspire youth to engage with agriculture as an industry, as a field of study, and as it impacts many facets of their lives. This project will not only promote and highlight a variety of specialty crops but will seek to spread this inspiration to potential career pathways. By learning about and engaging first-hand with professionals that make the local specialty crops industry work, young people will see new opportunities for science, technology, engineer, and math related and highly skilled careers they may not have known existed. The project will experience success when it can demonstrate increased awareness, as well as increased interest in careers in the specialty crop industry, as measured by participant records, surveys, and focus groups.



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California Agave Council

\$498,404

Pioneering Drought and Climate Resiliency Through Education and Training for the Emerging California Agave Industry

Climate change and the Sustainable Groundwater Management Act (SGMA) have reduced water availability throughout California, leading to higher production costs, lower yields, fallow fields, and rural job losses that disproportionately impact historically underrepresented farmers and farmworkers. As such, California specialty crop farmers urgently need support in adopting drought-resistant crops and practices. The California Agave Council, a non-profit representing 200 members, will provide technical assistance and training to 60 agave specialty crop farmers on reducing water use, improving water efficiency, and adjusting to a changing climate, supporting California's high-demand, economically viable agave industry. This project will deliver, 1) a report on existing agave research, 2) bilingual producer outreach and training curriculum, 3) a web-based grower toolkit with how-to videos, and 4) grower education events. Project success will be measured through producer surveys evaluating technical knowledge gained.

Sonoma County Fundación de la Voz de los Viñedos

\$409,160

Voice of the Vineyards: Growing Leaders Among Sonoma County Vineyard Employees Through Advanced Workforce Development

The winegrape industry is acutely impacted by California's agricultural labor crisis. California's winegrape workforce has declined 24 percent since 2015, creating an urgent need to foster retention. The non-profit Sonoma County Fundación de la Voz de los Viñedos will expand its pioneering first of a kind Leadership Academy to equip the vineyard workers who are the bedrock of Sonoma's \$540 million specialty crop winegrape industry with training to support upward mobility, contributing to a retained, skilled workforce. Data shows that 70 percent of California vineyard workers were born in Mexico and are underrepresented in leadership positions. The project's goal is to develop 150 historically underserved leaders through expanded Leadership Academy cohorts; train 150 Leadership Academy alumni as peer mentors; and 3) extend education to 1,300 vineyard workers through broader training. With some Leadership Academy alumni served by multiple objectives, the total unique project reach is 1,500; success will be evaluated by Leadership Academy completion and surveys.

The Regents of the University of California, Riverside

\$497,710

Seeding Success: Youth Engagement and Skill Development for Sustainable and Resilient Specialty Crop Farming in California

The University of California (UC), Riverside aims to promote specialty crops and the need for a skilled, diverse, and adaptive workforce comprehensively trained to meet emerging climate and socio-economic challenges. Led by UC Riverside and UC



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Agriculture and Natural Resources, together with Growing Hope Project, John W. North, and San Andreas High Schools, this project will address this need by prioritizing youth education and engagement. The proposed curriculum integrates classroom theory with experiential learning on sustainable, climate-smart agriculture principles, and technology adoption within the current regulatory frame. It will also offer pathways to higher education and entrepreneurship to underserved populations. Comprising two cohorts, each consisting of a nine-month course with nine teaching modules, seven tours to several educational displays, plus field tours with the UC Riverside course Field Plant Pathology. Project impacts will be assessed with pre- and post-activity evaluations, focus groups, skill application metrics, and data analytics, ensuring measurable, data-driven outcomes and improvements.

