

Sustainable Agriculture Research & Education

FIELD NOTES



Ohio Milk and Cheese Initiative Explores New Market Opportunities in Ohio

The Newsletter
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Abbe and Anderson Turner's Lucky Penny Farm is a family-owned dairy goat farm located on a once-fallow century farmstead in Northeast Ohio's Hiram Township. The 14-acre farm includes Nubian, La Mancha and Alpine dairy goats. They also run a creamery located in Kent, OH.

"I love working with small ruminants," said Abbe Turner. "The size of livestock is great for small family farms and the delicious, nutritious milk they produce is a fantastic addition to the family diet."

Lucky Penny Creamery produces about 400 to 500 pounds of cheese a week, but Abbe Turner says the facility could potentially produce nearly five times that much, including the production of sheep's milk cheese. To determine the level of interest and opportunities for the production of sheep milk and cheeses in Ohio, the Turners helped form the Ohio Sheep Milk and Cheese Initiative (OSMCI). In 2009, the OSCMI applied for a NCR-SARE Farmer Rancher grant, receiving \$16,885.

"The sheep dairy industry is a market that could unfold into an exciting economic opportunity for small farm producers in Ohio," said Turner. "Demand for specialty cheeses exists, but raw materials, fluid sheep milk, processing capabilities, quality sheep dairy genetics, and milk logistics issues in Ohio are currently limiting factors."

Turner managed OSMCI's NCR-SARE grant project, and together, the group conducted surveys of farmers, consumers, producers, chefs, retailers, food service workers, farmer's market patrons, specialty food vendors, and ordinary consumers to understand the producers' interests, the marketplace, and the demand for the products.

Of the 263 survey responders, 35 percent were farmers, 10 percent worked in the

food industry, 4 percent were retailers, and 51 percent were consumers of cheese. OSCMI's survey results revealed:

- 88.6 percent of those surveyed would pay more for a locally produced cheese.
- 96 percent said eating local cheese was somewhat or very important.
- 100 percent were somewhat likely or very likely to purchase Ohio-made cheese.
- 45 percent of farmers were somewhat or very interested in adding a sheep or sheep cheese enterprise.

In addition to the survey, the OSMCI presented a Sheep Dairy Symposium at Ohio State University's Agricultural Technical Institute. They covered topics such as sheep genetics, the state of artisan cheese, workings of a sheep dairy and cheese maker, grazing practices, and they had a panel of cheese makers tell their stories and answer questions. More than 80 people attended.

Turner believes the survey results and feedback they received at the symposium, along with the subsequent development of new sheep dairies in Ohio, support future action and the continuation of business development for the production of sheep milk and sheep cheese.

"We are proud to say that as of this writing there are three licensed sheep dairies in Ohio that didn't exist before the OSMCI



The Ohio Milk and Cheese Initiative is exploring and inspiring the production of sheep milk and artisan sheep cheese, like this sheep's milk feta, in Ohio. Photo by Kate Sumpter.

project started," said Turner. "Another two dairies are on the way in 2013 and now the challenge is to continue to build the market for sheep milk and cheeses across Ohio."

Although their SARE grant project is complete, the OSMCI project will continue with support from Innovative Farmers of Ohio, and will continue to work to put Ohio on the map for sheep dairying.

"The NCR-SARE Farmer Rancher grant was a good start for the Ohio Sheep Milk and Cheese Initiative because it gave us the opportunity to educate and inform the interested community as well as build an industry in Ohio that otherwise didn't exist," said Turner.

Ready to learn more about sheep production in Ohio? For more information, turn to page three to read about a sheep parasite control project conducted at Ohio State University.

For more information on OSMCI's NCR-SARE Farmer Rancher grant project, visit the SARE project reporting website. Simply search by the project number, FNC09-780, at <http://www.mysare.sare.org>, or contact the NCR-SARE office. Expanded results from OSMCI survey can be found at <http://ohiosheepdairy.wordpress.com/>.

