



ANNUAL REPORT

Supporting Western Agriculture

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SARE 



Sustainable Agriculture
Research & Education

2016

Western Sustainable Agriculture Research and Education



SARE's mission is to advance—to the whole of American agriculture—innovations that improve profitability, stewardship and quality of life by investing in groundbreaking research and education.

SARE's vision is an enduring American agriculture of the highest quality. This agriculture is profitable, protects the nation's land and water and is a force for a rewarding way of life for farmers and ranchers whose quality products and operations sustain their communities and society.

At Western SARE, we serve 13 Western states and the four Pacific Island territories and are supported by the USDA's National Institute of Food and Agriculture.

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On the web: westernsare.org

Our Challenge:

Helping Western Agriculture Adapt to Whatever Comes Next

Western agriculture has always remained resilient during changing conditions, and current times are no different. Shifting weather patterns, water availability, markets and pest and weed populations must be dealt with repeatedly. Producers do so through observation, quick learning, and adoption of new best practices. Ag professionals routinely share innovative ideas, while researchers determine practical solutions to agriculture's challenges.

Western SARE has worked closely with our region's agricultural community during challenging times by supporting cutting-edge, realistic research conducted with strong engagement from producers themselves. In 28 years, we have provided more than \$57 million to fund over 1,000 projects addressing identified sustainable agriculture questions and then made the research results easily accessible.

For the first time, we are sharing a yearly snapshot of our work. The stories provided here typify the creative, participatory and integrated research Western SARE annually funds – led by land grant institution researchers and graduate students, Extension and other ag professionals, and nonprofit leaders in full partnership with producers. Uniquely, Western SARE also provides up to 20% of our funding directly to farmers and ranchers to lead research on their land.

In this report you will read stories that illustrate both the breadth and depth of Western SARE funding. Projects are performed in 17 states and protectorates, including the Pacific Islands, Hawaii, Alaska, West Coast, Southwest and Intermountain West, and focus on 10 different subject areas. Projects highlighted in this report range from producer-led research projects examining aquaponics in Arizona and the use of sensors to prevent over-application of nitrogen fertilizer in Montana, to research projects that are developing on-line resources so Oregon vegetable growers can better time their harvest, and a Hawaii project that is developing local fertilizer options to reduce reliance on imported fertilizers.

The second and equally important part of our mission is to get innovative solutions and best practices into the hands of farmers, ranchers and ag professionals quickly and easily. We do so through extensive outreach with a coordinator in each state, a comprehensive Learning Center on the website, multiple publications, and research results made public in our easy-to-use searchable database. During the course of one year, Western SARE has published four 12-page reports, two newsletters, a monthly e-newsletter and dozens of project stories. We have also promoted the publications, websites, blogs and videos of multiple projects, expanding the number of recipients receiving new knowledge.

With the challenges of reaching out to a far-flung population, meeting the needs of producers in multiple sub-regions with vastly differing conditions and undergoing leadership transitions, Western SARE has remained as resilient and adaptable as the people we serve. We are grateful to be part of a strong, resourceful ag community and are committed to responding to future changes and challenges.



Sustainable agriculture seeks to sustain farmers, resources and communities by promoting farming practices and methods that are profitable, environmentally sound and good for communities. It works on farms and ranches large and small, harnessing new technologies and renewing the best practices of the past.

How Producers See Sustainability



“Sustainable ag is farming the land in a way that will provide holistically successful agriculture of that land in future generations.”

*Jean-Pierre Wolff
Wolff Vineyards
San Luis Obispo, California*

“Sustainable agriculture has to begin with economic sustainability. Only then will it serve the needs of the environment and the community. Every tool used to benefit the environment and society will have a price, and that price has to be included in the cost of doing business or the business will eventually fail.”



*Bryce & Jan Wrigley
Alaska Flour Company/Wrigley Farms
Delta Junction, Alaska*

“When my husband and I first started farming, we were most concerned about protecting natural systems: improving our soil health, protecting riparian areas, reducing dependence on off-farm inputs, etc. The longer we have farmed however, the more we see the need for a balance of all three components of sustainability, so we have worked to make our farm financially viable with an eye toward succession planning, and have cultivated our social sustainability through building our direct markets and strong relationships in our community.”

*Maud Powell
Wolf Gulch Farm
Little Applegate Valley, Oregon*



“Sustainable ag is a lens through which we weigh our work on the land, in the marketplace and in our community.”

*Janie Burns
Meadowlark Farm
Nampa, Idaho*



Western SARE is one of the biggest sources of funding for researchers and graduate students developing new tools, techniques and knowledge to improve the sustainability of Western ranching and farming.

