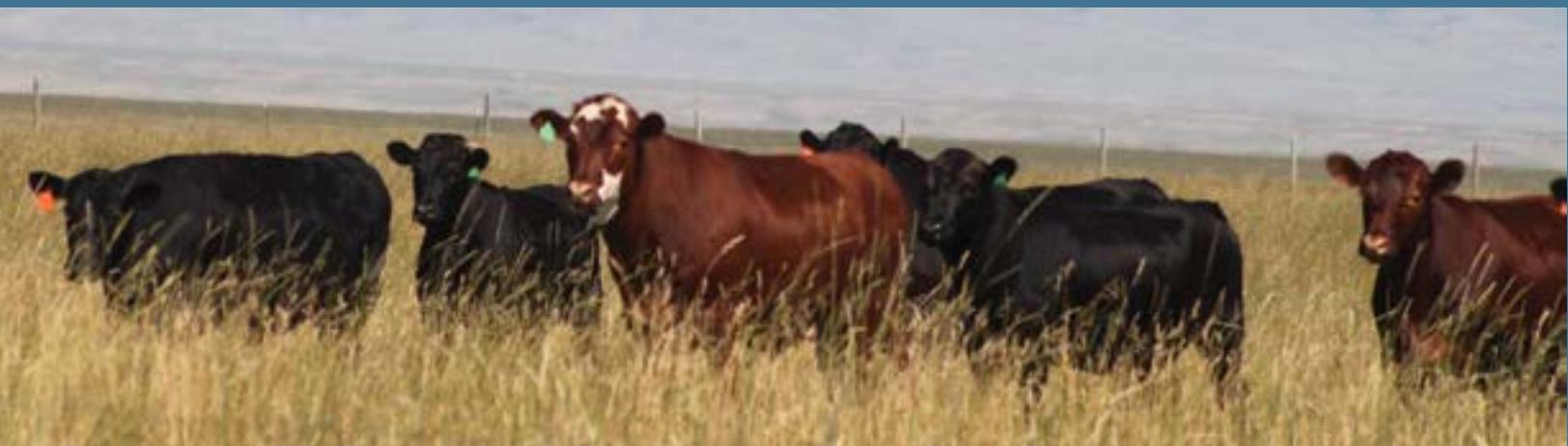




2018

Annual Report



Teaming Up to Protect Chile Peppers

In New Mexico, the chile pepper is king. Hay is grown on 40 times the acreage and pecans rack up nearly 4.5 times the farm sales, but you don't see either of those crops on the "Welcome to New Mexico" signs as you drive into the state. You see red and green chile peppers.

For New Mexico's citizens, chile isn't a crop, it's culture. When the summer's crop ripens, families gather to roast, peel and freeze chile for the upcoming year. New Mexicans - natives and transplants alike - know the names of the different varieties grown in the state - Big Jims, Jalmundos, 64s - and argue about the proper way to prepare them. People have favorite varieties, favorite recipes and favorite dishes at local restaurants. Like Florida citrus and Idaho potatoes, New Mexico's identity is tied to a crop.

But for all its importance, chile is not robust. Insects eat chile. Diseases kill chile. Weeds outcompete chile.

"It's a bit of a wimpy crop," said Steve Thomas, a nematologist at New Mexico State University's Department of Entomology, Plant Pathology and Weed Science (EPPWS). "Everything likes to attack chile, and if you look at it wrong, it dies."

Fortunately, New Mexico State University is one of the crop's biggest supporters. It's home to the Chile Pepper Institute, which conducts chile research and develops new varieties, and the EPPWS department brings its unique structure and integrated focus to protect chile from weeds, diseases, nematodes and insects that make it so difficult to grow profitably.

"The EPPWS department is unique in the country, having those disciplines all together," said Soum Sanogo, a fungal plant pathologist in the department. "There are challenging interactions among several pests and pathogens, and this integrated structure helps us understand those."

Currently, research funded by Western SARE is looking at ways to control weeds and diseases simultaneously. Project Director Brian Schutte, a weed scientist, explained.

"We know reducing the weed seed bank in fields is important for chile growers," he said. "And there's also a reservoir of fungal pathogens in the soil as well. This research is looking at tactics to address both issues at once."

Specifically, the project will investigate whether biofumigation using crushed mustard seed can work to suppress the diseases and weeds that plague chile plots.

"We know that mustard seed meal, when incorporated into the soil under the right conditions, provides some suppression of the fungal pathogens," Schutte explained. "And there's some literature that it also provides some degree of weed control. We want to combine that treatment with



Chile fields outside Las Cruces, New Mexico.

stale seed beds to see if its economically beneficial for growers."