Funded Grant Projects in the North Central Region

This year, more than 110 projects were awarded a total of more than \$2.7 million through NCR-SARE's grant programs, which offer competitive grants for producers, scientists, educators, institutions, organizations, and others who are exploring sustainable agriculture in America's Midwest.

For the 2012 Research and Education Grant Program, NCR-SARE awarded more than \$1.5 million to nine projects ranging from \$47,067 to \$200,000. The Research and Education Grant Program is a competitive grant program for researchers and educators involved in projects that explore and promote environmentally sound, profitable, and socially responsible food and/or fiber systems. Research and Education projects include a strong outreach component and significant farmer/rancher or other end user involvement from inception of the idea through implementation of the project.

For the 2012 Farmer Rancher Grant Program, NCR-SARE awarded more than \$545,000 to 53 projects ranging from \$1,264 to \$22,500. The Farmer Rancher Grant Program is a competitive grants program for farmers and ranchers who want to explore sustainable solutions to problems through on-farm research, demonstration, and education projects.

For the 2012 Graduate Student Grant Program, NCR-SARE awarded more than \$168,000 to 17 projects ranging from \$9,445 to \$10,000. The Graduate Student Grant Program is a competitive grant program to fund graduate student projects that address sustainable agriculture issues.

For the 2012 Youth Educator Grant Program, NCR-SARE awarded more than \$40,000 to 21 projects ranging from \$1,895 to \$2,000. The Youth Educator Grant Program supports educators who seek to provide programming on sustainable agriculture for youth.

For the 2012 Youth Grant Program, NCR-SARE awarded more than \$3,000 to eight projects ranging from \$389 to \$400. The Youth Grant Program has provided grants for on-farm research, demonstration, or education projects by youth ages 8-18. Research and demonstration projects

were awarded for hands-on efforts to explore sustainable agriculture issues and practices. Education projects could involve teaching others about sustainable agriculture or attending a sustainable agriculture conference, workshop, or camp. Although grants were awarded for 2012, NCR-SARE has discontinued this program.

Earlier this year, NCR-SARE awarded more than \$441,000 to six projects ranging from \$42,472 to \$75,000 for the 2011 Professional Development Grant Program. The Professional Development Grant Program is a competitive grants program that emphasizes training agricultural educators in extension, Natural Resources Conservation Service, private, and not-for-profit sectors, using farmers as educators and addressing emerging issues in the farm community.

To view more information about the grants funded in your state, visit the NCR-SARE website here: <http://www.northcentralsare.org/Educational-Resources/Funded-Grants-in-Your-State>, where you can view a portfolio summary and funded grants list for every state and island protectorate.

NCR-SARE administers these grant programs, and each has specific priorities, audiences, and timelines. NCR-SARE grant programs focus on research and education. Funding considerations are made based on how well the applicant articulates the nature of the research and education components of their sustainable agriculture grant proposals.

NCR-SARE's Administrative Council (AC) members decide which projects will receive SARE funds. A collection of farm and non-farm citizens, the AC includes a diverse mix of agricultural stakeholders in the region. Council members hail from regional farms and ranches, the Cooperative Extension Service, universities, and nonprofit organizations. In addition, regional representatives of the U.S. Geological Survey, the U.S. Department of Agriculture, the Environmental Protection Agency, the Natural Resources Conservation Service, and NCR agribusinesses, state agencies, and foundations sit at the table to distribute grant money.

Learn More About Applying for NCR-SARE Grants

Online

NCR-SARE has online resources to help you learn more about writing proposals for NCR-SARE grant programs. Read tips, tutorials, and watch videos online here: <http://www.northcentralsare.org/Grants/Write-a-Successful-Grant>

Personal Contact

NCR-SARE provides funds to land grant universities to assist extension educators, farmers, and other stakeholders in developing education activities in sustainable concepts and systems. The funds help equip agricultural educators with tools they need to help farmers. SARE sustainable agriculture coordinators in every state and island protectorate are charged with training agriculture professionals in sustainable practices and sharing SARE project results with them. State coordinator responsibilities include professional development—promotion, networking and coordination, especially of SARE-related activities—and communication and evaluation. View documents about funded grants in your state or learn more about your SARE State Coordinator by visiting NCR-SARE online at <http://www.northcentralsare.org/State-Programs> or contact the NCR-SARE office.

