What is SARE?

Since 1988, the Sustainable Agriculture Research & Education (SARE) program has been the go-to USDA grants and outreach program for farmers, ranchers, researchers and educators who want to develop innovations that improve farm profitability, protect water and land, and revitalize communities. To date, SARE has awarded over $309 million to more than 7,408 initiatives.

SARE is grassroots with far-reaching impact

Four regional councils of expert practitioners set priorities and make grants in every state and island protectorate.

SARE communicates results

SARE shares project results by requiring grantees to conduct outreach and grower engagement; and by maintaining an online library of practical publications, granteeproduced information products and other educational materials.

SARE: Advancing the Frontier of Sustainable Agriculture in...

Montana

Project Highlight: Improving the Benefits of Applied Nitrogen

Broadcast applications of urea are a common management practice for large- acreage, no-till, dryland winter wheat producers in Montana. But when urea is applied to the soil surface, a significant amount of nitrogen can be lost when it converts to ammonia gas and enters the atmosphere in a process known as volatilization. Farmers face economic losses due to reduced yield or crop quality from inadequate nitrogen fertility, and ammonia emissions contribute to environmental pollution and nitrogen enrichment of natural ecosystems.

With SARE funding to address the problem, Montana State soil scientist Richard Engel conducted on-farm trials over four seasons to identify soil and environmental conditions under which urea applications were most susceptible to ammonia loss, and to identify management practices to reduce those losses. Based on the findings, Engel’s team recommends against surface-applying fertilizer to frozen or wet ground, particularly during the over-winter period. Applying it during the spring following thaw resulted in lower ammonia volatilization loss. By following the team’s recommendations to fertilize in the spring and incorporate the fertilizer into the soil when possible, a majority of Montana’s wheat growers are reducing air pollution and saving about $5 million a year through reduced fertilizer loss and increased yields.

For more information on this project, see sare.org/projects, and search for project number SW10-050.

SARE in Montana

western.sare.org/sare-in-your-state/montana

$8,119,936 in total funding

123 grant projects

(since 1988)

For a complete list of grant projects state by state, go to www.sare.org/state-summaries
SARE Grants in Montana

Total awards: **123 grants**

- 1 Enhanced State Grants
- 33 Farmer/Rancher
- 15 Graduate Student
- 9 On Farm Research/Partnership
- 21 Professional Development Program
- 43 Research and Education
- 1 Research to Grass Roots

Total funding: **$8,119,936**

- $24,998 Enhanced State Grants
- $372,219 Farmer/Rancher
- $343,767 Graduate Student
- $349,613 On Farm Research/Partnership
- $1,225,264 Professional Development Program
- $5,729,316 Research and Education
- $74,759 Research to Grass Roots

Find a complete list of projects on page 3.

SARE's Impact

- **53 percent** of producers report using a new production technique after reading a SARE publication.
- **79 percent** of producers said they improved soil quality through their SARE project.
- **64 percent** of producers said their SARE project helped them achieve higher sales.

Learn about local impacts at: [western.sare.org/sare-in-your-state/montana](http://western.sare.org/sare-in-your-state/montana)

Contact Your SARE State Coordinator

SARE sustainable ag coordinators run state-level educational programs for Extension and other ag professionals, and many help grant applicants and recipients with planning and outreach. Visit [western.sare.org/state-pages/montana](http://western.sare.org/state-pages/montana) to learn more.

Patrick Mangan
MSU Ravalli County Extension
(406) 375-6611
pmangan@rc.mt.gov

For detailed information on SARE projects, go to [www.SARE.org](http://www.SARE.org)

SARE is funded by the USDA’s National Institute of Food and Agriculture (NIFA).

This report includes summaries of competitive grant programs only. Some competitive grant programs that are no longer offered may be included or excluded from the totals in this report depending on the grant program and SARE region.
Montana has been awarded $8,094,938 grants to support 121 projects, including but not limited to, 42 research and/or education projects, 21 professional development projects and 33 producer-led projects. Montana has also received additional SARE support through multi-state projects.

