



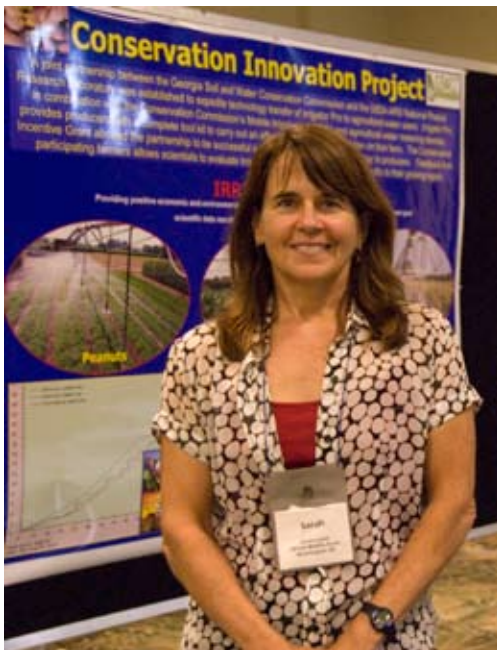
Conservation Innovation Grants Showcase

Introduction

In an effort to provide information on cutting-edge conservation projects, NRCS, in conjunction with the Soil and Water Conservation Society, piloted a Conservation Innovation Grants (CIG) Showcase. The July 23-24 Showcase was held in Tampa, Florida, during the Society's 2007 Annual Conference and included over 30 oral and poster presentations. A poster award session was also part of the Showcase.

As part of the Environmental Quality Incentive Program, Conservation Innovation Grants are intended to stimulate the development and adoption of innovative conservation approaches and technologies through pilot projects and field trials. The projects and field trials are made possible by awarding competitive grants to State and local governments, non-governmental organizations, Tribes, or individuals. CIG enables NRCS to work with many public and private entities to accelerate technology transfer and the adoption of promising technologies. While some States offer CIG grants specific to their state, the pilot Showcase included only Federal/National level grants.

This CIG Showcase summary highlights the speakers, panels, and presentations from the agenda, including a synopsis of each poster and the award winners.



Sarah Lynch, North America Wildlife Federation



NRCS Chief Arlen Lancaster and Tom Esgate, Pitt Resource Conservation District, Cooperative Sagebrush Steppe Restoration Project Director



Natural Resources Conservation Service
P.O. Box 2890
Washington, D.C. 20013

Greetings—

We are pleased to share this collection of highlights from our Conservation Innovation Grants (CIG) Showcase, which debuted during the 2007 Soil and Water Conservation Society Annual Conference in Tampa, Florida. The Natural Resources Conservation Service (NRCS) administers CIG under the Environmental Quality Incentives Program (EQIP). CIG provides competitive grants to State and local governments, tribes, non-governmental organizations, and individuals to promote the development and adoption of innovative conservation approaches and technologies for use in agricultural production.

Since its inception, 479 grants were awarded with a total NRCS funding commitment of \$121.5 million. Synopses of several of those projects, including those highlighted at the Showcase, are contained in this report. They are impressive in both variety and geographic diversity.

We appreciate the effort of so many individuals and organizations in conceiving and developing conservation practices and applications to address many of our Nation's most pressing natural resource needs. Congratulations to all concerned. Keep up the great work and look for details of the upcoming fiscal year 2008 CIG competition.

Sincerely,

A handwritten signature in black ink, appearing to read "A. Lancaster", is written over the typed name.

Arlen L. Lancaster
Chief

Conservation Innovation Grants Showcase

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2007 Pilot Showcase Oral Presentation Agenda

Monday, July 23, 2007

1:00	Moderator	Lillian Woods, National Technology Coordinator, NRCS, Washington, DC
1:00 – 2:00	Welcome Roundtable Arlen Lancaster, NRCS Chief Craig Cox, SWCS Executive Director	Lawrence Clark, Deputy Chief for Science and Technology, NRCS, Washington, DC Thomas Christensen, Deputy Chief for Programs, NRCS, Washington, DC William Puckett, Deputy Chief for Soil Survey and Resource Assessment, NRCS, Washington DC The Role of Conservation Innovation Grants in Technology Development and Transfer
2:00 – 2:30	Sarah Lynch, World Wildlife Fund	Designing a Market-Based Program for Enhancing Environmental Services on Florida Ranchlands
2:30 – 3:00	Gary L. Hawkins, University of Georgia	Utilizing Solar Power as a Supplemental Power Source for Small Irrigation Needs
3:00 – 3:30		Break
3:30	Moderator	Cheryl Simmons, National Technology Specialist, Central National Technology Support Center, NRCS, Fort Worth, TX
3:30 – 4:00	Thomas A. Green, Agflex and IPM Institute of North America, Inc.	BMP CHALLENGE: Increasing Adoption of Nutrient Management and Conservation Tillage in Corn Production
4:00 – 4:30	Calvin Perry, University of Georgia	Demonstration of Variable-Rate Irrigation for Water Conservation and Application Optimization
4:30 – 5:00	Mike McGolden, Coaltec Energy USA, Inc.	Gasification of Poultry Litter to Produce Bio-Energy for Heat
5:00 – 6:00	CIG Poster Award Session - Grand Pavillion	Deputy Chiefs, NRCS
5:00 – 7:00	SWCS Scheduled Exhibition Hall	Exhibitors Reception and Poster Presentations