Esperanza Community Farms

\$247,457

Supporting Small Latinx specialty Crop Farmers in Pájaro and Salinas Valleys

In the Pájaro and Salinas Valleys, individual local farmers of color struggle to enter the specialty crops market in the rich agricultural setting flush with large farm projects. The Organic Farmers Co-op was formed to address the common struggles to access sustainable and just markets, operational equipment, and innovation in the field. As a technical advisor, Esperanza Community Farms (ECF) has provided technical assistance and capacity building to the Organic Farmers Co-op through bi-weekly laboratory-based trainings that build skills in procurement, communication with client bases, contract negotiations, and social capital. Part of ECF's mission is a commitment to economic empowerment of small Latinx, Mexican, and Mexican-Indigenous farmers as a model to increase the production, distribution, and consumption of healthy fruits and vegetables among local young people and families. This project will formalize ECF's role as an assistance provider and fund the expansion of previous bilingual trainings. ECF will evaluate the success of this project through pre- and post- surveys with farmers that track their confidence in managing, marketing, networking in the specialty crop business, as well as their development of technical skills with invoice creation and budgeting, among others. From the four special events at regional high schools or markets, ECF also seeks to establish increased knowledge and interest in specialty crops on behalf of youth and adult consumers. Successful outcomes will see increased specialty crops access points, confidence among farmers, and knowledge and interest of specialty crops among consumers.



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Three Sisters Gardens

\$244,079

Urban Agriculture Youth Development Program

The goal of this project is to inform and educate the next generation of farmers on the importance of specialty crops in California through Three Sisters Garden's (TSG) Urban Agriculture Youth Development Program. As farmers age out, there is a sharp drop-off in new farmers taking their place and an increasing need to inspire and train a new generation of farmers to ensure the stability of California's food system. In line with this need, TSG will work to create an engaging and informative 12-week education curriculum focused on inspiring the next generation of specialty crop farmers. The programming is tailored to youth ages 14-24 who are interested in learning how to feed their communities through climate smart agriculture. Over the course of this project, TSG will recruit and train at least 50 youth from the Sacramento and Yolo County area. The curriculum will be tailored to include specialty crop education and periodic assessments to gauge learning and program effectiveness. TSG staff will have several streams of feedback to incorporate into improving the curriculum. Success of this project will be measured and evaluated through frequent surveys of the youth cohorts participating in the program and staff feedback. Data will be collected via Google Forms and compiled into internal spreadsheets with certain (anonymized) data shared publicly in the form of newsletters and website posts.



ENVIRONMENTAL STEWARDSHIP, CONSERVATION, AND CLIMATE SMART AGRICULTURE

The Regents of the University of California, Davis **\$491,288**

California Agave: Foundational Agronomy, Viral-load, Genetic Diversity, and Metabolites Characterization for a Drought-tolerant Specialty Crop

Agave is a forward-looking crop for the United States, particularly in California, as many farming communities face a challenging future of low water tables and long dry periods. Extended droughts and high variability in annual rainfall are a result of climate change and have forced California farms, especially those growing specialty crops, to fallow up to 40 percent of land, negatively impacting climate-vulnerable, agricultural communities. The University of California, Davis will generate and share foundational knowledge of agave growing in California that can be used to positively impact portfolio decisions of specialty crop farmers. This project will evaluate and measure success by, 1) working with farmers to complete research activities that collect, analyze, and share quantitative data that characterize agronomy, viral-load, genetic diversity, and key metabolites, and 2) quantifying the number of growers and distillers that the project team will reach through outreach efforts including in-person events.

The Regents of the University of California, Riverside **\$467,411**

Evaluation of Frass as a Soil Amendment and Fertilizer for Specialty Crop Production in California

Inorganic fertilizer use in California is responsible for more than three quarters of excess nitrogen (N) entering the environment as air and water contamination. More than 25 percent of inorganic N applied in California is used for vegetable crops. Helping vegetable growers to reduce N losses could have significant environmental benefits. One way to reduce N loss is to incorporate organic N fertilizers. However, organic N sources are logistically and economically challenging to obtain and use. With this project, the University of California, Riverside (UC Riverside) will evaluate a new organic fertilizer option, frass of black soldier flies reared at an industrial scale on food waste, as a tool to reduce air and water contamination in tomatoes and cantaloupe. The project team will evaluate the qualities of frass products, N mineralization, and impacts of frass on crop N, yields, soil N leaching, and N volatilization versus inorganic and organic fertilizers. The project will evaluate project success by quantifying stakeholders directly impacted by the decision support tools created.