### RESEARCH AND EDUCATION GRANTS

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<tbody>
<tr>
<td>SW19-907</td>
<td>Snowbanks to Grassbanks</td>
<td>$349,710</td>
<td>Dr. Bok Sowell, MSU- Animal &amp; Range Sciences, Dr. Andrea Litt, Department of Ecology, Montana State University, Megan Van Emon, Montana State University</td>
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<tr>
<td>SW17-016</td>
<td>Soil acidity management of long-term no-till fields in Montana to prevent crop failure</td>
<td>$264,016</td>
<td>Dr. Richard Engel, Montana State University</td>
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<td>SW17-080</td>
<td>The Impacts of Integrating Livestock into Cropping Systems on Soil Health and Crop Production</td>
<td>$249,502</td>
<td>Devon Ragen, Montana State University</td>
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<td>SW16-051</td>
<td>Research and Demonstration of Minimum Tillage and Optimum Water Management in Sugarbeet Production in Eastern Montana</td>
<td>$247,410</td>
<td>Dr. Chengci Chen, Montana State University</td>
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<td>SW15-028</td>
<td>Examining, Optimizing, and Building Capacity for Montana’s Local Beef to School Supply Chain</td>
<td>$220,021</td>
<td>Dr. Carmen Byker Shanks, Montana State University</td>
</tr>
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</table>
**SW14-014**  Sustainable Cropping Systems for Dual-Purpose Biennial Canola  $256,397
Dr. Darrin Boss
Montana State University
Dr. Steve Fransen, PhD
Washington State University

**SW13-043**  Evaluating Native Perennial Flower Strips for Enhancing Native Bees and Pollination Services on Farmlands  $170,951
Laura Burkle
Montana State University

**SW13-056**  Landscape Collaborative Grazing and Greater Sage Grouse Survival  $339,552
Dr. Bok Sowell
MSU - Animal & Range Sciences

**SW12-108**  Low Glycemic Potatoes, a value-added crop for Montana  $154,000
Dr. David Sands
Montana State Univ

**SW11-099**  Using cover crop mixtures to improve soil health in low rainfall areas of the northern plains  $354,405
Dr. Perry Miller
Montana State University

**SW11-086**  Degree Day Modeling and Economic Considerations of Insects and Weeds in Sheep Grazed Alfalfa, Grain, and Range Production Systems  $206,700
Dr. Hayes Goosey
Montana State University

**SW10-050**  Enhancing Cropping System Sustainability by Minimizing Ammonia-N Losses from Biological and Chemical Inputs  $190,009
Dr. Richard Engel
Montana State University

**SW09-068**  Integrating Biological Control with Targeted Sheep Grazing to Suppress Spotted Knapweed  $49,865
Rachel Frost
Montana State University
Jeff Mosley
Montana State University

**SW09-601**  Infrastructure Support for Small Livestock Processing Facilities  $46,796
Dr. Jane Boles
Montana State University

**SW07-013**  Evaluation of Alfalfa Weevil (Coleoptera Curculionidae) Densities, Weed Abundance, and Regrowth Characteristics of Alfalfa Grazed by Sheep.  $96,817
Dr. Hayes Goosey
Montana State University

**SW07-025**  Grower-based selection of varieties and systems for wheat stem sawfly control  $125,000
Dr. Luther Talbert
Montana State University

**SW07-028**  Is Sulfur Cinquefoil a Candidate for Control with Sheep and Goats?  $54,250
Jeff Mosley
Montana State University
Rachel Frost
Montana State University

**SW07-603**  Developing a free on-line excel based enterprise budget decision support program to evaluate the incorporation of sheep into farm systems as an alternative to presesticide and mechanical methods of weed and insect control  $10,000
Dr. Hayes Goosey
Montana State University

**SW06-006**  Survey and Economic Analysis of Montana Farms Utilizing Integrated Livestock-Cereal Grain (Ley Farming) Systems  $91,500
Dr. Chengci Chen
Montana State University