Bill Puckett, Deputy Chief for Soil Survey & Resource Assessment



Tom Christensen, Deputy Chief for Programs



Larry Clark, Deputy Chief for Science & Technology

Conservation Innovation Grants Showcase Agenda

Tuesday, July 24, 2007

1:00 pm	Moderator	Kathleen Dobler, National Technology Specialist, West National Technology Support Center, NRCS, Portland, OR
1:00 – 1:30	Dennis J. Thompson, Aitkin County Soil and Water Conservation District	Forest Certification for Family Forests
1:30 – 2:00	Brian Wick, Cape Cod Cranberry Growers' Association	Irrigation Automation Systems For Frost Protection in the Massachusetts Cranberry Industry
2:00 – 2:30	Dr. Joe Browde, Dr. Jeff W. Dlott, SureHarvest and California Sustainable Winegrowing Alliance	California Code of Sustainable Winegrowing Practices - Innovations for Air and Water Quality
2:30 – 3:00	Alexis Darnell Cole, University of Arkansas at Pine Bluff	Conservation Innovative Grants used to assist Small Scale/ Limited Resource Farm in East Arkansas
3:00 – 3:30		Break
3:30	Moderator	Ross Braun, Natural Resources Specialist, NRCS, Beltsville, MD
3:30 – 4:00	Michael Hanrahan, Arizona Department of Water Resources	Innovation in Arizona Agricultural Water Conservation
4:00 – 4:30	Cynthia Lee Johnson Plainview Farms, Inc.	Site-specific N Management Based on Soil Electrical Conductivity in a Semiarid Cropping System
4:30 – 5:00	Tessa Chadwick, CIG Program Manager, NRCS, Washington, DC	More on the Conservation Innovation Grants Program

Additional CIG Sessions in the Meeting

- Innovating Conservation Outreach to Absentee Landowners
- Using a Conservation Innovation Grant to Stimulate Adaptive Management
- Conservation Innovation Grant (CIG) Energy*A*Syst Comprehensive Farmstead Energy Self Assessment Tool Kit



2007 Pilot Showcase Poster List

- Using a neutron probe, soil moisture sensors and data loggers to increase irrigation efficiency
- Air Quality, Water, and Soil Conservation Demonstration Project at Lincoln (CA) High School
- Biomass Medium-BTU Hydrocarbon Fuel Gas Generator Application Project. (Poultry Litter Energy Conversion Project)
- C-Lock pilot project to quantify and market CO₂ emission offsets from farmland
- Cooperative Sagebrush Steppe Restoration Initiative - removing western juniper from rangelands through biomass utilization
- Demonstration of conservation & producer-based benefits of a bedded pack system for small intensive grazing farms
- EcoApples: Economic Benefits for Northeast Apple Growers Who Protect Air, Soil and Water Resources
- Economic Feasibility of Using Prescribed Summer Fire as an Invasive Brush Management Tool in Texas
- Erosion Prevention through Vegetated Swales for Water Infiltration
- Field Scale Evaluation and Technology Transfer of Economically, Ecologically Sound Liquid Manure Treatment and Application Systems
- Heron Lake Watershed District Conservation Tillage Demonstration Project
- High Quality Fiber and Fertilizer as Co-Products from Anaerobic Digestion
- National Feed Management Education and Assessment Tools as part of a Comprehensive Nutrient Management Plan
- Precision Dairy Feeding to Reduce Nutrient Pollution in Pennsylvania's Waters and the Chesapeake Bay
- Purple Sulfur Bacteria Management in Dairy Lagoon Systems
- Irrigator Pro Incentive Program
- Outcomes Based Nitrogen Efficiency Project for Corn Production
- Development, Training, and Implementation of Fertilizer BMPs for Six Major U.S. Cropping Systems
- Conservation Drainage: Partnerships and Practices to Improve the Waters in Minnesota, and the Gulf of Mexico
- SPARC creates market based incentives for conservation
- Energy*A*Syst, a Comprehensive Farmstead Energy Self Assessment Tool Kit



Chief Arlen Lancaster (right) visits with Brian LaTourette, Agricultural Program Manager of the Watershed Agricultural Council, (far left) at the CIG Showcase.



Poster Session during the CIG Showcase

AWARDS, PRESENTATIONS, & POSTERS

CIG Poster Award Winners



Brian LaTourette, (left) accepts the award for top CIG poster from NRCS Chief Arlen Lancaster. John Thurgood, (right) Dairy Specialist with Cornell Cooperative Extension is a key conservation partner to the Watershed Agricultural Council and NRCS.



Chief Arlen Lancaster (left) and Deputy Chief for Programs Tom Christensen (right) present the second place award to Fred Stringer, representing the Southwest Arkansas RC&D Project Area.