The Regents of the University of California, Davis

\$498,225

Scaling Up Climate Smart Nutrient Management in Cool-season Specialty Crop Production

Climate change is impacting coastal cool-season specialty crop production at an alarming frequency. To optimize strategies that enhance resiliency within these systems, prioritization of climate smart nutrient management (CSNM) practices such as compost use, cover cropping, and nitrogen (N) fertilizer reductions is urgently needed. The University of California, Davis aims to, 1) determine the potential of CSNM practices to sustain yields while reducing N discharge, greenhouse gas emissions, and sequestering soil carbon, 2) prioritize CSNM practices by evaluating their impacts at a watershed scale under future temperature and precipitation conditions, and 3) increase knowledge and adoption of CSNM practices through comprehensive outreach and education. This project will increase the understanding of CSNM for producers and multiple other stakeholders. Success will be measured by increasing producer awareness, practice adoption, open access publication of research results, and educational media products.

Sustainable Conservation

\$498,423

Improving Water Quality and Soil Health Outcomes for On-Farm Recharge in California Pistachio Orchards

Aquifer replenishment is critical to the long-term viability of California's specialty crop industry. However, on-farm recharge (OFR) must be approached carefully to avoid the short-term worsening of groundwater quality and protect crop health. Sustainable Conservation aims to expand OFR in the San Joaquin Valley while researching one promising strategy for improving OFR outcomes. This project will, 1) deploy six OFR pilots in pistachio orchards with extensive technical assistance; 2) quantify cover crop impacts to OFR outcomes related to nitrate leaching, hydraulic function, soil health, and yield; 3) develop a recharge methods manual; and 4) conduct outreach to growers and technical assistance. Project success will be measured against the goals of conducting OFR on 240 acres with six new adopter growers, developing one guidance document, and hosting two field days, two webinars, and two 'train-the-trainer' workshops reaching at least 396 beneficiaries. Effectiveness will be measured via four participant surveys.

*The Regents of the University of California,
Agriculture and Natural Resources*

\$368,100

Recruiting Earthworms to Improve Soil Health on Organic Farms

This project aims to harness the power of earthworms for organic almond production, recruiting them as partners in on-farm soil fertility and soil health. Earthworms assist nutrient and residue management by ingesting and transporting residues from the soil surface to the subsurface. Resulting burrows and increased soil organic matter improve



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soil structure, water holding capacity, nutrient availability, and microbial activity. Farmers and researchers have documented practices like those in this project led to a 4-to-20-fold increase in earthworms. Tree roots grew stronger and more rapidly, and profits increased. In this study, the earthworm diversity will be compared across 20 working farms, representing a gradient of soil health practices. The University of California, Agriculture and Natural Resources (UC ANR) will determine the best methods to rear naturalized earthworms to expedite population growth. Additionally, UC ANR will evaluate how soil health practices affect earthworm populations and impact soil health metrics (biological, chemical, and physical).

The Regents of the University of California, Riverside **\$498,465**

Closing the Loop: Transforming Agri-Food Waste into Sustainable Carbon-Based Soil Amendments and Fertilizers

California's 24 million tons per year organic waste contributes to greenhouse gas emissions. This project aims to transform such waste into carbon-based soil amendments and fertilizers, tackling California Department of Food and Agriculture's priorities of mitigating climate change, improving soil health, and promoting sustainability. Building on prior work, the project will develop and validate a procedure for creating soil amendments in a short three-phased, four-six weeklong process from agri-food wastes and expand research on the impacts of organic waste-based soil amendments on field-grown trees and greenhouse-grown vegetables. The goal is to divert waste from landfills, sequester carbon, markedly reduce synthetic fertilizer use, and lower greenhouse gas emissions. The University of California, Riverside will focus on education and outreach through labtofarm.org and direct engagement, targeting underserved farmers. Success will be gauged by, 1) enhanced soil health metrics; 2) increased business sustainability via cost savings; 3) carbon sequestration data; and 4) farmer adoption rates.