**SW06-075**  Does Timing of Defoliation Affect Spotted Knapweed Seed Viability and Germination?  $62,600
Tracy Brewer
Park County Extension - Montana State University
Dr. Tracy Mosley
Montana State University Extension
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<tr>
<th>Project ID</th>
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<tr>
<td>SW05-038</td>
<td>Developing Distance Learning Based on Perceptions and Knowledge of Producers and Agricultural Professionals</td>
<td>$98,819</td>
<td>Fabian Menalled&lt;br&gt;Dept. of Land Resources and Environmental Sciences</td>
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<td>SW04-007</td>
<td>Methane Recovery from Small Dairy Operations</td>
<td>$123,834</td>
<td>Ron Carlstrom&lt;br&gt;MSU Extension- Gallatin County</td>
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<td>SW03-056</td>
<td>Ecologically Based Integrated Weed Management to Restore Plant Diversity</td>
<td>$121,750</td>
<td>James Jacobs&lt;br&gt;Montana State University</td>
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<td>SW03-063</td>
<td>Factors Affecting Alfalfa Stand Longevity in Montana</td>
<td>$139,397</td>
<td>Dennis Cash&lt;br&gt;Montana State University</td>
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<tr>
<td>SW02-005</td>
<td>Increasing Crop Water Use Efficiency in Advanced No-Till Systems</td>
<td>$22,980</td>
<td>Dr. Perry Miller&lt;br&gt;Montana State University</td>
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<td>SW01-048</td>
<td>Using Crop Diversity in No-till and Organic Systems to Reduce Inputs and Increase Profits and Sustainability in the Northern Plains</td>
<td>$157,888</td>
<td>Bruce Maxwell&lt;br&gt;MSU</td>
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<td>SW00-015</td>
<td>An Alternative to Traditional Wheat Stubble Management Using Sheep to Control Pests and Improve Soil Nutrient Cycling</td>
<td>$166,147</td>
<td>Patrick Hatfield&lt;br&gt;Department of Animal and Range Sciences&lt;br&gt;Sue Blodgett&lt;br&gt;Montana State University, Dept. Entomology&lt;br&gt;Dr. Hayes Goosey&lt;br&gt;Montana State University&lt;br&gt;Duane Griffith&lt;br&gt;Montana State University, Ag Econ and Ext Dept</td>
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<td>SW98-064</td>
<td>Selecting Cattle to Prevent Grazing Distribution Problems</td>
<td>$115,598</td>
<td>Derek Bailey&lt;br&gt;Montana State University</td>
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<tr>
<td>SW97-056</td>
<td>Comparison of Pest Management Interactions in Spring Wheat-Cover Crop and Spring Wheat-Fallow Cropping Systems</td>
<td>$150,964</td>
<td>Andrew Lenssen&lt;br&gt;Montana State University</td>
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<td>SW96-019</td>
<td>Sustaining Agriculture and Community: Moving the Farm Improvement Club Program Beyond the Farm Gate</td>
<td>$124,425</td>
<td>Jonda Crosby&lt;br&gt;Alternative Energy Resources Organization</td>
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<td>LWD92-004</td>
<td>The Sustainable Farming Quarterly (SFQ) A Regional Newsletter</td>
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<td>Al Kurki&lt;br&gt;Alternative Energy Resources Organization (AERO)</td>
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<td>LW92-004</td>
<td>Sustainable Farming Quarterly</td>
<td>$17,500</td>
<td>Nancy Matheson&lt;br&gt;Alternative Energy Resources Organization (AERO)</td>
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<td>LWD91-003</td>
<td>Regional Farm and Research Center Matching System-FARMS</td>
<td>$3,000</td>
<td>J. Jacobsen&lt;br&gt;Montana State University</td>
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<td>LW91-023</td>
<td>Farm Improvement Club Network for Sustainable Agriculture</td>
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<td>Nancy Matheson&lt;br&gt;Alternative Energy Resources Organization (AERO)</td>
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<td>LW91-024</td>
<td>Specifying and Analyzing Whole-Ranch Systems for Sustainable Range Livestock Production in Environmentally Sensitive Areas</td>
<td>$290,000</td>
<td>Jack Riesselman&lt;br&gt;Montana State University</td>
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<td>LW91-025</td>
<td>Practical Education in Sustainable Production Systems</td>
<td>$14,250</td>
<td>Wade Crouch&lt;br&gt;Montana State University</td>
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<tr>
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<tr>
<td>LW89-014</td>
<td>Low-Input Legume/Cereal Rotations for the Northern Great Plains/Intermountain Region</td>
<td>$162,000</td>
<td>James Sims Montana State University</td>
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<td>LW89-016</td>
<td>Bio-Priming for the Control of Pythium Reemergence Damping-Off in Vegetable Crops</td>
<td>$14,984</td>
<td>Nancy Callan Montana State University</td>
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<td>LW89-019</td>
<td>Livestock Health and Nutrition Alternatives: A Western States Conference</td>
<td>$5,000</td>
<td>Al Kurki Alternative Energy Resources Organization (AERO)</td>
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**RESEARCH TO GRASS ROOTS GRANTS**