Robert Rhykerd (second from left) accepts the award for third CIG poster from NRCS Chief Arlen Lancaster (left). Tom Christensen, Deputy Chief for Programs and Larry Clark, Deputy Chief for Science and Technology are also pictured.

The Watershed Agricultural Council, a conservation partnership in New York, received top prize for top Conservation Innovation Grant (CIG) poster presentation. The presentation was made at NRCS' first CIG showcase as part of the 2007 Soil and Water Conservation Society's Annual Conference. The CIG showcase featured 36 presentations including 22 posters that provided an opportunity to learn about innovative conservation projects at various levels of completion from across the United States.

Other Posters with Honorable Mentions not pictured are:

- *Outcomes Based Nitrogen Efficiency Project for Corn Production* – Tracy Blackmer, Iowa Soybean Association;
- *Eco-Apples: Economic Benefits for Northeast Apple Growers Who Protect Air, Soil, and Water Resources* – Arthur Tuttle, University of Massachusetts; Thomas Athony Green, Agflex and IPM Institute of North America, Inc., Harvey Reissig, Cornell University; Art Agnello, Cornell University, Dan Cooley, University of Massachusetts/ Sue Furtrell, Red Tomato, Inc.; Michael Rozyne, Red Tomato, Inc.
- *C-Lock pilot project to quantify and market CO₂ emission offsets from farmland* – Karen Updegraff, South Dakota School of Mines & Technology; Patrick Zimmerman, C-Lock Technologies; Patric Kozak, South Dakota School of Mines & Technology. P.V. Sundareshwar, SDMT.

Presentations

CIG is a component of the Environmental Quality Incentives Program (EQIP) that is intended to stimulate the development and adoption of innovative conservation approaches and technologies while leveraging the Federal investment in environmental enhancement and protection, in conjunction with agricultural production. Technical Contacts at the National and/or State levels have been designated for the 2004 – 2006 National, Chesapeake Bay, Technology, and State Components CIG Projects.

In an effort to get technical feedback from grantees, the Natural Resources Conservation Service (NRCS), in cooperation with the Soil and Water Conservation Society (SWCS) is sponsoring the first CIG Showcase.

The following pages provide an overview of the presentations from the 2007 Conservation Innovation Grants Showcase. Information was provided by the grantees and edited for length. Contact information is also provided.



Designing a Market-Based Program for Enhancing Environmental Service on Florida Ranchlands

Grant Year: 2005

Location: Florida

Resource Issues: Water Quality

Contacts: Sarah Lynch, World Wildlife Fund, Inc.
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NRCS Contact: Bill Reck East NTSC - Core Team -
Kenneth Spaeth, Grazing Lands Team
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Background and Project Premise:

In October 2005, a group of collaborators that included ranchers, environmentalists, state and federal agencies, and scientists received a USDA Conservation Innovation Grant to develop a market-based program that would pay south Florida ranchers for providing critical water management services. The purpose of the Florida Ranchlands Environmental Services Project (FRESP) is to design a market-based program for increasing water storage, phosphorus retention and wetland habitat enhancement on Florida ranchlands in the Lake Okeechobee watershed through a collaborative process that will: 1) Pay for measured and documented environmental services; 2) Be profitable for ranchers and retain land in ranching; 3) Be compatible with and build on existing state and federal environmental and agricultural improvement programs and regulatory requirements; 4) Motivate innovation in environmental service provision; and 5) Be cost-effective for tax payers and be easily administered by the agencies. Because setting up a program like this is complicated, the project will start with a set of pilot projects implemented on ranchlands in order to demonstrate that ranchers can store and clean water on their land, that these environmental services can be documented, and that it does save taxpayers money in the process.

Progress and Expected Benefit:

After a pilot phase to field test critical elements the program will be scaled up in the watershed

Quote: *“The goal of FRESP is to create a program that produces documented increases in water storage, retention and wetland habitat enhancement that is:*

- *Profitable to ranchers*
- *Cost-effective for tax-payers*
- *Feasible to administer*
- *Based on a credible and transparent method for documenting services.”*

Utilizing Solar Power as a Supplemental Power Source for Small Irrigation Needs

Grant Year: 2005

Location: Georgia

Resource Issues: Alternative Energy and Irrigation Management

Contact: Gary L. Hawkins
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Athens, Georgia
229-386-3914,
ghawkins@uga.edu

NRCS Contact: Stephanie Aschmann, Energy Team Leader
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Portland, OR 97232
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Dot Harris, Asst. STC – Operations
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Athens GA 30601
706-546-2097, dot.harris@ga.usda.gov

Background and Project Premise:

This project is designed to demonstrate the use of solar power as a viable means to provide water (irrigation in this case) for crop production in areas that may not have electric lines available.

We are expecting that the use of solar energy, and alternative energy sources in general, will continue to increase. This project will show that investment in a solar system can and should pay for itself in those locations where water is required, but electric lines are cost prohibitive.

Project and Expected Benefit:

A field day was very successful, with many participants expressing genuine interest in solar systems for moving water.