The Regents of the University of California, Davis **\$484,559**

Real-Time Nutrient Monitoring System for Hydroponic Production in Controlled Environment Agriculture

Hydroponic cultivation is commonly used for growing leafy greens, fruits, and vegetables in controlled environment agriculture (CEA) systems, which is efficient regarding land and water use efficiency, and crops can be grown year-round at the expense of energy. Besides energy and labor costs, the nutrient-rich discharge from existing practices is a critical challenge for CEA. Precision nutrient management can improve water use efficiency (WUE) and nutrient use efficiency (NUE), improve yield, and reduce environmental impacts. The University of California, Davis will, 1) assess the environmental impact of hydroponic discharge; 2) develop an autonomous ion-based nutrient management system and evaluate its performance regarding NUE,



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WUE, and crop growth; 3) conduct a techno-economic and life-cycle analysis; and 4) outreach the new knowledge and technologies. Project outcomes will be evaluated through enhanced profitability and reduced environmental impacts.

The Regents of the University of California, Davis **\$499,348**
Developing Scalable Tools to Quantify the Impact of Regenerative Practices in Woody Perennial Crops

In 2021, the United States Senate passed the “Growing Climate Solutions Act,” followed by the U.S. Department of Agriculture's release of \$1 billion for “Climate-Smart Commodities.” Consequently, California farmers are considering or adopting new “regenerative” practices. Regenerative agriculture is gaining traction as a Nature-based Climate Solution (NbCS), or a managed agroecosystem to increase carbon sequestration with many other co-benefits, but the achievable benefits and potential drawbacks of NbCS are challenging to quantify, especially at scales relevant to farming. This project builds on over a decade of research from over 30 California orchards and vineyards, monitored using eddy covariance flux towers and advanced remote-sensing tools, to evaluate the effects of cover crops, no-till or low-till, and grazing on water and carbon fluxes. The University of California, Davis will develop a multi-scale framework to quantify the climate change mitigation potential of specialty crops against the backdrop of growing water scarcity in California. The success of this project will be assessed based on the number of growers and the acreage under study using the monitoring tools developed.



PLANT HEALTH AND PEST MANAGEMENT

The Regents of the University of California, Davis

\$482,958

From Warm Soils to Resistance-Breaking Strains: Evaluating the Robustness of a Novel Heat-Stable Nematode Resistance Gene from a Wild Tomato

The University of California, Davis will study root-knot nematodes (RKNs) which are highly evolved parasites impacting global food security. Resistance to RKNs is available in both fresh and processing tomatoes and is conferred by the single dominant gene Mi-1. The resistance provided by Mi-1 is compromised at soil temperatures above 28° C. Recently, a heat-stable resistance gene, Mi-9, from wild tomatoes was cloned, which unlike Mi-1, Mi-9 offers resistance at elevated soil temperatures. While the Mi-9 gene has shown potential in preliminary studies in wild tomatoes, evaluation of its ability to control RKNs in cultivated tomatoes remains missing. The goal of this project is to assess the efficacy of the Mi-9 in combating RKNs in domesticated tomatoes under different temperature conditions, employing both greenhouse and field trials. The success of the project will be determined by demonstrating that Mi-9 effectively controls RKNs at elevated soil temperatures in at least one domesticated tomato variety.