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<tr>
<td>RGR20-009</td>
<td>Montana Food Economy Initiative</td>
<td>$74,759</td>
<td>Lindsay Ganong AERO&lt;br&gt;Loren Bird Rattler&lt;br&gt;Blackfeet Tribe</td>
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**PROFESSIONAL DEVELOPMENT PROGRAM GRANTS**

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<tr>
<td>WPDP19-15</td>
<td>Sustainable Beef Cattle Production: Ranch to Ribeye</td>
<td>$57,310</td>
<td>Megan Van Emon&lt;br&gt;Montana State University&lt;br&gt;Colleen Buck&lt;br&gt;Montana State University&lt;br&gt;Callie Cooley&lt;br&gt;Montana State University&lt;br&gt;Molly Hammond&lt;br&gt;Montana State University&lt;br&gt;Elin Kittelmann&lt;br&gt;Montana State University&lt;br&gt;Kari Lewis&lt;br&gt;Montana State University</td>
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<td>EW18-027</td>
<td>Building Internal Capacity for the Blackfeet Tribe Agricultural Resource Management Plan (ARMP)</td>
<td>$52,155</td>
<td>Loren Bird Rattler&lt;br&gt;Blackfeet Tribe</td>
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<td>EW18-011</td>
<td>Pheromones as Tools for Monitoring the Insect Pests in the Northern Plains - Instructive Tools for Agricultural Professionals</td>
<td>$73,510</td>
<td>Dr.Michael Ivie&lt;br&gt;Montana State University-Bozeman</td>
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<td>EW17-011</td>
<td>Integrated Parasite Management: Train the Trainer</td>
<td>$74,189</td>
<td>David Scott&lt;br&gt;National Center for Appropriate Technology</td>
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<td>EW16-029</td>
<td>Best Management Practices (BMPs) for Mitigating Herbicide Resistance in the Northern Great Plains - Educational Tools for Agricultural Professionals</td>
<td>$68,871</td>
<td>Dr.Prashant Jha&lt;br&gt;Montana State University, Southern Agricultural Research Center, Huntley, MT</td>
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<td>EW16-036</td>
<td>Catalyzing Increased Agricultural Sales through a Common Understanding of Montana’s New Food Modernization Law</td>
<td>$22,332</td>
<td>Jennifer Hill-Hart AERO</td>
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<tr>
<td>EW15-009</td>
<td>Conservation and Augmentative Biological Control in the Northern Plains – Providing Tools for Agriculture Professionals</td>
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<td>Dr. Michael Ivie Montana State University-Bozeman</td>
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<tr>
<td>EW13-014</td>
<td>Enhancing the Exploring Energy Efficiency &amp; Alternatives (E3A) Curriculum</td>
<td>$42,277</td>
<td>Milton Geiger University of Wyoming Extension</td>
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<td>Dr. Glen Whipple University of Wyoming Extension</td>
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<tr>
<td>EW12-004</td>
<td>Tour of sustainable Small Grain Production in Eastern Washington</td>
<td>$7,350</td>
<td>Dan Picard MSU Extension-Pondera County</td>
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<td>EW01-007</td>
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<td>$52,483</td>
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<td>EW99-008</td>
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<td>Sustainable Noxious Weed Management on Northwestern Rangelands</td>
<td>$43,800</td>
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**FARMER/RANCHER GRANTS**

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</table>
Making the Most of Fine Fleece: Environmental, Economic, and Social Costs and Benefits of Alternative Strategies for Marketing Sheep Wool
$10,646  Linda Poole
Prairie Shepherd

Organic Control of Perennial Weeds with Vinegar and Biologicals
$20,790  Jess Alger
Organic control of Perennial Weeds

Marketing J Bar L Ranch Grassfed Beef to Members of Conservation Organizations
$13,000  Bryan Ulring
J Bar L Ranches, LLC