Research and Grad Student Projects

Project Develops Local Fertilizer Options for Hawaii

At the Western SARE conference held in Hawaii, stakeholders identified replacing imported fertilizers with local resources as the highest priority.

According to Theodore Radovich at the University of Hawaii, possible inputs include commercial green-waste composts, rendered animal products and invasive algae from coral reef remediation projects. These by-products are readily available, but bottlenecks exist that inhibit use and adoption by growers.

To address these problems, Radovich developed a Western SARE-funded project to conduct a series of greenhouse



and on-farm trials in cooperation with university faculty, commercial growers and industry partners. Radovich and his project team evaluated quality, maturity, nitrogen release patterns and crop growth for 10 composts through lab incubation and greenhouse trials. They collected samples of major algae invasive species and of rendered animal products.

Findings include:

- Bio-security protocols have reduced concerns of algae spread to other areas.
- There is an increased demand for locally produced rendered animal products. The increased reliance on local inputs will reduce the demand for off-state fertilizers.
- Farmers utilizing the invasive algae, mainly taro and sweet potato farmers, are reporting increases in the yield and quality of their crops.
- There is increased incorporation and utilization of locally produced composts among small-farm holders. This may lead to increased net benefits, due to reduction in production cost.

Details are at mysare.sare.org/sare_project/sw11-055/

Identifying Useful Soil Tests for Farmers in the Intermountain West

The ability of farmers to successfully evaluate their soil quality and fertility is important to avoid losses in productivity.



According to Esther Thomsen, graduate student at Utah State University, attempts in making soil quality assessments more available to farmers have had limited success.

While standard commercial tests are important, they typically do not address physical or biological aspects of soil fertility. Obtaining soil quality results can be expensive, time consuming and confusing to interpret. Tests are not always available, and when they are, prices are often prohibitive.

So Thomsen designed her graduate student project to identify user-friendly tests that are most indicative of soil quality on farms in the Intermountain West.

Thomsen identified four effective simple tests and tested them on multiple farms:

- Modified slake tests
- NRCS slake test
- Solvita soil respiration
- Earthworm abundance/biodiversity test.

“The more aware farmers are about soil quality and testing, the more likely they will have a positive impact on multiple levels,” Thomsen said.

Changes in management to benefit soil quality can cut costs associated with inputs like fertilizers, fossil fuel use and pesticides. They can also reduce erosion, and nutrient overload while improving biodiversity, nutrient cycling and uptake and farmer profits, she explained.

Details are at mysare.sare.org/sare_project/gw15-046/

Croptime Website Allows Growers to Plan Planting and Harvest Dates

Pest managers are familiar with the concept of using degree days to predict pest outbreaks. Insects, like many other organisms, develop according to the temperature around them and degree days are a way to measure accumulated temperature.

Plants – at least in part – also develop based on temperature, so a team in Oregon is adapting a degree-day modeling system built for pest management to make a tool for vegetable growers to better plan their planting and harvesting dates.

“The problem is when you’re trying to schedule a harvest, seed catalogs all give an expected maturity date in calendar days,” explained Oregon State University Small Farms Extension Agent Nick Andrews, who is spearheading the project. “Calendar days are pretty inaccurate, and growers recognize that.”

One seed catalog for example might say a broccoli variety needs 65 days to mature, while another claims the same variety requires 90 days. That range makes it tough to pick a planting day in May to hit a desired harvest date in August. And using calendar days ignores local temperature, which is a huge factor in how fast plants mature.

With a \$203,000 grant from Western SARE, the Oregon team created a website called Croptime to predict the time-to-maturity for a number of vegetable varieties important to Willamette Valley growers. Croptime was built on the backbone of the USPest.org pest-management degree-day modeling site, which was itself supported by the Western Integrated Pest Management Center.

Maximizing Profits

Here’s why it matters. For fresh vegetable growers, harvest timing is critical. Processors want a consistent supply of produce throughout a growing season, not a glut followed by a shortage then another glut. And growers want to time their harvest when labor is available and demand is high so they can maximize profits. Harvest-timing helps ensure a consistent supply of fresh produce for local restaurants and for community-supported agriculture operations that deliver fresh produce to customers.

Crop timing can also be a way growers avoid pests, an important integrated pest management principle. In fact, the Croptime model includes certain weed species to help growers – especially organic producers – pick varieties and planting dates to minimize weed issues. Growers are already finding new ways to use the site.

“When we have a couple weeks of wet weather in spring, we could use Croptime to choose varieties we might not be familiar with but that would help keep our production up,” explained Bob Egger of the Pumpkin Patch farm in Sauvie Island, Oregon.