*U.S. Department of Agriculture,
Agricultural Research Service*

\$495,877

Etiology, Detection, and Management of Fusarium Wilt of Strawberry and Blackberry

The \$2 billion strawberry and blackberry industries in California are threatened by emerging Fusarium wilt pathogens. In 2022, the "California Fof race 2" strain of *Fusarium oxysporum f. sp. fragariae* (cause of strawberry wilt) overcame the only source of disease resistance in commercial strawberry cultivars in California. Some *Fusarium oxysporum f. sp. mori* (cause of blackberry wilt) strains were also discovered to be pathogenic on disease-resistant strawberry cultivars. The U.S. Department of Agriculture, Agricultural Research Service will determine strain-level pathogenicity on strawberry and blackberry, create methods for detection, conduct surveillance, and develop tools for accelerating the production of resistant cultivars. The success of this project will be measured by, 1) the knowledge gained by stakeholders, 2) adoption of rapid detection methods and tools for marker assisted selection, 3) the development and new knowledge of disease resistant varieties, and 4) the impact of resulting industry and peer-reviewed publications.



The Regents of the University of California, Riverside *\$490,740*

Cropping Nematode-Antagonistic Plants for Nematode Suppression in Walnut

The University of California, Riverside will use anaerobic soil disinfestation (ASD) to increase the yield of the California edible walnut. The California edible walnut is produced by approximately 4,500 growers on approximately 350,000 acres. Among soil-borne pathogens, new plantings can be damaged by one *Pratylenchus vulnus* per 250 cubic centimeters of soil. Pre-plant soil fumigation with 1,3-dichloropropene against these soil pests is under tightening regulations because of human and environmental health concerns. In ASD for pathogen suppression, atmospheric oxygen is excluded from heavily irrigated soil during anaerobic decomposition of introduced substrate under plastic tarp. In preliminary studies, using the biomass of in situ grown nematode-resistant cover crops as substrate for ASD improved yield of walnuts. Such substrate will be incorporated using a moldboard plow and the soil sealed mechanically, a method showing promise for rice bran incorporation. ASD with rice bran substrate, plastic tarp, and drip lines costs approximately \$5,500 per acre. These new protocols can potentially save 70 percent of walnut yield, making ASD a sustainable economically feasible method.

*U.S. Department of Agriculture,
Agricultural Research Service* *\$394,117*

Rapid Assay for Identification of Verticillium Wilt Resistant Lettuce

Verticillium wilt of lettuce, caused by the soilborne fungus *Verticillium dahliae* (*V. dahliae*), threatens California lettuce production. Though resistance is available in lettuce for race 1 of *V. dahliae*, races 2 and 3 were recently identified in California. The U.S. Department of Agriculture, Agricultural Research Service will develop rapid assays for the identification of resistance against races 2 and 3. The assays take advantage of the natural plant immune response, as expression of a race-specific proteins from *V. dahliae* in leaves will cause an observable patch of localized cell death. The outcome includes rapid assays for California seed companies and breeders to facilitate breeding of resistant lettuce cultivars. Success of the project will be measured by the development of two new tools to reduce disease and outreach to educate 40 growers and seed companies on the use of the new tools. The adoption of the new tools by the lettuce industry in California will be tracked with surveys.



The Regents of the University of California, Riverside *\$448,742*

Mitigating Huanglongbing in Citrus Using Naturally-Derived Antimicrobials

The project team from the University of California, Riverside has demonstrated that infection of the citrus Huanglongbing (HLB)-associated pathogen, *Candidatus Liberibacter asiaticus* (CLAs), causes a significant increase in the relative abundance of sectors of the microbiome that include potential beneficial microbes that possess competitive antibiosis properties. It is hypothesized that these sectors represent native microbes that enter into a competitive interaction with CLAs. The project has antibiosis data supporting this hypothesis. However, CLAs ultimately wins the competitive battle. The purpose of this project is to amplify known competitive interactions to enable the native citrus microbiome to defeat CLAs by developing biologicals that target CLAs. This project will focus on scaling up production of lead bioinoculant strain and the anti-CLAs compound it produces for testing in whole plant assays for HLB suppression.