After developing the system, it will run this cropping season as data is gathered on the amount of power produced and used. Sending excess power to the grid will also be explored. This will help better define the cost analysis of using this system on a farm. Also part of the plan is the development of a Bulletin on designing solar systems to help farmers and land managers reduce and convert their energy usage.

Solar may have limited use as an alternative energy source. But in the right situations, it should prove to be a viable option for supplying crops, animals, and other required water needs.

Quote: *“It has been eye-opening to see the number of people interested in using solar power for multiple uses.”*

Improving Conservation and Ag Economics with Water Quality Credit Trading and the BMP CHALLENGE

Grant Year:	2006
Location:	Delaware, Illinois, Indiana, Iowa, Maryland, Michigan, Minnesota, Nebraska, North Carolina, Ohio, Pennsylvania, Virginia, Wisconsin
Resource Issues:	Improved Conservation through Market-Based Incentives
Partners:	Agflex, Inc. and IPM Institute of North America, Inc.
Contact:	Thomas A. Green Agflex, Inc. 1914 Rowley Ave. Madison WI 53726 608 232-1528, tom.green@agflex.com
NRCS Contact:	David Buland, Economist USDA NRCS – Central NTSC 501 West Felix Street, Bldg 23 Fort Worth, TX 76115 817-509-3577, david.buland@ftw.usda.gov

Background and Project Premise:

This project uses water quality credit trading in Minnesota and the BMP CHALLENGE in 12 additional states to improve the usage of conservation practices by corn producers and late adopters. In-state personnel are taught to support Conservation Districts, crop advisory professionals, watershed improvement organizations, and others who work with farmers to meet conservation goals using these new tools.

Progress and Expected Benefit:

Through this project, we continue to find farmers who are interested in working with conservation tillage and nutrient management despite the sharp increase in corn prices and revenue potential. In providing incentives and a financial safety net for corn producers applying less than BMP rates in nutrient-impaired watersheds, we have experienced higher net income guarantee payments than anticipated. In Year II, we are working to identify the effect of an unusual rainfall event in Year I (8-10 inches of rain to the region within 24 hours) on average payments.

The project was stimulated by a Minnesota Supreme Court decision that opened the door to pre-TMDL water quality credit trading in Minnesota. We also had to deal with the fact that the increase in corn prices increased the cost of the project and, to some extent, dampened farmer's enthusiasm for any practice perceived to potentially reduce yields. However, awareness of the BMP CHALLENGE Performance Guarantee Program is growing, with an increase in the number of unsolicited inquiries including those from states outside of the project area.

The next step is to begin writing up the results of interviews with potential participants in water quality trading, including farmers, point sources, and those working with farmers. We will be reviewing and updating our plan of work and time-line, based on those interviews and on what we've learned during year one. We are also beginning to work through pilot water quality credit trades with farmers and buyers, and increasing the number of training sessions on the BMP CHALLENGE and water quality credit trading offered within the project states over the coming year.

Quote: *Everyone finds change challenging and the tools used in this project help bring about positive change by minimizing economic and other risks associated with change.*

Demonstration of Variable-Rate Irrigation For Water Conservation and Application Optimization

Grant Year:	2004	
Location:	Georgia and South Carolina	
Resource Issues:	Water Quantity	
Partners:	University of Georgia Research Foundation	
Contact:	Calvin Perry 229-386-3377 perrycd@uga.edu	Ahmad Khalillian 803-284-3343 akhlln@CLEMSON.EDU
NRCS Contact:	Tony Stevenson, Environmental Engineer USDA NRCS National Water Management Center 101 East Capitol Avenue, Suite 100B Little Rock, AR 72201 501-210-8911, tony.stevenson@ar.usda.gov	

Background and Project Premise:

This project demonstrates the use, benefits and effectiveness of Variable-Rate Irrigation (VRI) for irrigation management, water conservation, and optimal application efficiency.

The goals of the project were to implement a VRI suitability index to identify VRI-suitable pivots (primarily in Georgia and South Carolina), cost-share the installation of VRI systems on 18 producer-owned center pivot (CP) systems over a 3-year period, and to inform and educate stakeholders and policymakers as to how VRI systems can play a role in benefiting urban and rural communities.

Progress and Expected Benefit:

VRI has been installed on many different sizes and brands of center pivot systems with various sprinkler types and has performed very well in all situations. Every VRI installation has had a unique need for the technology. These have included the elimination of off-site application, meeting soil moisture needs for varying soil types, avoiding runoff, and meeting the needs of multiple crops under a single pivot. Results are showing that VRI can increase center pivot water use efficiency. Irrigation water is applied in a more precise manner to optimize crop production.

The cross-section of producers and landowners interested in VRI technology has been quite broad. The group has included young farmers as well as older farmers, environmentally-conscious landowners, and computer-savvy users as well as those with few computer skills. Turf/sod producers have shown a keen interest in VRI as they are very interested in producing their high-value crop in an optimal manner.

Another issue that was encountered was “aggressive” VRI application maps causing the mainline pressure to climb too high on many center pivot systems. The solution to this problem was to create less “aggressive” maps, install a pressure sustaining valve, or install a variable-frequency drive (VFD) on the electrical service to the pump.