Growers also pointed out a way to make it more useful. “They want to enter a harvest date and have it display the planting date,” Andrews said. “It’s a really good feature.”

Access Croptime at smallfarms.oregonstate.edu/croptime

Details are at mysare.sare.org/sare_project/sw12-037/

Conducting groundbreaking research in agricultural sustainability is only the first step. To get new knowledge, tools and techniques into the hands of America's farmers and ranchers, Western SARE supports agricultural professionals in outreach and extension efforts. We also have a robust online Learning Center available to anyone interested in sustainable agriculture.



Professional Development Projects

Teaching Whole-Farm Management through Distance Learning

Holistic Management Institute has a successful whole farm planning method – incorporating environmental, economic and social sustainability.

When a survey showed dozens of ag professionals in the West were interested in Whole Farm Planning through distance learning, the institute adapted the training so that residency periods were shorter, enabling more professionals to participate, and it used Western SARE funds to provide scholarships for them to participate.

In three years, 40 professionals were trained in Introduction to Whole Farm/Ranch Planning, Financial Planning, Land Planning, Grazing Planning and Biological Monitoring, and they in turn trained 188 producers in various aspects of whole-farm planning. Producers developed plans or tested whole farm/ranch decisions and were provided feedback.

The training methods used included webinars, discussion groups, assignments and dedicated mentors, and focused on effective techniques for facilitating learning with farmers.

Details are at mysare.sare.org/sare_project/ew13-021/

Boosting Knowledge about Forage and Pastures in the Northwest

To increase the productivity of pastures and reduce the use of mechanically harvested feeds, this project provided training about improved pasture and grazing management to extension educators, Natural Resource Conservation Service personnel and other ag professionals so they could train ranchers through local workshops, tours and farm visits.

Five workshops in Idaho, Oregon, Washington, Colorado and Utah trained 165 people. The program was developed with Western SARE funding and revised based on evaluations. It provided 12 hours of classroom lecture and 10 hours of laboratory and field demonstrations about genetics, seed certification, grazing management and animal behavior.

The program filled a gap for focused training about grass physiology in relation to grazing, plant materials available, including legumes in mixes, fertilization, irrigation and grazing management. It would be difficult for a single state to develop a comprehensive program, so combining resources and from Western universities and USDA was effective.

Details are at mysare.sare.org/sare_project/ew11-019/

Promoting Food Tourism to Boost Agriculture in the Intermountain West



For farmers and ranchers, food tourists are the best kind.

They travel to find genuine, culturally-relevant dining experiences, and the places they visit benefit economically and socially with opportunities to distribute local food, support family farms and promote cultural distinctiveness. Farm stays and tours, wineries and breweries, farmers' markets or locally sourced restaurant meals are all aspects of food tourism.

But Kynda Curtis of Utah State University found barriers to successful food tourism in some areas, including a lack of local investment or effective marketing. Visitors seek convenience, diversity of attractions and product-purchasing opportunities, and it is vital that food tourism providers offer ample information in order to capture visitor spending.

To help overcome these barriers, Curtis led five one-day workshops where 97 ag professionals learned about food and tourism partnerships, regional initiatives and best practices in uniting food production and tourism. All participants received a full-color workbook, PowerPoint presentations of all curriculum modules and worksheets.



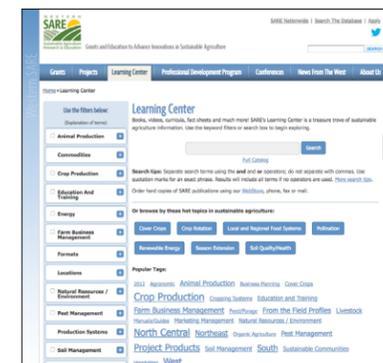
The course materials are at diverseag.org/html/farm-and-food-tourism

Details are at mysare.sare.org/sare_project/ew13-005/

Learning Center

The Western SARE Learning Center is an online treasure trove of material about agricultural sustainability that includes books, videos, curricula, fact sheets, profiles and more.

The repository is fully searchable, with quick-link filters and hot-topic buttons, as well as full keyword search functionality. If you're looking for information about sustainable systems, the Learning Center is the place to start.



Access the Learning Center at westernsare.org/Learning-Center

IPM Training Helps Growers Know their Enemies



To manage pests, growers have to be able to identify them. They have to be able to distinguish enemies – insects, weeds and diseases that will cause them economic harm – from beneficial insects that prey on damaging pests, and others that neither help nor harm the crop.