U.S. Department of Agriculture, *\$391,515*
Agricultural Research Service

Application of Seed Treatments to Reduce Specialty Crop Pathogens

Infested seeds transfer pathogens into soil, causing severe diseases in valuable California specialty crops such as strawberry, lettuce, and spinach. There is a need to develop treatments to eliminate these pathogens from seed. The U.S. Department of Agriculture, Agricultural Research Service will evaluate the efficacy of three seed treatments for reducing pathogen levels in spinach seeds for organic and conventional production. Nearly 45 percent of the California fresh market spinach production is organic. An anticipated outcome includes an effective seed treatment useful for protecting California specialty crops beyond spinach as well. Preliminary research on the three treatments yielded highly encouraging results, reducing, or eliminating the pathogen population without harming seed germination. Two of these treatments are currently compatible with organic production. Success of the project depends upon industry adoption of one or more of the seed treatments and the adoption will be evaluated through surveys.



*U.S. Department of Agriculture,
Agricultural Research Service*

\$370,586

Replacing Virus Reservoirs with Beneficial Plants to Support Healthy Lettuce Ecosystems

Lettuce production in the Salinas Valley is severely impacted by *Impatiens necrotic spot virus* (INSV), a plant pathogen that is transmitted by western flower thrips. This virus can infect hundreds of plant species, including common weeds in the Salinas Valley. While weed management efforts are needed to break the disease cycle, non-crop vegetation provides critical ecosystem services in heavily managed areas (e.g., insectary habitat, erosion control). The U.S. Department of Agriculture, Agriculture Research Service will, 1) identify weedy sites that harbor INSV to prioritize weed management efforts, and 2) conduct INSV susceptibility tests on a panel of native and beneficial plants to identify species that are safe options to plant in managed areas. Outcomes include information on key areas to focus weed management efforts and a list of beneficial, non-crop plants with low INSV-risk. Success of the project will be measured by the number of stakeholders that have gained knowledge and adopted practices to reduce disease risk.

The Regents of the University of California, Riverside

\$498,393

Sustainable Citrus: Unlocking the Potential of Controlled Environment Agriculture for Commercial Nursery Growers

Building on previous work, this project advances, controlled environment agriculture (CEA) technologies for citrus nursery growers. With this project, the University of California, Riverside aims to improve plant growth and stress resilience by optimizing photobiology (photosynthesis and photomorphogenesis) under CEA. Goals include, 1) assessing optimal light conditions for growth, 2) elucidating light-dependent disease symptom expression, 3) translating this science into real-world solutions for commercial growers, 4) assessing CEA's energy and cost efficiencies, and 5) expanding outreach to underserved farmers. Success will be measured by, 1) increased disease-free plant quality output, 2) decreased disease diagnosis time, 3) verified CEA technologies efficiencies, 4) the number of commercial citrus varieties evaluated, and 5) the number of growers gained knowledge and trained. The project aims to foster both scientific and practical advances in citrus plant production, enhancing CEA's sustainable agricultural future.



The Regents of the University of California, Riverside *\$391,840*

Evaluating Attract and Kill for Control of South American Palm Weevil in California

South American Palm Weevil (SAPW), an invasive pest, established in San Diego County in 2015, has killed an estimated 20,000 palms. Control relies on quarterly prophylactic insecticide applications. The ongoing spread of SAPW poses an unprecedented threat to California's edible date industry. With this project, the University of California, Riverside will develop Attract and Kill technology for managing SAPW. This technology uses an inert wax-like matrix infused with 3 percent contact insecticide and the weevil's aggregation pheromone to lure adult male and female SAPW. Weevil interactions, approximately three seconds, with AK dollops kills them. Project outcomes will be a highly effective targeted control strategy that minimizes insecticide use. This project will be evaluated, and impacts measured using large, replicated field trials across two and half consecutive years with three cooperating communities infested with SAPW. Success will be documented by statistically significant declines in SAPW captures in traps and reduced palm mortality rates between treated and untreated plots.