Grant-Writing Assistance

Did you know that the Michael Fields Agricultural Institute Grant Advisor can help you apply to grant and cost-share programs of your state or the federal government that could help you improve your farming business? If you are a farmer who is a member of a historically socially disadvantaged group in the Midwest, you are invited to contact the grants advising service of the Michael Fields Agricultural Institute.

Contact Grants Advisor, Deirdre Birmingham, at (608) 219-4279 or deirdreb@mindspring.com for more information.

Researchers Study Forage Chicory for Parasite Reduction in Sheep

Curt Cline sorts forage samples to learn more about sheep grazing patterns at his farm in Albany, OH. Photo by Bill Shulaw.



Sheep and goat production is a growing enterprise for small and limited resource farmers in the North Central region. While small ruminants (sheep and goats) are adaptable to many different production systems and can be raised with relatively few inputs, they present production challenges. For instance, control of internal parasites, especially gastrointestinal nematodes including *Haemonchus contortus* (barberpole worm, stomach worm), is a primary concern for many sheep and goat producers and is particularly challenging in humid regions. In Ohio, researchers are examining the use of forage chicory as part of a gastrointestinal nematode parasites control strategy for sheep.

"Sheep farms that utilize managed grazing are both economically profitable and environmentally sustainable," said Bill Shulaw, professor and Extension Veterinarian and at the College of Veterinary Medicine at Ohio State University. "In our region, perhaps the greatest threat to this production system is gastrointestinal parasites, especially the blood feeding *Haemonchus contortus*. Loss of productivity associated with parasite infections is usually more costly to the farmer than animal deaths, although mortality attributed to parasite infection can be significant too."

In 2008, Shulaw, together with Ohio State Extension Educators Rory Lewandowski and Jeff McCutcheon, applied for a NCR-SARE Research and Education grant, and was awarded \$137,150 to measure animal performance and the potential of plant secondary metabolites found in forage chicory to reduce the impact of parasite infections in sheep.

"Research reports describing plants with possible activity against internal parasites in sheep and goats have been appearing for several years," said Shulaw. "Here in the U.S., much of the work has focused on *sericea lespedeza* and the role of condensed tannins (CT). However, this plant is not particularly desirable in our region, and other reports, mostly from outside the U.S., have suggested that forage chicory might also be useful."

As the team began investigating forage chicory as a parasite control strategy, they learned that Dr. Joyce Foster and her colleagues at the USDA's Agricultural Research Service Appalachian Farming Systems Research Center had conducted research with several varieties of forage chicory studying its nutritional value and palatability for small ruminants. They contacted Foster, and together the team of four had collective expertise in sheep management, management intensive grazing techniques and forage production, internal parasite biology and control, and in forage chicory, including the biochemistry that might be involved. The team worked with farmers John Anderson, of Shreve, OH, Curt Cline of Albany, OH, and Bruce Rickard of Fredericktown, OH.

The two-year, on-farm, research project sought to determine the usefulness of a non-traditional forage, forage chicory (*Cichorium intybus* L.), in controlling gastrointestinal nematode parasites (GIN) in grazing sheep. A comparison forage, brown mid-rib (BMR) forage sorghum (*Sorghum bicolor* (L.) Moench.) x sudangrass (*Sorghum sudanense* Piper) hybrid was used to provide a comparable forage to provide a low, or no, parasite challenge.

"Chicory contains sesquiterpene lactone (SL) and small amounts of condensed tannins, and it has been shown to have negative effects on the survival of adult and larval stages of internal parasites of sheep and farmed deer in research conducted in other countries," said Shulaw. "Published research suggests that the SL concentration is likely the principal factor affecting parasite numbers although this is still incompletely studied."