Schutte is building his study on previous research funded by the Western Integrated Pest Management Center that developed an economic model showing how important it can be for growers to keep weeds in check. Fewer weeds can mean fewer hoeings during the season, which is critical because hand labor is a huge expense for growers.

"One of the nice parts of the Western SARE project is that it has a strong outreach component," Schutte said. "We'll be able to present the model developed in the IPM Center project to a new set of growers."

Chile pepper is planted in March and April in the Southwest, and harvested from August to the end of October, depending on the variety. So while the bulk of the work is planned for the 2019 growing season, Schutte and Sanogo are getting started now, ordering mustard seed, recruiting farmers for the on-farm trials, and getting graduate students involved in the project.

Learn more: projects.sare.org/sare_project/sw18-059/



Photo by Gadi V.P. Reddy, Montana State University

Pheromone monitoring traps placed in a Montana wheat field.

Growers Learning Pheromone-Based Monitoring

Growers are turning to integrated pest management tools in order to reduce the use of pesticides on their farms, and pheromone-based monitoring is one IPM technique that could work well in the Northern Plains.

However, according to Dr. Gadi V.P. Reddy of Montana State University, agricultural professionals currently have limited knowledge on the use of pheromone-based monitoring methods for important insect pests such as wheat stem sawfly, wheat midge, wireworms/click beetles, flea beetles and other Northern Plains pest insects.

Reddy and Dr. Anamika Sharma are using Western SARE Professional Development funds to create a curriculum and training program that will enhance Extension agents', educators' and consultants' knowledge of the role of pheromones in pest monitoring. They'll then have the ability to share these skills with farmers.

Pheromone-based pest monitoring techniques use the same chemical insects produce to find mates and to bait insect-traps. The number of insects caught in the traps are counted to estimate whether the population is large enough to cause economic damage and, if so, trigger specific management practices. Some pheromone traps are used to mass-capture insects for control.

"In the wheat, canola, and pulse-growing areas of Montana, this environmentally-friendly monitoring tool has not been very popular in the past," Reddy said. "Farmers and ag professionals don't know about it or don't know if it can be practical and useful. However, research in other regions shows that it helps a lot."

In March, Reddy and his team held the Pheromones as Tools for Monitoring Crop Insect Pests in the Northern Plains - Instructive Tools for Agricultural Professionals workshop to build understanding of pheromone-based monitoring techniques. In this workshop, 10 speakers spoke about various pheromone-based techniques used to monitor and manage major and minor insect pests of Northern Great Plains.

A 27-page manual has been developed, with 50 copies being distributed to ag professionals. Field days, data collection, and more trainings will be conducted into 2020.

According to Reddy, the large amount of press received demonstrates that people are interested in learning about pheromone-based monitoring.

"Farmers are very interested and the ag professionals who have gone through the training are educating farmers in the practice," he said.

Learn more: projects.sare.org/sare_project/ew18-011/

Western SARE

Montana State University
207 Linfield Hall - P.O. Box 172840
Bozeman, MT 59717-3120

Contact Us:
406-994-4789 or wsare@montana.edu
On the web at www.westernsare.org

This material is based upon work supported by the National Institute of Food and Agriculture, U.S. Department of Agriculture, under award number 2017-38640-26913. Any opinions, findings, conclusions or recommendations expressed in this publication are those of the authors and do not necessarily reflect the view of the U.S. Department of Agriculture.



131

Farmers who have already or plan to change a practice

Impacts of 2017 Funded Projects

1,783

Farmers who attended an educational or outreach activity

201

Farmers reporting change in knowledge, attitude or skills

3,983

Ag professionals who attended an educational activity

136

Farmers who participated in SARE-sponsored research

ALASKA

Projects: 2
Topics: Cooperative marketing of potatoes; attracting pollinators

Funds: \$70,808

2018 Western SARE Projects

In 2018, Western SARE provided nearly \$4 million in funding to projects in the region. These included Research & Education, Professional + Producer, Professional Development, Farmer/Rancher and Graduate Student grants. See westernsare.org/Projects/Funded-Projects-by-Year/2018-Projects

MONTANA

Projects: 4
Topics: Pest monitoring, nitrate leeching, cover crops, tribal capacity building
Funds: \$175,665

HAWAII

Projects: 7
Topics: Mint mulch, rotational grazing, capacity building of ag professionals

Funds: \$234,690

WASHINGTON

Projects: 9
Topics: Soil health, wireworms, prairie grazing, overseeding hay, bees and canola

Funds: \$682,020

IDAHO

Projects: 3
Topics: Rangeland monitoring, dairy manure separation, soil-health training

Funds: \$375,709

WYOMING

Projects: 3
Topics: Pulse crops in dryland farming, a rangeland institute, livestock and crop rotations
Funds: \$299,924

From Director Fabian Menalled

Challenges Abound, but I Remain Optimistic

At Western SARE, we know there are numerous threats to sustainable agriculture’s ability to provide food, fiber, and bioenergy for a growing population. Climate change, land degradation, biodiversity loss, rising production costs, pesticide resistance, unstable markets, shifting consumers demands, as well as a declining farm and rural population are just some of them.