The Regents of the University of California, Davis *\$429,188*

WeedChat: AI-Powered Chatbot Solutions for Specialty Crop Weed Management

Leveraging similar technologies to ChatGPT, WeedChat aims to address a pressing issue in modern agriculture: the need for immediate, expert advice on managing weeds in specialty crops. Growers often face daunting challenges in weed control, leading to significant financial losses and environmental impact. Existing extension services are limited in providing timely, individualized advice. With WeedChat, the University of California, Davis) will fill this gap with immediate, artificial intelligence-enabled recommendations, enabling farmers to make quick, informed decisions. Project goals include, 1) build weed management database, 2) develop WeedChat using large language models, 3) make WeedChat accessible online, and 4) reduce weed-related losses through educated decision-making. User engagement and the accuracy of WeedChat's advice will serve as primary metrics for success. Pre- and post-implementation surveys will assess user satisfaction and impact. By achieving these evaluation benchmarks, WeedChat aims to modernize weed management in specialty crops.



*California Department of Food and Agriculture,
Integrated Pest Control Branch*

\$377,884

Implementing Classical Biological Control of Brown Marmorated Stink Bug

This project will deliver long-term, sustainable management of the brown marmorated stink bug (BMSB), an invasive agricultural pest in California from Asia. BMSB is highly polyphagous, and established in 16 counties, including several in the San Joaquin Valley. The primary goal of this project is to release and establish samurai wasp (*Trissolcus japonicus*) in California's key agricultural production areas facing increasing BMSB pressure. Samurai wasp is the most important host specific BMSB natural enemy in the world. In 2018, samurai wasp was discovered in an urban area of southern California. The California Department of Food and Agriculture, Biological Control Program has a field release permit and will mass rear and redistribute this parasitoid to agricultural regions in critical need of BMSB control. Project success will be evaluated by tracking the number of samurai wasps released, confirming parasitoid field establishment, and measuring regional changes in BMSB population levels following agent release.



FOOD SAFETY

The Center for Produce Safety

\$507,943

Genomic and Phenotypic Assessment of *E. coli* O157:H7 REPEXH02 Strains

The Center for Produce Safety (CPS) will partner with Michigan State University to identify factors associated with emergence and persistence of REPEXH02, a genetic subtype of *Escherichia coli* (*E. coli*) O157:H7 linked to leafy greens grown in specific regions in California. This project will determine genetic and phenotypic features that may facilitate persistence of this REPEXH02 subtype in the Salinas and Santa Maria growing regions. *E. coli* O157:H7 will be isolated from soil, sediment, water, and wildlife samples collected from these regions, and will be sequenced along with historical *E. coli* O157:H7 isolates. Physicochemical parameters will be measured for soil and water and used to develop experimental assays to measure resilience phenotypes. Links between genes, phenotypes, and environmental parameters will be determined using bioinformatics and artificial intelligence based modeling tools. A model to predict the persistence of REPEXH02 based on soil physicochemical parameters will be developed. The data and predictive methods will be used to inform growers and producers of mitigation strategies for this persistent subtype of *E. coli* O157:H7. Results of this study will be summarized in project reports, presented at the annual Center for Produce Safety Research Symposium, and published in peer-reviewed journals.

The Center for Produce Safety

\$518,514

***Salmonella* Risk is Enhanced by Onion Condition or Defect**

The Center for Produce Safety will partner with Cornell University to identify factors that enhance food safety risk in bulb and head-and-tailed onions. Recent recalls of onions due to potential *Salmonella* contamination have increased the focus on production and handling practices to mitigate this risk. Short-day and intermediate-day onion varieties are sweeter and spoil more quickly than do long-day storage onion varieties. Onion attributes (e.g., moisture, sugar, acid content) that increase susceptibility to microbial spoilage may also increase the risk from *Salmonella* contamination. This risk may be further enhanced in head-and-tailed onions, which are distributed peeled and pre-cut, with the top and bottom of the onion removed. This project will characterize the impact of onion variety, physiology, mechanical damage, and postharvest handling practices on *Salmonella*. The role of artificial, forced-air curing on *Salmonella* reduction in short-day onions also will be assessed. The scientific data generated will help identify key risk factors in onion production that may enhance risk, so that resources for mitigation can be better directed. Results of this study will be summarized in project reports, presented at the annual Center for Produce Safety Research Symposium, and published in peer-reviewed journals.