Among the 18 VRI systems that were cost-shared, irrigation water savings has averaged 12% over water normally applied in an average rainfall year. The project is recommending acceptance of VRI technology as an NRCS conservation practice and eligible for state NRCS EQIP cost-share funding.

Quote: *“This grant has provided a means for cost-effectively deploying a new technology (VRI) to producers in several states and demonstrating substantial water savings while optimizing crop production.”*

Gasification of Poultry Litter to Produce Bio-Energy for Heat

Grant Year: 2006

Location: West Virginia

Resource Issues: Manure Management and Carbon Sequestration

Partners: Coaltec Energy USA

Contact: Michael McGolden
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Background and Project Premise:

This project seeks to utilize poultry litter to provide heat to chicken houses and eliminate the land application of raw litter. The project includes a gasification system, heat exchanger to provide clean air, and air distribution system inside of the houses. Also, a critical component of the project is the mechanism to control the heat and maintain the proper environment within the houses. The project will quantify benefits from the system, including the elimination of propane costs and land application of the litter, disposal of mortalities, increased animal health, nutrient value of the ash product, reduction of ammonia emissions, and reduction of disease risk.

Project and Expected Benefit:

The disposal of the mortalities has been easier than anticipated. The introduction of the bodies does not create any significant changes in the operation of the system. The forced air distribution system also appears to be very effective.

One of the key components in the cost effectiveness of the project is the value of the ash. When the project started, we were unaware of the interest in “biochar.” This is a material that closely resembles the composition of the ash from poultry litter and has some very interesting potential value as a nutrient supplement. We are investigating the ability to produce this material from the ash of the gasifier.

We have found additional benefits that were not identified in the initial development of the project. The air distribution system appears to be able to eliminate a huge amount of equipment and controls. This is not a big savings in initial cost, but the maintenance cost in both labor and materials will be substantially less. We are also investigating the ability to improve the environment in the house by increasing the temperature during the period when the birds are out of the house.

(continued)

Gasification of Poultry Litter to Produce Bio-Energy for Heat

The project is focused on eliminating an environmental issue in a manner that improves the economic viability of the grower's operation. Initially, there were revenue streams identified to provide a suitable return. As the project has progressed, there appears to be even more opportunities to generate revenue, all of which will increase the likelihood of a successful project and the transferability of the project. Probably the most significant finding is the ease in which the raw manure is taken directly from the floor of the house and fed into the gasifier, then converted to clean air distributed throughout the house.

The system has operated for a period of five days. It will be operated again in July for one-week to fine-tune the controls within the house. Testing has been limited to periods between flocks to avoid any potential damage to the chickens while the system controls are being refined. The system will become completely operational before cold weather starts in the fall. At this time, the monitoring of the system and its benefits will be tracked. Also included in this step will be the analysis of the ash product and the identification of the marketability and value of that ash.

Quote: *"The key to a successful, transferable project is that it not only demonstrates a technology that will work; but one that is easy enough for the grower to integrate into his normal operation, and that it will provide an economical return for the investment."*



Commercial 36 sq. ft. unit on poultry farm

Forest Certification for Family Forests

Grant Year:	2006		
Location:	Minnesota		
Resource Issues:	Forest Health through certification addressing natural resource concerns such as soil resources and productivity, invasive species, and insect and disease threats to forest health.		
Partners:	Aitkin County Soil & Water Conservation District		
Contact:	Kathryn Fernholz Dovetail Partners, Inc. 528 Hennepin Av, Ste 202 Minneapolis, MN 55403 612-333-0430 katie@dovetailinc.org	Steve Hughes Aitkin County SWCD 130 Southgate Drive Aitkin, MN 56431 218-927-6565 swcd@mlecmn.net	Dennis Thompson Aitkin County SWCD 130 Southgate Drive Aitkin, MN 56431 218-927-6565 dennis.thompson@mn.nacdnet.net
NRCS Contact:	Bruce Wight, Forester Forest Service Lab University Nebraska Lincoln – East Campus N. 38 East Campus Loop Lincoln, NE 78583 402-378-5720, ext 36; brice.wight@ftw.usda.gov		

Background and Project Premise:

Recent studies indicate that only about five percent of private forest landowners in the United States have a written management plan. Engaging these landowners in forest certification can improve their land use practices and provide them with access to the growing market for certified products. The Forest Certification for Family Forests project intends to increase woodland owner participation using forest certification as a market-based incentive for environmentally responsible forest management.

Progress and Expected Benefit:

There is increasing demand for certified wood in the region and more than two dozen Minnesota companies are registered to produce and market certified products. The project involves the Aitkin County SWCD establishing a group certification program for forestland owners in Aitkin County, Minnesota that meets the standards of the Forest Stewardship Council (FSC). Three professional foresters have enrolled their land in the program, one of whom was instrumental in having the County land in Aitkin “FSC” certified.