Statistical analysis of the data collected over the two-year period revealed that during the respective grazing periods, lambs grazing the BMR gained slightly more weight than the lambs grazing the chicory, but the fecal egg count (FEC) of the lambs grazing the chicory increased less than those grazing the BMR. Shulaw believes that this suggests that the antiparasitic effect of chicory was attributable to a direct effect on GIN. Given the slightly superior weight gain in the BMR lamb groups, Shulaw thinks there was an antiparasitic effect on the GIN in the lambs grazing chicory, at least with regard to their egg output, and that this was likely due to a direct effect of chicory on the worms (as opposed to merely an effect of improved nutrition for chicory, as has been suggested in other studies).

The team disseminated project results to farmers, students, veterinarians, and researchers using face-to-face workshops, web programming, field days, presentations at forage and grazing conferences, and publication in professional journals.

"Our project examined just one piece of a very large problem in the sheep and goat industries," said Shulaw. "Going into it, I don't think any of us, farmers included, believed that forage chicory would be the 'silver bullet' that solved the parasite control problem. But we all learned a great deal about various forages, grazing techniques, and the complexities of internal parasite control. I believe that it is this continual questioning and learning process, coupled with applying what we learn, that contributes to sustainability in agriculture."

To obtain more information, watch the recorded online programming, or read the fact sheets the team created during this NCR-SARE Research and Education grant project, visit the SARE project reporting website. Simply search by the project number, LNC08-306, at <http://www.mysare.sare.org>, or contact the NCR-SARE office.



Bill Shulaw's research team created a multi-page fact sheet that describes basic parasite biology for gastrointestinal worms acquired by sheep and goats on pastures, and provides several strategies for managing internal parasitism. It's available online at www.northcentralsare.org/ParasiteLarvaeStrategiesOH. Additional fact sheets are being developed, and will be uploaded as they are finished.

SARE's Agricultural Innovations fact sheet, *Sustainable Control of Internal Parasites in Small Ruminant Production*, provides basic information on each parasite approach and cites resources for training and further information. It's available online at www.sare.org/SmallRuminant



Researcher Shares Grafting Techniques with Agricultural Educators

Sanjun Gu conducts heirloom tomato trials in a high tunnel at the Lincoln University George Washington Carver Farm in Jefferson City, MO. Photo by Lin Zhao.

A Lincoln University researcher is training extension educators on emerging plant grafting technology and the relevant physiology.

Sanjun Gu is a State Horticulture Specialist with an extension/research appointment dealing with commercial vegetable and small fruit production at Lincoln University in Jefferson City, MO. His research interests include vegetable grafting, vegetable production in high-tunnels and the other types of solar plastic greenhouses, and new variety trials. His current emphasis includes the testing of new varieties and grafting of tomatoes and watermelons for high yield and improved quality. Using grafting, Gu has been fusing scions (young shoots) with resistant root stocks to manage soil-borne diseases.

Gu wanted to conduct a series of grafting workshops and field tours for educators from extension, government, and other agencies. In 2008, he applied for a NCR-SARE Professional Development Grant, and he was awarded \$61,837 to conduct the work.

"Vegetable grafting has been practiced for many years in some Asian and European countries," said Gu. "I worked extensively with

cucumber and tomato grafting in China and knew this technology would benefit American vegetable farmers, especially the smaller ones."

Researchers around the world have demonstrated that grafting young shoots on resistant rootstocks can protect plants against a variety of soil-borne diseases in various climates and conditions. Worldwide use of grafting has been used to battle corky root rot, root-knot nematodes, bacterial wilt, southern blight, and Verticillium and Fusarium wilt.

"Grafted tomatoes/vegetables are resistant to some critical soil-borne diseases, and are often cold hardy and vigorous," said Gu. "This technique, however, is new to most agricultural professionals in the United States. There is a need to train educators in this area, especially for vegetable production in high tunnels and solar greenhouses, which offer seasonal extension and save energies."