Despite those challenges, we are confident in the ingenuity of our farmers and ranchers, educators, graduate students, and researchers to find practical solutions to these problems.

In 2018, Western SARE allocated almost \$4 million to support sustainable agriculture research and education programs across our region of 17 states and territories. These projects are as diverse as the landscapes and people of American West. Designing bee-protection protocols in vegetable production systems, assessing approaches to grow and market ancient grains, improving fruit production through hands-on student education, developing small business training for agricultural professionals, and promoting regenerative agriculture through cover crops are just a few of them.

Many times, the headlines in the news are concerning. I

have recently read that the decline of wild bees and other pollinators may be an even more alarming threat to crop yields than the loss of honeybees; that new weed biotypes have been identified to be resistant to multiple herbicides; and that tensions between urban and rural communities are rising over the management of finite resources such as water and space.

Yet, I am optimistic. In 2019, Western SARE will allocate more than \$6 million in research and education programs for sustainable agriculture. However, to be successful, we need you!

I encourage you to visit our website at www.westernsare.org and contact us at 406-994-4789 or wsare@montana.edu to learn more about our grant opportunities.

We are looking forward to learning about your ideas and reviewing your proposals.



AMERICAN SAMOA

Projects: 1
Topics: Using movable coops as “chicken tractors” in banana plantations
Funds: \$19,231

OREGON

Projects: 9
Topics: Olive, broccoli and berry production, squash storage rots, cover crop performance
Funds: \$685,492

UTAH

Projects: 4
Topics: Feed for beef production, natural enemies of cabbage aphid, stink bug monitoring
Funds: \$299,966

COLORADO

2018 Projects: 3
Topics: Cover crops, Canada thistle management, seed saving
Funds: \$304,302

MICRONESIA

Projects: 1
Topics: Cage farming and hatchery-rearing of rabbitfishes
Funds: \$70,447

CALIFORNIA

Projects: 9
Topics: Low-stress herding, barn owls, barley testing, cover crops, soil health education
Funds: \$497,917

ARIZONA

Projects: 1
Topics: Integrating biological control and selective insecticides
Funds: \$25,000

NEW MEXICO

Projects: 4
Topics: Biofumigation, mite-resistant bee colonies, sustainable ranch management
Funds: \$206,001



Western SARE Program
Montana State University
207 Linfield Hall
P.O. Box 172840
Bozeman, MT 59717-3120

Breeding Better Beans for Organic Production

With Western SARE funding, University of California, Davis graduate students have begun field tests on very rare commodities: high-yield, disease-resistant bean varieties that can thrive on organic farms.

“Most crops—about 95 percent—have been bred for conventional farming and can be difficult to grow in organic systems,” said Travis Parker, a Ph.D. student in plant biology who is leading the project. “These new bean varieties could make a big difference in performance and profitability of organic legumes like pinto, black and kidney beans, as well as heirloom-like varieties with high culinary quality.”

To create a desirable variety, breeders cross plants with desired traits and select the best offspring over multiple generations. It takes several years of plot testing to produce a variety good enough to name and sell. With each new generation of crops, breeders pick plants that perform better to create new commercial varieties.

However, because conventional agricultural is the most common production system, most varieties are selected for conventional production, which rely on synthetic pesticides and fertilizers. Those varieties may not grow well in organic production where those synthetic inputs are not used.

The Western SARE grant will support efforts to identify the genetic basis of important traits, develop tools to accelerate the time it takes to measure traits such as plants grow in the

field, and – ultimately – release new varieties specifically bred for high performance on organic farms.

“We’ve begun trials on virus-resistant lines on campus and on farms in California,” Parker said. “We hope to have varieties available for commercial production soon after 2020.”

Legumes are nutritious and especially important to sustainable agriculture. They contain symbiotic bacteria in their roots that fix atmospheric nitrogen and produce nitrogen compounds, which feed the crop and enrich the soil even after harvest.

“Plus, dry beans have a long shelf life so farmers can store them and sell them according to market conditions,” he said.

But conventionally bred beans can present a challenge for organic farmers. With limited use of herbicides, organic farmers have trouble controlling the weeds that battle young crops for water, sun, and food.

To address that, Parker and his team are breeding fast-growing plants that can outcompete weeds. The hope is that new varieties will grow tall enough to shade out weeds without tipping over to make it easier for organic and conventional farmers to use tractors to mechanically control weeds.

Learn more: projects.sare.org/sare_project/gw18-062/