An unusual range of parcel sizes were enrolled in this project of the 12 landowners in the initial pilot pool. Their lands ranged from 417 acres to as small as 30 acres. The initial forest certification assessment with the third-party auditor went very well. Corrective action requests and observations were minor in scale and gave extremely positive feedback.

Of significance are the reasons people give for wanting to have their land certified. Some landowners know they will never sell any type of certified product from their land but still want to have it certified. They are in the program strictly for knowing that their land is being managed to meet internationally recognized standards for responsible forestry. Other landowners are extremely active in selling and marketing certified products from their land and started doing so as soon as they became certified.

With this certification achievement, the Aitkin County Soil and Water Conservation District has piloted a project that can serve as a model to other public and private organizations interested in engaging family forest landowners in certification efforts. Minnesota has more than 6 million acres of FSC certified forest land, but the missing piece to date is that very few of Minnesota’s private forest landowners are participating in certification. Efforts like this project in Aitkin County are helping to change that.

Quote: *“I am amazed at the local and national attention this project has received so far!”*

Irrigation Automation for the Cranberry Industry

Grant Year: 2005

Location: Massachusetts

Resource Issues: Water Quality and Quantity

Partners: Cape Cod Cranberry Growers' Association, 3203-B Cranberry Highway, East Wareham, MA 02538

Contact: Jeffrey LaFleur, 508-759-1041 x.11, jlafleur@cranberries.org
Brian Wick, 508-759-1041 x.14, bwick@cranberries.org

NRCS Contact: Ron Gronwald, Agricultural Engineer
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David Nelson, Assistant State Conservation Engineer
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Background and Project Premise:

The successful cultivation of cranberries requires cool temperatures, sandy soils, and an abundant supply of fresh water. The water is used to hydrate the cranberry vines and to protect the buds and berries against frost. Water is moved into bogs through sprinkler systems or flooding practices. Currently, the irrigation of cranberry bogs must be done manually which can result in excessive or insufficient irrigation which reduces yield. The purpose of this project is to implement and evaluate an automated, internet-based system to increase irrigation efficiency and improve yield.

The project demonstrates an effective, affordable, and usable means of protecting water resources. This technology will conserve water, improve water quality, and reduce potential runoff.

Progress and Expected Benefit:

Cranberry growers can cycle their pumps on/off during a frost event and conserve a significant amount of water. In some instances, water savings of 50-60% have been reported on a frost night as compared to conventional manual systems.

Automated systems allow pumps to automatically increase/decrease speed in order to match the desired RPM. Growers do not need to run back from the field to the pump house to adjust the motor, it's now done automatically.

Initially, some pumps and computer systems were overheating when the systems were started remotely. Growers usually leave the pump house doors open while the pumps are running. However, since they were starting them remotely, this was not happening. Many of the houses needed to be retrofit with secure open screens, roof vents, blower fans, etc. to reduce the heat without manually opening doors.

Water savings has varied depending on how the grower is using the system, the time of year, local conditions, etc. The project has demonstrated a clear advantage in conserving water through automated systems.

Quote: *“This CIG grant has provided a tremendous opportunity for cranberry growers to confidently invest in and evaluate a new technology that has the potential to revolutionize the way grower’s manage water while both reducing water use and increasing water quality.”*

California Sustainable Winegrowing Practices – Innovations for Air and Water Quality

Grant Year: 2004

Location: California

Resource Issues: Water Quality; Air Quality

Contact: California Sustainable Winegrowing Alliance
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San Francisco, CA 94105
Joe Browde, CIG Project Manager, (707) 776-4943, mjbrowde@pacbell.net
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NRCS Contact: John Beyer, Air Quality Specialist
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Rebecca Challender, Water Quality Specialist
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530-792-5621, rebecca.challender@ca.usda.gov

Greg Johnson, Air Quality Team Leader
USDA NRCS - West NTSC
1201 NE Lloyd Blvd, Suite 1000
Portland, OR 97232
503-273-2424, greg.johnson@por.usda.gov

Background and Project Premise:

This grant is designed to improve and increase the use of the California Sustainable Winegrowing Program through the adoption of practices for improving air and water quality during the growing of grapes. California's winegrowers currently farm over 500,000 acres of land. Project plans include the development and implementation of an air quality chapter for the Code of Sustainable Winegrowing Practices Self-Assessment Workbook, modifying and applying the self-assessment and reporting software to highlight NRCS practices and EQIP cost-share opportunities, and establishing and using demonstration vineyards to showcase innovative technologies and practices. It will also include holding targeted education events using newly developed and relevant educational materials, and documenting and advertising the results of the demonstration projects.

Project and Expected Benefit:

Two products resulting from the grant are the 2nd edition of the Code of Sustainable Winegrowing Practices Self-Assessment Workbook with a chapter on air quality; other content specific to the conservation of water, air, and other natural resources; and an online self-assessment and reporting system which works with the Workbook and highlights NRCS technical assistance and conservation planning, NRCS conservation practices specific to the industry, and EQIP cost-share opportunities. There has definitely been a deeper realization of the issues, impacts, pollution mitigation practices, and regulations relevant to the protection of natural resources. There has also been a substantial willingness both inside and outside of the wine industry to partner in achieving CIG objectives.