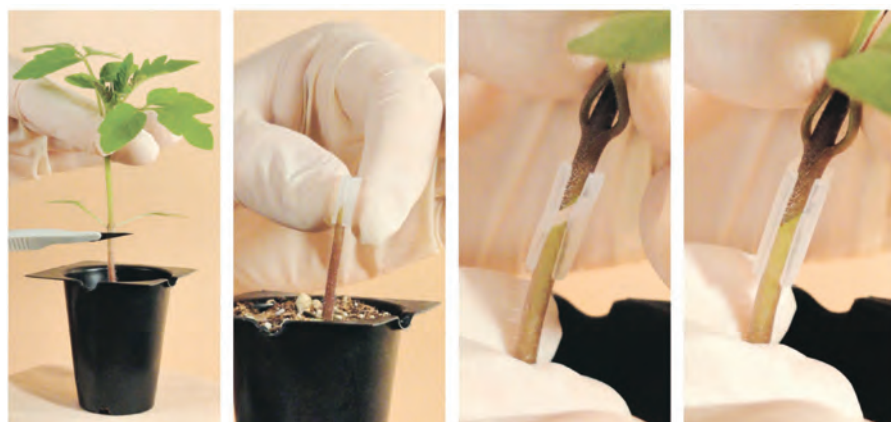
Gu's workshops and tours focused on tomato, watermelon, cucumber, and other vegetable grafting. He shared the history and physiology of vegetable grafting, grafting techniques including rootstock and scion selection, various grafting methods, acclimation of

grafts, and management of grafted transplants, automated grafting, the economics of vegetable grafting, and conducted a tour and demonstration of vegetable production with grafted transplants.

Gu was able to deliver grafting technology information to horticultural educators in Missouri and neighboring states. He says more than 80% of the participating educators have conducted at least one grafting workshop to vegetable farmers.

"This project provides farmers with non-chemical options in managing (soil-borne) diseases," said Gu. "This is a great deal in sustainable vegetable farming because the enhanced disease resistance and cold hardiness of vegetable crops could ultimately result in enhanced crop productivity and profitability. The non-chemical input in production always leads to a better natural environment."

Read more about Gu's "Vegetable Grafting Training for Agriculture Professionals" project online on the SARE Project reporting website. Simply search by the project number, ENC08-102, at <http://www.mysare.sare.org>, or contact the NCR-SARE office for more information at ncrsare@umn.edu.



Curious about grafting? Check out the SARE Agricultural Innovations Fact Sheet, *Tomato Grafting for Disease Resistance and Increased Productivity*. It shares the basics like how to graft, economic advantages of grafting, references, and other resources. It's available online at www.sare.org/TomatoGrafting



NCR-SARE Elects New Administrative Council Representatives

NCR-SARE Administrative Council members, SARE State Coordinators, and staff attend a tour of the Show Me Energy Co-op in Centerview, MO. Photo by Marie Flanagan.

Vicki Hebb, Katie Nixon, Mike Schmitt, and Nancy Williams have been recently elected as new Administrative Council members for NCR-SARE.

Vicki Hebb will be serving on the NCR-SARE Administrative Council as a farmer/rancher representative. Hebb is a member of the Cheyenne River Sioux Tribe of South Dakota is currently dedicated to Native Women & Youth in Ag, a non-profit she co-founded in an effort to increase awareness of agriculture on reservations as well as engage youth in agriculture. Hebb and her husband Marty, are cow/calf producers on the Cheyenne River Sioux Reservation, where they also raise bucking horses.

Lincoln University Cooperative Extension Small Farm Specialist, Katie Nixon, has been elected to serve as an 1890/1994

Land Grant University representative to the NCR-SARE Administrative Council. Among other activities, Nixon manages the Innovative Small Farmers Outreach Program in the West Central region of Missouri.

Mike Schmitt has been elected to serve as the Extension Director's representative to the NCR-SARE Administrative Council. Schmitt is the Senior Associate Dean for Extension at the University of Minnesota. In this role, Schmitt oversees all of the state Extension's programs as well as their research efforts. He holds a faculty appointment in the Department of Soil, Water, and Climate, where he previously conducted research and extension programs with soil nutrient management issues.