Composting Recommendations and Marketing Evaluation for Livestock Operations in Cold Semi-Arid Environments
$49,315  Thomas Bass
Montana State University

Pasture-Raised Heritage Turkeys in a Dryland Farming System
$6,413  Jacob Cowgill

High-Nutrition Drought-Tolerant Corn
$30,000  Dave Christensen

Sustainable Food and Bioenergy Systems: Student Internships Development Plan
$29,983  Dr. William Dyer
Montana State University

Can Producers in Five Montana Counties Successfully Use No-Till Methods for Renovation of Irrigated and Dryland Pastures?
$29,999  Ron Carlstrom
MSU Extension- Gallatin County
George Reich

Agroecosystem Approach to Managing Imported Cabbage Worm (P. rapae)
$6,356  Helen Atthowe
Biodesign Farm

Forage Winter Wheat Production for Grazing or Hay Production in Eight Montana Counties
$19,795  George Reich

Protecting High Quality Rangelands in Garfield County from Invasive Weed Spread
$20,000  Eric Miller
Montana State University

Demonstration of Leafy Spurge Management Using Sheep Grazing in a Leafy Spurge Barrier Zone
$9,960  Sharla Sackman
Montana State University Extension Service

Forage Winter Wheat Production for Jay or Grain in Gallatin County, Montana
$5,370  George Reich

Sheep and Cattle Grazing Complementarity Project
$5,055  Randall Tunby

Biological Weed Control: Education and Implementation
$7,500  Noah Poritz

Biological and Mechanical Control of Perennial Weeds in North-Central Montana
$6,387  Robert Quinn
Montana State University

Establishing a Sustainable Program for Recycling and Propagation of Quality Flower Bulbs in a Wholesale Flower Production Operation
$2,197  Laura Smith
FW00-260  Test Marketing Campaign to Conduct In-Store Lamb Cooking and Recipe Demonstration for Montana Natural Lamb Cooperative in the Billings, Montana Market Area  $9,300  Gayle Ott

FW00-282  Better Board of Trade.Com  $8,054  David Oien

FW00-288  TEAM-Team Effort in Agricultural Marketing for the McAlpine Ranch  $9,705  Clay McAlpine

FW00-314  Montana Arnica Web Page  $870  Rod Daniel

FW99-069  No-Till Wheat into Medic vs. Conventional Wheat  $4,578  Jess Alger

FW99-102  Range Monitoring in the Badlands Grazing District  $10,000  Jack McCuin

FW99-035  Annual Forages for Dryland Rotations  $1,540  Vern Pluhar

FW98-093  Cull Potato Composting  $7,500  Steve McCullough

FW96-007  Green Manure/Covercrop Combination Experiment  $1,923  Rod Daniel

FW96-008  Legume Grazing in Rotation with Small Grains  $4,000  Jess Alger

FW96-073  Evaluation of Grass Species for Improved Pasture Management  $4,800  Robert Lee

FW96-083  Vegetative Changes through Alternative Water Sources  $2,500  Dale Veseth

FW95-078  Managing a Living Mulch System in an Intensive Organic Vegetable Cropping Operation to Enhance Weed, Nutrient, and Pest Management  $5,000  Helen Atthowe

FW95-093  Influencing Elk and Livestock Riparian Use  $4,750  Allen Carter

FW95-026  Carter-Fallon Forage Committee Range/Livestock Project  $4,943  Randy Tunby