Quote: *"The CIG partnership with NRCS is vastly improving the impact and visibility of the California Sustainable Winegrowing Program and is measurably increasing grower performance in natural resource protection."*

Demonstration of Low Cost Drip Irrigation Systems for Limited Resource Farmers

Grant Year: 2005

Location: Arkansas

Resource issue: Water Quality

Contact: Alexis Darnell Cole, Outreach Technician
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School of Agriculture, Fisheries and Human Sciences
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501-676-4470, eaec@sbcglobal.net

NRCS Contact: Theodis Bunch, Natural Resource Specialist,
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Little Rock, AR 72201-3811
501-210-8904
theodis.bunch@ar.usda.gov



Background and Project Premise:

The UAPB Agriculture Demonstration Outreach Center, in collaboration with the USDA-NRCS and the East Arkansas Enterprise Community began final stages of planning and developing an innovative water management conservation program designed to provide small scale and limited resource farmers with a low cost drip irrigation system tailored to the farmer/producers' individual needs.

During the early stages of the project a pre-selection process was developed to identify eligible farmers to participate in the program. A "Farmers Application and Agreement" form was developed to identify interested farmers in the East Arkansas Enterprise Community Area. Part of the requirement for being selected in this initiative was for the Farmer to be NRCS-Environment Quality Incentive Program (EQIP) eligible. This concept was initiated to better prepare and enable the Farmer to be more aware of the opportunities that may be available under USDA Programs. Many of the CIG participants who are NRCS-EQIP eligible had received assistance in putting down electric submerged wells or had an identified water source for irrigation purposes under the Program. As such UAPB would provide supplies and technical assistance to install the "low cost drip irrigation system" to irrigate approximately one acre plots were set-aside for drip irrigation for alternative vegetable crops. Other vegetable crops will be irrigated through normal means, such as furrow and flood methods. The conventional irrigation methods will be compared to the new low cost drip system.

Progress and Expected Benefit:

The UAPB-CIG participants installed six (6) Drip Irrigation Systems. Early spring installation of these systems ensured the farmers would have the capability of utilizing the drip irrigation system for the entire season. Each of the farmers in the program thus far, have indicated that without the UAPB-NRCS-CIG participation they would not be financially capable of competing in the vegetable production with any long term sustainability.

Quote: *"One of the goals for UAPB is to use the Conservation Innovative Grant to assist Small Scale or Limited Resource farmers become more competitive farmers."*

Arizona Best Management Practices Agricultural Water Conservation Program

Grant Year: 2004

Location: Arizona

Resource Issues: Water Quantity

Partners: State of Arizona – Department of Water Resources

Contact: Michael S. Hanrahan
602-771-8601, mshanrahan@azwater.gov

NRCS Contact: Peter Robinson, Water Management Engineer
USDA NRCS – West NTSC
1201 NE Lloyd Blvd. Suite 1000
Portland, OR 97232
503-273-2417, peter.robinson@por.usda.gov

Dino DeSimone
230 N First Ave., Suite 509
Phoenix, AZ 85003
602-280-8786, Fax: 602-280-8795

Background and Project Premise:

The Arizona BMP Agricultural Water Conservation Program requires the producer's choice of a balanced set of water conservation practices and in return allows producers to respond to market incentives rather than be constrained by a fixed water allotment. This project is about water management. It intends to increase producer enrollment and add sophisticated performance evaluation, and to impact analysis, producer outreach, and technology transfer components, as well as motivate participation through the use of non-monetary incentives.

Progress and Expected Benefit:

Preliminary indications suggest that Central Arizona farmers who volunteer to practice a balanced mix of physical and management agricultural BMPs for water conservation, are at least as likely to conscientiously practice agricultural water conservation as farmers who are subject to mandatory "not to exceed" allotments. Administrative paperwork has also been reduced.

Quote: *"This process has been very worthwhile and beneficial to the Arizona Department of Water Resources. The Grant allowed us to broaden and deepen the BMP Program, which has become very popular with our growers."*

Presentations

Site-Specific N Management in an Intensified No-till Dryland Cropping System

Grant Year: 2004

Location: Colorado

Resource Issues: Nutrient and Nitrogen Management on Cropland, Water Quality

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Background and Project Premise:

This project addresses key sustainability issues for the Great Plains region. Its multidisciplinary partnerships; on-farm, farm-scale, producer-managed approach; and regional scope bolster potential impact, significance, and transferability.

This grant establishes an on-farm, farm-scale, regional demonstration project to test and evaluate soil electrical conductivity (EC) as a basis for delineating management zones for site-specific N management in dryland winter wheat. Site-specific fertilizer application has the potential to increase farm profitability through improved N efficiency and increased grain yield, decrease N over-application and accompanying negative environmental impacts, and improve biomass production and soil quality through enhanced C sequestration and diminished wind/water erosion.