Identification is one of the first principles of integrated pest management, and the core of a train-the-trainers program that's been successfully improving the skills of young ag professionals in rural Oregon, Washington and Idaho. Since 2009, Western SARE has funded the project with two grants totaling \$170,000.

"We've targeted the ag industry, because a lot of people in the industry now are very young," explained Steve Van Vleet, an extension specialist with Washington State University in Colfax. "A lot of the old guard has been replaced by young men and women."

The trainees are primarily crop consultants who work with a number of different growers, or area managers for the big farming companies growing crops in the Columbia River Basin and surrounding areas of eastern Oregon and Washington and western Idaho. In classes limited to 20 participants at a time, the program has trained 140 people to date.

Attendees are required to provide 10 hours of training to others, and most go well beyond that in spreading the information they've gained to others in their communities or companies.

And it's working. An estimated 15 to 25 percent of trainees are adopting integrated pest management principles into their farming, and training others in IPM as well.

Details are at mysare.sare.org/sare_project/ew14-031/



One thing that sets Western SARE apart from other programs is our insistence that producers - the West's farmers and ranchers - be involved in the projects we support. Two grant programs focus specifically on on-farm research: Farmer/Rancher projects, and Professional + Producer projects.

Producer-Led Research Projects

Using Sensors to Reduce Over-Application of Nitrogen in Wheat

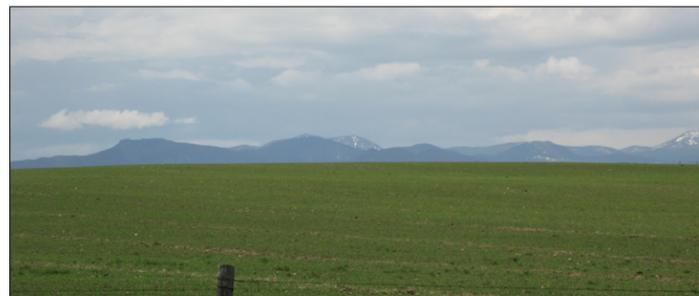
Nitrogen is a key nutrient limiting wheat production, but its use efficiency is only about 30%. This project focused on educating and training wheat producers on how sensor-based technologies can increase the efficiency and profitability of their farms. Sensors enable growers to develop crop-specific and site-specific yield-potential-based topdress nitrogen recommendations and increase nitrogen-use efficiency.

They can also net wheat growers more than \$25 per acre in fertilizer savings, which is significant because wheat production in Montana covers over five million acres, employs approximately 15,000 people and accounts for approximately 25% of Montana's total agricultural revenue.

Five on-farm demonstration plots were established in cooperating wheat producers' fields. The plots included a range of nitrogen fertilizer rates from zero to 200 pounds per acre.

Growers rated the demonstration plots by visual evaluation and the research team then compared the growers' ratings with the sensor measurements. They found in most cases, the visual evaluation did not correspond to the sensor readings.

In short, growers' visual observations would result in substantial over-fertilization, compared to sensor-based recommendations. Growers' visual ratings were directly proportionate to the nitrogen rates applied, so as the rate increased,



the growers' perception of the crop stand improved. However, above 100 pounds of nitrogen per acre, no increase in the crops' vigor and greenness was detected by the sensors.

This supports previous findings that remote sensing allows for much more precise crop-stand assessment compared to visual evaluation. Furthermore, results illustrate that sensors can be an effective tool in identifying nitrogen-deficient and adequately fertilized areas of the field, enabling growers to develop topdress nitrogen recommendations to correct early to mid-season nitrogen stress and to fertilize their wheat crop according to its need.

Details are at mysare.sare.org/sare_project/ow13-017/

Bringing Low-Cost Aquaponics to the Desert Southwest

Cochise County, Arizona, where Aaron Cardona's Arevalos Farm is located, is classified by the USDA as a food desert with high poverty rates, as well as high rates of diabetes and obesity.

To help confront these problems, Cardona decided to look into aquaponics, which had not been experimented with in the desert regions of the Southwest or in areas with low-income populations. Cardona looked to build a more economically viable aquaponic system for people of low income and integrate two traditional greens, verdolagas (purslane) and berros (watercress) with tilapia, while cooling the greenhouse from the harsh Arizona sun using solar power. His objectives were to:

- Explore the viability of aquaponics in the Desert Southwest
- Construct a more economically viable aquaponics system
- Increase the availability of traditional foods locally
- Make a greenhouse operation truly sustainable by using solar energy
- Serve as an example of sustainable agriculture for the local agriculture community

It's working.