Nancy Williams, has been elected to serve as a non-profit representative to the NCR-SARE Administrative Council. Based in Omaha, NE, Williams works with the Boys & Girls Club of the Midlands and No More Empty Pots, a grassroots non-profit dedicated to empowering citizens to become self-sufficient, and building resilient collaborative urban, suburban, and rural communities through sustainable food systems.

NCR-SARE would like to extend gratitude to the following Administrative Council members who either fulfilled their terms or are stepping down: Dave Baker, Tom Coudron, Hans Kandel, Tricia Wagner, Juan Marinez, and Stephen Wegulo.

2012 Farmers Forum to Take Place November 1-3 in Columbia, MO

Join a host of SARE grant recipients and staff from NCR-SARE at the largest annual small farm trade show in the United States — The National Small Farm Trade Show & Conference. Now in its 20th year, the conference will take place on Thursday, November 1st through Saturday, November 3rd, 2012, in Columbia, Missouri, at the Boone County Fairgrounds.

Can you farm or ranch while protecting the environment, making a profit, and benefiting your community? These speakers say, "Yes!" and will show you how to do it. There will be many Farmers Forum talks featuring NCR-SARE grant recipients, including a tomato grafting session from Sanjun Gu (see page 4). Sessions are 25-55 minutes long and run continuously throughout the three-day event.

You'll hear about many practices that can help you develop new, innovative strategies to produce and distribute food, fuel, and fiber sustainably. After the talks, meet the speakers and pick up free sustainable agriculture resources at the SARE Trade Show booths.

Choose from several one-hour seminars at the show. Short courses give you the opportunity to get in-depth information on a variety of topics.

The National Small Farm Trade Show & Conference is sponsored by Small Farm Today and sustained by Missouri Department of Agriculture, National Sustainable Agriculture Information Service (ATTRA), SARE (USDA-NIFA), and Truman State University.

To learn more visit <http://www.smallfarmtoday.com>.



Read more about the Farmers Forum in the Farmers Forum Highlights from the 2011 event. It's available online at www.northcentralsare.org/FarmersForum



NCR-SARE's Social Media Opens Doors to Sustainable Agriculture

Social media has changed the way NCR-SARE communicates, both as a program and as individuals. With social media platforms such as Facebook and Twitter, anyone with an Internet connection now has the ability to create a dynamic Web presence, update it from wherever they are whenever they want, and share their content instantly with friends and followers around the world.

Social media will give NCR-SARE the opportunity to share information and engage in ongoing "conversations" with grantees, staff, stakeholders, state coordinators, administrative council members, fans, and friends about sustaining America's agriculture, extending the NCR-SARE community.

The purpose of NCR-SARE's social media communication forums—including Facebook, Twitter, and other collaborative tools—is to share news and information related to our grant-funded research and educational products, and to engage farmers, ranchers, agricultural professionals and the general public. NCR-SARE encourages participation in our social media forums through comments and discussion related to our posts. Public insights are important to ensure that everyone is informed and can be a part of

NCR-SARE's work to advance innovations in sustainable agriculture. For now, NCR-SARE's social media presence will be administered by the Communications Specialist, Marie Flanagan, who will manage the day-to-day tasks associated with maintaining NCR-SARE's social media presence.

Visit NCR-SARE online for grant information specific to America's central states or read the latest NCR-SARE news and research in the region or in each state. Did you know that NCR-SARE's website is mobile-device friendly and that we offer a bare-bones mirror site for people with slow internet connections? You can also share information directly from the website with email, Facebook, Twitter and other share functions.

NCR-SARE website:
www.northcentralsare.org

NCR-SARE on Facebook:
www.facebook.com/NCRSARE

NCR-SARE on Twitter:
<https://twitter.com/ncrsare> or @ncrsare



NCR-SARE's Climate and Energy Training Initiative

NCR-SARE's Professional Development Program is organizing a two-year professional development and training initiative around climate and energy issues. To launch this initiative, invited state teams of educators will attend a kickoff training conference being held at the Kellogg Biological Station operated by Michigan State University in southwestern Michigan. Other educators will have a chance to get involved later on in follow-up programs in their states.