The Center for Produce Safety

\$510,497

Solutions to Brush Sanitation Tailored to the Producer's Appetite for Capital Investment and Labor Intensity

The Center for Produce Safety will partner with Cornell University to determine how deterioration of produce brushes impacts sanitation outcomes. Brushes are important tools for washing, waxing, and polishing some produce, but they are difficult to effectively clean and sanitize. Pathogens that are not removed through sanitation may increase in number and cross-contaminate fruit subsequently processed on that equipment. Also, brushes will deteriorate over time with repeated use, which makes them more difficult to clean. Effective methods for sanitation are needed, and there is a lack of evidence on when produce brushes should be replaced. This project will, 1) quantify the impact of brush deterioration on retention of wax and *Listeria*; 2) investigate how well different bristle types resist deterioration; 3) define the critical parameters for sanitation by steam treatments; and 4) test the findings in a packing facility. The scientific data generated will provide industry with tools to assess tradeoffs in brush replacement and sanitation, improving their hygienic status and enhancing control over pathogen cross-contamination. Results of this study will be summarized in project reports, presented at the annual Center for Produce Safety Research Symposium, and published in peer-reviewed journals.

The Center for Produce Safety

\$515,009

Agent-based Models Can Predict Appropriate Risk-based Set-back Distances for Flooded Fields

The Center for Produce Safety will partner with Cornell University to help identify risk-based harvest setback distances after field flooding events. Flooding of produce fields can present a food safety risk, as flooding can transport and introduce bacterial hazards and facilitate bacterial growth. There is a need for better tools and information that will allow growers to implement setback distances and other risk management strategies appropriate for a given flooding event. This project will address this need through development of a model that can predict situation appropriate setback distances to manage flooding-related food safety risk, and a large dataset on growth, die-off, and dispersal of key bacterial food safety hazards after flooding. These tools will help industry to apply improved risk-based approaches to manage food safety hazards after flooding events, which in the long term should replace one-size-fits-all setback distances and wait periods with location- and situation-specific risk management approaches. The agent-based model developed will be available to industry (including instructions for use of the model). Results of this study also will be summarized in project reports, presented at the annual Center for Produce Safety Research Symposium, and published in peer-reviewed journals.



California Department of Food and Agriculture
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Project Abstracts

The Center for Produce Safety

\$475,415

Quantitative Microbial Risk Assessments Need to Consider Quality Parameters to Accurately Predict Produce Food Safety Risks

The Center for Produce Safety will partner with Cornell University to develop a tool to better assess food safety risks associated with the postharvest condition of fresh produce. Retailers often evaluate fresh produce for quality using criteria such as percentage of damaged leaves, wilting, decay, and insect damage. These types of postharvest defects impact customer satisfaction and may also impact food safety risks, for example by allowing pathogens to grow to higher levels or by enhancing their ability to cause disease. This project will use leafy greens as a “test case” to determine how various postharvest defects that are assessed by retailers will impact food safety risks. The research team will, 1) determine growth of *Listeria monocytogenes* and disease-causing *Escherichia coli* on leafy greens with different levels of leaf damage, and 2) use the resulting data as well as other available data to build a computer model—a quantitative microbial risk assessment (QMRA)—that can predict the increases in food safety risks associated with products that show quality defects, such as a higher percentage of damaged leaves. The data generated will help industry assess the impact of different postharvest defects on food safety risks, which will facilitate the development of rational receiving specifications that minimize food safety risks as well as unnecessary product rejections. Results of this study will be summarized in project reports and in at least two factsheets and/or lay publications, presented at the annual Center for Produce Safety Research Symposium, publicly accessible posting of the QMRA and associated data, and published in peer-reviewed journals.