"Knowledge of fish grown in a greenhouse has spread far and wide, bringing many to come and ask how to set up their own system," Cardona said. "By fulfilling one of the project goals of constructing an aquaponics system for half of the cost of a pre-manufactured system, it is now more accessible to a wider range of people of different backgrounds and income."

Purslane did not develop in the system but watercress



was a success. Due to the publicity of the project and availability of watercress, Cardona estimates that nearly 40% of his sales at the farmers' market were to people of Hispanic descent, typically a much lower percentage of farmers' market customers. He believes that integrating more traditional foods can increase the participation of the Hispanic community at farmers' markets.

And the fresh-water tilapia?

"It's virtually an unexplored world with colossal potential," Cardona said. "I have been approached by many at farmers markets asking to buy them and was sought out by a popular four-star restaurant salivating over the potential to serve locally grown tilapia."

See a YouTube video at youtube.com/watch?v=DH_nMBdB1cA

Details are at mysare.sare.org/sare_project/fw13-142/

Analyzing Market Opportunities for Broilers Fed a non-GMO Diet

Jared Pruch received numerous requests from his farmers' market customers in Oregon to produce GMO-free poultry products. Phoenix Farm Enterprises produces pastured chicken, duck and turkey, but Pruch was uncertain of the economic viability of raising poultry with GMO-free feed.

In order to determine the potential for his operation and other local poultry farmers, he conducted a cost-comparison study between raising Cornish cross broiler chickens on locally sourced, GMO-free feed versus conventional feed.

In 2015, the farm performed a side-by-side comparison of pasture-raised Cornish Cross broilers fed on GMO-free feed vs. conventional feed. At the farmers market, Pruch also surveyed consumers to evaluate preferences for GMO-free vs. conventionally fed birds.

A higher cost-per pound price was assigned to the GMO-free birds to account for higher feed costs.

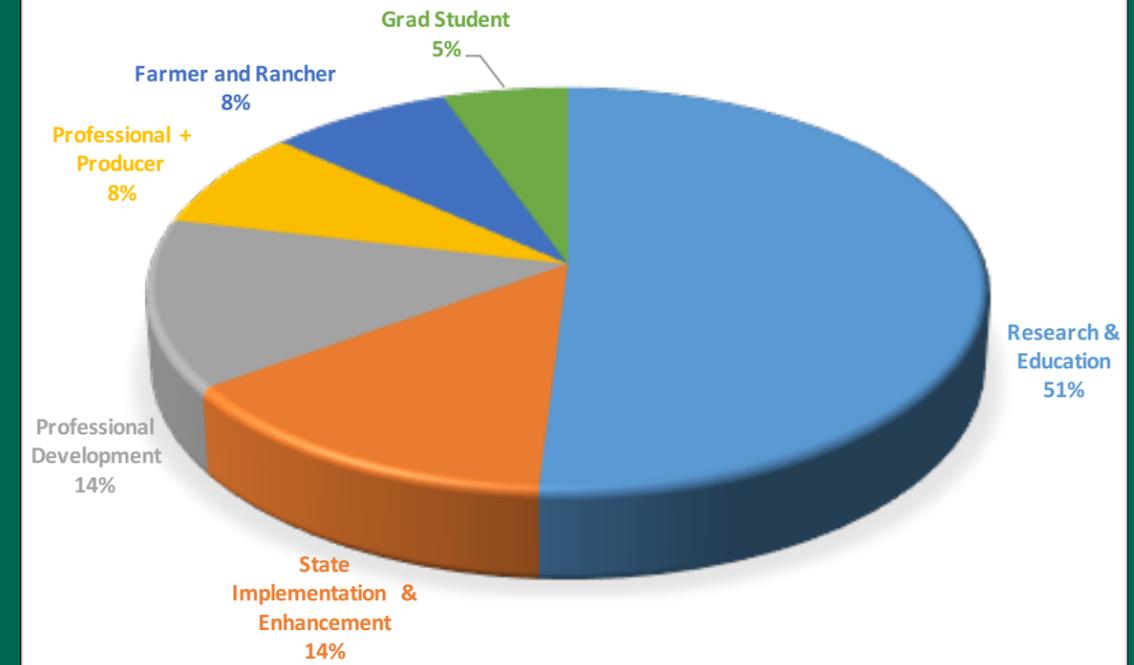
Here's what Pruch found:

- Feed consumption per bird was lower in the GMO-free birds; however, total cost of feed per bird was higher given the higher cost of GMO-free feed.
- Total input costs per bird were approximately 12% higher for the GMO-free broilers.
- Average dressed weight of broilers was slightly lower, on average, for the GMO-free broilers.
- Consumers had a slight preference for GMO-free birds when presented with a choice, despite a higher price point.