This "train the trainer" initiative will initially reach agriculture educators from across the North Central region. They will then provide training for farmers and other end users via workshops, tours, and other educational efforts on energy and climate issues facing farmers in the region. Ultimately, these educators will not only provide training on challenges and opportunities associated with these issues, but will also provide practical steps such as relevant farming system practices and selection of appropriate federal and state farmer assistance programs related to bioenergy, energy conservation, carbon capture, and organic matter improvement.

Grant Programs Update

NCR-SARE's Administrative Council voted to make changes to some of the NCR-SARE Grant Programs. Some of the changes of note include:

- The Research and Education (R&E) Grant Program timeline has been altered. The next R&E Call for Preproposals will be issued in August 2012, with preproposals due November 10, 2012. Awards will be announced in August 2013.
- Farmer Rancher Grant Program timelines have been altered. The next Farmer Rancher Grant proposals will be due November 29, and the Youth Educator Grant Program proposals will be due November 15.
- The Youth Grant Program has been discontinued.
- The Graduate Student Grant Program timeline has been altered. The next Graduate Student Call for Proposals will be issued in March 2013, with proposals due in late May 2013.

For complete timelines please see the back page of this newsletter.



Across the country, farmers and ranchers are investigating the potential economic benefits and use of energy crops to revitalize the rural landscape. As energy prices climb,

clean energy practices have become more important to their operations. In 2007, NCR-SARE issued a special call for the Professional Development Grant Program (PDP) for projects to provide professional development in topics related to bioenergy and energy-efficient production. Read about the results of these completed projects online at www.northcentralsare.org/AgEnergyEducators



Iowa Student Studies Woodchip Bioreactors for Nitrate Reduction in Agricultural Drainage

Iowa State University graduate student, Laura Christianson, presents information about nitrate reduction methods at a field day in Iowa .

Photo by Jackie Comito, The Iowa Learning Farms.

Tile drainage reduces soil moisture levels for optimal crop growth, but there is concern about nitrate loss from these systems. Because the water quality of regional streams, rivers, and lakes can be negatively impacted by nitrate in drainage, researchers at Iowa State University are studying several practices that can be done to reduce the amount of nitrate in drainage water.

In 2009, Iowa State University graduate student, Laura Christianson, applied for an NCR-SARE Graduate Student Program grant, and was awarded \$9,953 to provide information to producers about nitrate reduction technologies, and to provide researchers information about producer acceptance of various nitrate reduction approaches, including an innovative approach using woodchip bioreactors.

“When I started my Ph.D., I was drawn to studying bioreactors because they combined an engineered approach to water quality improvement with a natural treatment system,” said Christianson. “I liked the idea that just by routing drainage water through a trench filled with woodchips, you can create a ‘vacation resort’ environment for denitrifying microbes that convert nitrate in drainage water to nitrogen gas. Of course, the further I got into bioreactors, the more I realized we really needed to put this technology within the context of other drainage water quality improvement strategies like wetlands and cover crops.”

Christianson’s NCR-SARE grant project compared the economic cost efficiencies and ecosystem services among seven nitrate reduction methods (wetlands, controlled drainage, cover crops, crop rotation, fertilizer rate reduction, fertilizer timing modification, and denitrification bioreactors). She used these comparisons to develop an educational program with an associated survey to gauge the social acceptance of these seven nitrate reduction methods. To further study the perceived adoption potential of these practices in the context of ecosystem service provisioning, a small discussion group was held with farmers. A hand-out comparing the seven practices was distributed at events.

“Each nitrate reduction strategy provides landowners an additional distinct option for drainage water quality improvement and different strategies or combinations of such will be applicable in different locations,” said Christianson. “While the nitrate management practices were very cost effective and had high interest and compatibility, they offered

few additional ecosystem services. Conversely, the practices that had high ecosystem service provisioning generally had lower compatibility (wetlands) or interest (crop rotation).”