GRADUATE STUDENT GRANTS

<table>
<thead>
<tr>
<th>Project #</th>
<th>Project Title</th>
<th>SARE Support</th>
<th>Project Leaders</th>
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</thead>
<tbody>
<tr>
<td>GW20-205</td>
<td>Measuring intra-field variability in pea protein to understand influencing factors in Montana cropping systems</td>
<td>$25,000</td>
<td>Dr.Clain Jones, Montana State University Dr.Perry Miller, Montana State University Samuel Koeshall, Montana State University</td>
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<tr>
<td>Code</td>
<td>Title</td>
<td>Amount</td>
<td>Principal Investigator(s)</td>
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</tbody>
</table>
| GW20-204 | Restoring Disturbed Rangelands With Site-Specific Seeding           | $25,000| Lisa Rew  
Montana State University  
Colter Mumford  
Montana State University |
| GW19-199 | Effects of Habitat Heterogeneity on Crop Yield and Biodiversity     | $24,972| Bruce Maxwell  
MSU  
Hannah Duff  
1992 |
| GW19-190 | Nitrogen Fertilizer Management Based on Site-Specific Maximized Profit and Minimized Pollution | $24,992| Dr.Stephanie Ewing  
Montana State University  
Bruce Maxwell  
MSU  
Paul Hegedus  
Montana State University |
| GW19-197 | Fostering resilient plant-soil interactions on working ranches in semi-arid steppe ecosystems of north-central and eastern Montana. | $24,988| Dr.Craig Carr  
Montana State University  
Dr.Stephanie Ewing  
Montana State University  
Dr.Christine Gobrogge  
Montana State University Environmental Analytical Laboratory  
Seth Newton  
Bear Gulch Ranch  
Jay "Butch" Ortner  
Ortner Ranch  
Danny Pratt  
Natural Resources Conservation Services  
Tiffany Salveson  
Natural Resources Conservation Service  
Timothy Seipel  
Joseph Capella  
Montana State University |
| GW19-198 | Precision Agriculture Applied to Organic Systems                   | $22,500| Bruce Maxwell  
MSU  
Royden Loewen  
Montana State University |
| GW18-179 | Predicting overwinter nitrate-N changes at the subfield scale in leaching-susceptible, agricultural soils | $25,000| Dr.Clain Jones  
Montana State University  
Dr.Patrick Carr  
Montana State University  
Simon Fordyce  
Central Agricultural Research Center |
| GW18-151 | Advancing Cover Crop Knowledge: Assessing the Role of Plant Diversity on Soil Change | $25,000| Dr.Perry Miller  
Montana State University  
Kristen Dagati  
Montana State University |
| GW18-050 | Montana Hardy Fruit Nutraceutical Quality                          | $17,765| Mac Burgess  
Montana State University  
Durc Setzer  
Montana State University |
| GW17-040 | Sustainability of dormant season grazing: Does protein supplementation impact beef cattle performance, soil organic matter, vegetation, and residual cover for wildlife? | $24,970| Dr.Janice Bowman  
Montana State University  
Dr.Lance McNew  
Montana State University  
Samuel Wyffels  
Montana State University |
| GW16-053 | Cover Crop Grazing: Optimal Seasonality for Soil and Livestock Benefit | $25,000| Dr.Perry Miller  
Montana State University  
Robert Walker  
MSU LRES |
| GW12-004 | Multiple Forms of Uncertainty as a Barrier to the Adoption of Sustainable Farming Practices | $24,830| Patrick Lawrence  
Montana State University |
Investigating the Legume Green Fallow Alternative on North-Central Montana No-Till Operations


Effects of Weed Communities in Conventional and Organic Agricultural Systems.

ON FARM RESEARCH/PARTNERSHIP GRANTS

Project #  
OW17-026  
OW17-021  
OW17-009  
OW15-026  
OW13-017  
OW13-144  
OW12-044  
OW11-326  
FW04-313

Project Title  
Montana Food Economy Initiative  
Evaluating Nitrates and Forage Quality in Fall Regrowth of Annual Cereal Forages  
Soil Moisture Network and Tools - MT and WY collaborative  
Are Feedlot-based Performance Cattle Limiting Ecological Services for Rangeland Ecosystems in Northern Mixed-grass prairies?  
Reference strips and precision sensors for increased nitrogen use efficiency in wheat production  
Effects of Late-Season Water Lease on Forage Crops  
Best Management Practices for Livestock Protection Dogs  
Developing Community Based Oilseed Industry in Montana  
Preserving Farms and Ranches

SARE Support  
$50,000  
$19,972  
$49,995  
$49,961  
$49,907  
$24,950  
$49,998  
$49,830  
$5,000

Project Leaders  
Lindsay Ganong  
Dr. Tracy Mosley  
Lee Schmelzer  
Dr. Emily Meccage  
Dr. Olga Walsh  
Jodi Pauley  
Jeff Mosley  
Taylor Lyon  
Robert “Rob” Johnson

Total funding from the USDA SARE program to Montana

$8,094,938

For further information on projects, contact Western SARE at (435) 797-2257 or wsare@usu.edu.
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