Details are at mysare.sare.org/sare_project/fw15-054/

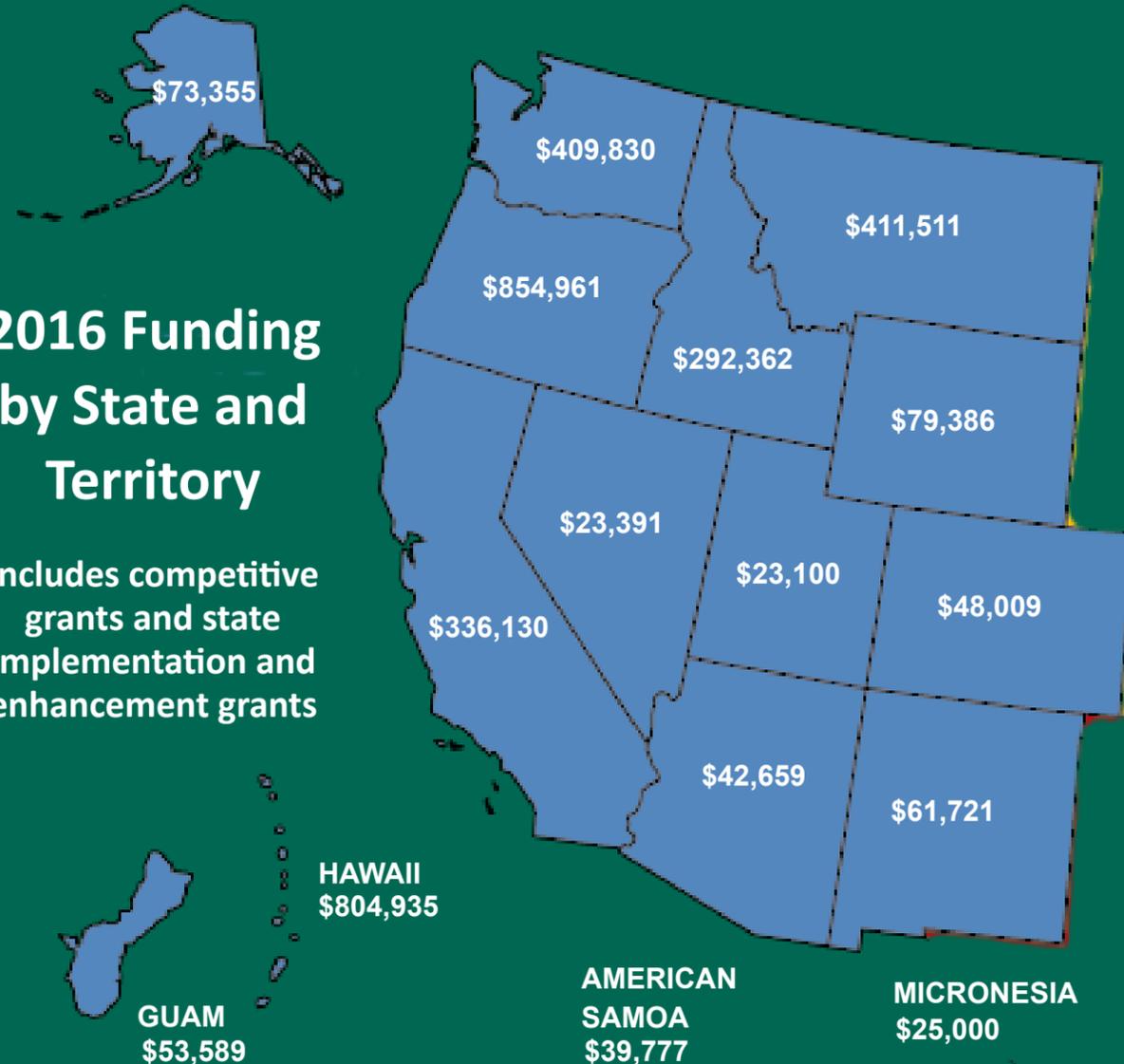
In 2016, Western SARE awarded more than \$3.5 million in funding to Western states and territories, researchers, extension specialists, graduate students, agriculture professionals and farmers and ranchers in the West. We are one of the largest and most-responsive sources of sustainable agriculture funding that exists, and are unique in requiring that all of our funded projects involve producers.

FUNDING BY GRANT TYPE, 2016



2016 Funding by State and Territory

Includes competitive grants and state implementation and enhancement grants



AWARDS BY SUBJECT AREA, 2016



Over the past 28 years, Western SARE has provided more than \$57million in funding for more than 1,000 projects.