The newest in the slate of technologies that Christianson researched and presented were woodchip bioreactors (also known as denitrification bioreactors), which are made by routing drainage water through a buried trench filled with woodchips. Woodchip bioreactors, installed at the edge of agricultural fields, can help remove nitrate in tile-drained water.

According to Christianson, bioreactors are well-suited for buffer strips or grassy areas, which typically means that little land is taken out of production. They are specifically designed to treat subsurface drainage water that contains high amounts of nitrogen as nitrate and that has relatively little sediment. They work best in drainage systems that have few surface intakes, and are not intended to treat runoff or water collected along terraces. Most current bioreactor designs have been successful at reducing the amount of nitrate in drainage from 30 to 80 acres. Because this is an edge-of-field practice, other conservation practices such as no-till, cover crops, and improved nutrient management can be done in the field, and the bioreactor will treat the remaining nitrate that is lost in drainage.

“I think better understanding of the costs of conservation practices, like bioreactors, helps contribute to sustainable agriculture, but a better understanding of what farmers perceptions are of certain practices is important, too,” said Christianson. “We tried to get at both these things with this project. Bioreactors won’t get us to ‘sustainable agriculture’ by themselves, but they can be a new way to talk about water quality and may provide an option for some individuals.”

View the *Comparison of Practices that Reduce Nitrate in Drainage* handout, or read more about Christianson’s NCR-SARE Graduate Student Grant Program project online on the SARE project reporting website. Simply search by the project number, GNC09-103, at <http://www.mysare.sare.org>, or contact the NCR-SARE office for more information.



Iowa State University graduate student Laura Christianson and Iowa State University agricultural and biosystems engineer, Matthew Helmers, developed *Woodchip Bioreactors for Nitrate in Agricultural Drainage*, which provides information about this innovative approach to water quality management. Read it online at www.northcentralsare.org/WoodchipBioreactors



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ABOUT NCR-SARE

NCR-SARE has awarded more than \$40 million worth of competitive grants to farmers and ranchers, researchers, students, educators, public and private institutions, nonprofit groups, and others exploring sustainable agriculture in 12 states.

NCR-SARE funds cutting-edge projects every year through grant programs.

Are you interested in becoming a project coordinator for a NCR-SARE grant? Before you write the grant proposal, determine a clear project goal, and engage in sustainable agriculture research on your topic. Need help determining which program is best suited for your project? Go to <http://www.northcentralsare.org/Grants> for more information, or contact the NCR-SARE office.

For more information about any of the NCR-SARE grant programs, go to <http://www.northcentralsare.org/Grants> or contact the NCR-SARE office at 612-626-3113 or ncrsare@umn.edu.

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Jackie Comito, Marie Flanagan, C. Rivard, Kate Sumpter, Ennis Walker, Lin Zhao, and SARE Outreach.

GRANT PROGRAM TIMELINES

Farmer Rancher*

August - Call for Proposals
Late November - Proposals Due
March - Funding Decisions
Spring - Funds Available to Recipients

Graduate Student*

March - Call for Proposals
Late May - Proposals Due
August - Funding Decisions
October - Funds Available to Recipients

Research and Education*

September - Call for Preproposals
November - Preproposals Due
Late February - Preproposal Status
May - Full Proposals Due
Late July - Funding Decisions
Fall - Funds Available to Recipient

Professional Development Program*

Late March - Call for Preproposals
Late May - Preproposals Due
Late June - Preproposal Notification
Late August - Full Proposals Due
November - Funding Decisions
Early Spring - Funds Available to Recipient

Youth Educator*

Late August: Call for Proposals
Mid-November: Proposals Due
March: Funding Decisions
Spring: Funds Available to Recipients

*Timelines are subject to change.

NORTH CENTRAL REGION SUSTAINABLE AGRICULTURE
RESEARCH AND EDUCATION PROGRAM

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Photo by Ennis Walker.