2016 Funded Projects, by State

Western SARE awarded more than \$3 million to 46 competitively selected projects in 2016, and provided another \$504,000 to state sustainability programs. Here's the list, by state.

Alaska

Professional + Producer Grant: OW16-031, "Building Leadership Capacity with Rural Alaskan Youth," Principal Investigator: Greg Finstad, \$49,355.

Arizona

Farmer/Rancher Grant: FW16-032, "Sustainable Water Management in a Passive Irrigation System," Principal Investigator: Aaron Anderson, \$19,660.

American Samoa

Farmer/Rancher Grant: FW16-029, "Alternative Vegetable Crops and Production Methods for American Samoa," Principal Investigator: Ivona Ballard, \$15,202.

California

Professional + Producer Grant: OW16-013, "Irrigated Pastureland Enhancement Program," Principal Investigator: Leslie Roche, \$49,774.

Professional Development Grant: EW16-015, "Harmonizing Organic Standards and Food Safety Metrics," Principal Investigator: Dave Runsten, \$74,970.

Professional Development Grant: EW16-018, "Facilitating Food Safety for Small, Sustainable Farms," Principal Investigator: Nathaniel Harkleroad, \$55,000.

Professional Development Grant: EW16-026, "Assessment of Soil Biology and Plant Available Nitrogen for Soil Health and Water Quality," Principal Investigator: Hunter Francis, \$49,690.

Farmer/Rancher Grant: FW16-032, "Sorrel Pesto: The Positive Implications of Sorrel as a Substitute for Basil in Pesto Production," Principal Investigator: David Ceaser, \$19,710.

Farmer/Rancher Grant: FW16-034, "Sustainable Irrigation Demonstration Project: Demonstrating Irrigation Efficiency in California Winegrapes through Advanced Practices and Technologies," Principal Investigator: Jason Melvin, \$19,180.

Farmer/Rancher Grant: FW16-036, "Improving Water Use Efficiency in Conventional and Organic Almonds through Data Driven Irrigation," Principal Investigator: Pat Ricchivti, \$19,878.

Graduate Student Grant: GW16-044, "A Collaborative Approach to Integrated Pest Management of Tadpole Shrimp in California Rice Fields," Graduate Student: Joanna Bloese, \$24,928.

Colorado

Graduate Student Grant: GW16-020, "Dryland Cropping System Intensification in the West-Central Great Plains: Impacts and Barriers to Adoption," Graduate Student: Steven Rosenzweig, \$25,000.

Guam

Farmer/Rancher Grant: FW16-015, "From Peewee To Large Eggs," Principal Investigator: Alex Coloma, \$11,393.

Farmer/Rancher Grant: FW16-030, "Rotating Paddock-style Systems in Tropical Environments," Principal Investigator: Hertha Van Beurden, \$17,196.

Hawaii

Professional + Producer Grant: OW16-022, "Cover Crop Cocktails: Evaluating Costs and Benefits of Mixed-Species Plantings," Principal Investigator: Jean Brokish, \$41,606.

Research and Education Grant: SW16-021, "Improving Nitrogen Synchronization of Local Fertilizers, Soil Fertility, and Crop Quality with Biochar Application," Principal Investigator: Nguyen Hue, \$259,816.

Research and Education Grant: SW16-023, "Development of Individual Free-Choice Mineral Supplementation Program for Sustainable Grazing Management of Hawaii's Rangelands," Principal Investigator: Mark Thorne, \$332,601.

Professional Development Grant: EW16-008, "Agroforestry Design for Sustainable Production Systems in the U.S. Affiliated Pacific Islands," Principal Investigator: Craig Elevitch, \$73,970.

Farmer/Rancher Grant: FW16-003, "Establishing Profitable Durian Crops in Hawaii," Principal Investigator: Ken Love, \$28,192.

Farmer/Rancher Grant: FW16-023, "Malama Kou Kino," Principal Investigator: Melanie Holt, \$20,000.

Idaho

Research and Education Grant: SW16-031, "Optimizing Water and Nitrogen Use for Sustainable Wheat Production," Principal Investigator: Olga Walsh, \$249,939.

Farmer/Rancher Grant: FW16-042, "A Rangeland Stock Handling Concept: In-herding on the Hat Creek Grazing Allotment, Ellis Idaho," Glenn Elzinga, \$19,423.

Montana

Research and Education Grant: SW16-051, "Research and Demonstration of Minimum Tillage and Optimum Water Management in Sugarbeet Production in Eastern Montana," Principal Investigator: Chengci Chen, \$247,410.

Professional Development Grant: EW16-029, "Best Management Practices (BMPs) for Mitigating Herbicide Resistance in the Northern Great Plains – Educational Tools for Agricultural Professionals," Principal Investigator: Prashant Jha, \$68,871.

Professional Development Grant: EW16-036, "Catalyzing Increased Agricultural Sales through a Common Understanding of Montana's New Food Modernization Law," Principal Investigator: Jennifer Hill-Hart, \$22,332.

Graduate Student Grant: GW16-053, "Cover Crop Grazing: Optimal Seasonality for Soil and Livestock Benefit," Graduate Student: Robert Walker, \$25,000.

New Mexico

Farmer/Rancher Grant: FW16-028, "Passive Solar Herb Drying Project," Principal Investigator: Tomas Enos, \$18,999.

Farmer/Rancher Grant: FW16-035, "A Comparative Study of Shading Systems to Control the Beet Leafhopper and Reduce Beet Curly Top Virus in Heirloom Tomato Fields," Principal Investigator: Peter Sinanian, \$19,909.

Oregon

Professional + Producer Grant: OW16-008, "Winter squash: Extending the Season and Expanding the Uses," Principal Investigator: Alexandra Stone, \$49,958.

Professional + Producer Grant: OW16-028, "Evaluating Cover Crops for Mature Hazelnut Orchards in the Willamette Valley, Oregon," Principal Investigator: Nik Wiman, \$49,997.

Professional + Producer Grant: OW16-038, "Restoring Rangeland Quality with Soil Health Enhancement," Principal Investigator: Debbie Wood, \$44,450.

Research and Education Grant: SW16-010, "Impacts of Chaff Collection or Chaff plus Straw Collection at Harvest to Improve Weed Control," Principal Investigator: Judit Barroso, \$250,000.

Research and Education Grant: SW16-070, "Soil Solarization as a Tool to Control Weeds and Soilborne Pathogens in Tree

Seedling Nurseries in the Pacific Northwest," Principal Investigator: Jennifer Parke, \$247,329.

Professional Development Grant: EW16-010, "Redefining Learner-Centered Education to Build High Impact IPM Partnerships," Principal Investigator: Mary Halbleib, \$67,802.

Professional Development Grant: EW16-027, "Sustainable Grazing Management in Riparian and Wetland Pasture," Principal Investigator: Caley Sowers, \$15,237.

Farmer/Rancher Grant: FW16-031, "Understanding On-Farm Costs of Production," Principal Investigator: Sarah Brown, \$9,400.

Farmer/Rancher Grant: FW16-038, "Improving Water Saving Techniques and Fruit Quality in Oregon Vineyards," Principal Investigator: Karen Peterson, \$20,548.

Graduate Student Grant: GW16-016, "Effects of Grassland Restoration on Native Bee and Spider Communities in a Pacific Northwestern Agroecosystem," Graduate Student: Lauren Smith, \$24,999.

Washington

Research and Education Grant: SW16-013, "Bovine-Avian Interactions on Dairies: Improving Cow Welfare and Farm Economic Stability by Implementing Effective and Sustainable Pest Bird Deterrence Methods," Principal Investigator: Amber Adams-Progar, \$238,105.

Professional Development Grant: EW16-021, "Climate Adaptation Training for Foresters," Principal Investigator: Kirk Hanson, \$58,461.

Farmer/Rancher Grant: FW16-020, "Cryogenic Preservation of Oyster Gametes to Improve Hawaii and West Coast Oyster Stocks," Principal Investigator: David Nisbet, \$25,000.

Graduate Student Grant: GW16-033, "Assessing the Effects of Non-Bee Insects on Pollination in Diversified Organic Farms," Graduate Student: Rachel Olsson, \$22,610.

Graduate Student Grant: GW16-021, "Identification of Peony Diseases in the Pacific Northwest and Alaska," Graduate Student: Andrea Garfinkel, \$24,979.

Graduate Student Grant: GW16-055, "Seed Transmission and Management of White Leaf Spot and Light Leaf Spot Pathogens in Brassicas in the Pacific Northwest," Graduate Student: Shannon Carmody, \$15,675.

Wyoming

Graduate Student Grant: GW16-068, "Conservation Biological Control of Alfalfa Weevil in Wyoming," Graduate Student: Mackenzie Benander, \$7,280.

Graduate Student Grant: GW16-038, "Increasing Sustainable Agriculture through Enhanced Diagnostics with Brucella Infection," Graduate Student: Noah Hull, \$24,818.