Information on the complex inter-relationships between N fertilizer rates, soil variability, grain yield, grain quality, and farm economics is fundamental to the development of more profitable wheat cropping systems, the production of a high quality grain product, improved Carbon sequestration and soil conservation, and the diminished potential for ground/surface water contamination and soil acidification.

Project and Expected Benefit:

Due to severe drought conditions in the Great Plains region during 2005-2006, initiation of this project was delayed until wheat planting in September 2006. Consequently, this Conservation Innovation Grant project is in the first year of implementation and data collection. Analysis of collected data will begin this fall (2007).

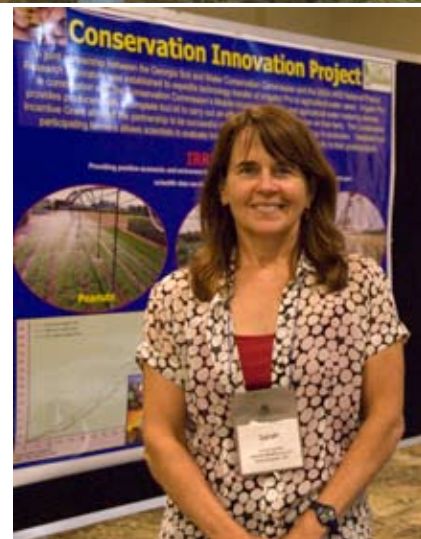
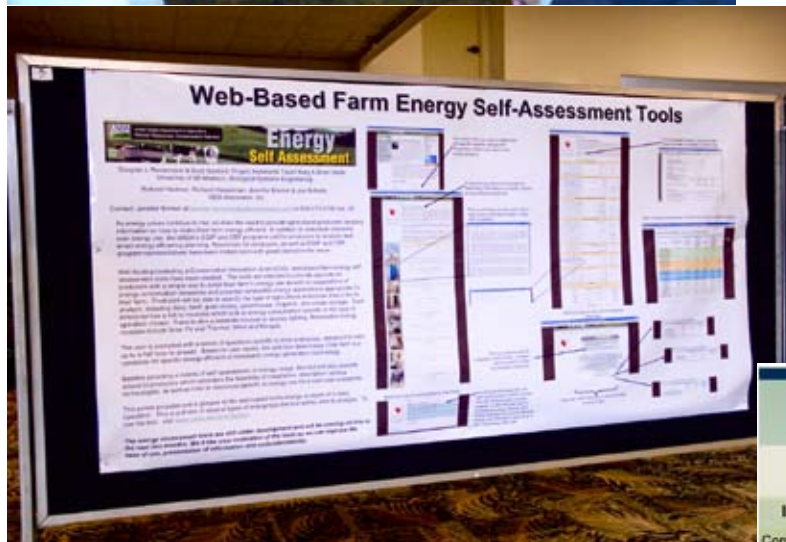
Quote: *"We appreciate that the administrators of the USDA-NRCS Conservation Innovation Grant program understand the extreme weather variability of the Great Plains region and the constraints posed by this variability for production agriculture. Extreme and persistent drought conditions during 2005-2006 delayed initiation of our project. Extension of our grant from three to five years affords us the additional time required for project completion."*

Synopsis of Poster Presentations

The following pages provide a sample of the posters presented at the 2007 Conservation Innovation Grants Showcase. Information was provided by the grantees and edited for length. Contact information is also provided.

Posters were judged on the following:

- Does the poster clearly describe the project and its environmental benefits funded by the Grant?
- How clearly does the poster portray the purpose and outcomes of the project?
- Does the poster explain how the CIG project is an innovative example that is transferable to others? and
- The overall quality and appearance of the poster.



Minnesota Department of Agriculture

Conservation Drainage:

Projects Through Partnerships. Improving Water Quality

Innovative Practices — Structural and Design Solutions — Water Quality Outcomes

Controlled Drainage Structures. Shallow drainage (3T) Bioreactor (Woodchips) In-Ditch Treatments	Hold rainfall & nutrients for dry stretches. Reduce runoff to streams and rivers.	Demonstrating and measuring innovative practices.	Producer-led partnerships with industry, government and researchers
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AGRICULTURAL RESOURCES MANAGEMENT AND DEVELOPMENT DIVISION

Using A Neutron Probe, Soil Moisture Sensors And Data Loggers To Increase Irrigation Efficiency

Grant Year: 2006
Location: California
Resource Issues: Water Resources and Management

Contact: Kirk T. Taylor
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ktaylor@eid.org

NRCS Contact: Peter Robinson, Water Management Engineer
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Background and Project Premise:

The purpose of this project is to purchase and install soil moisture sensors and data loggers. The equipment will be used to determine if the neutron probe that is currently in operation can be replaced with permanently placed sensors to increase irrigation scheduling capabilities. The goal is greater irrigation efficiency coupled by reduced (or eliminated) run-off and erosion and more efficient use of EID resources.

El Dorado Irrigation District (EID) has used a neutron probe for nearly 30 years to assist commercial growers (>5 acres in production) with irrigation scheduling. A water use audit of 100 growers irrigation ~2,500 acres was conducted in 1986 and the audit found that the growers reduced water use by over 2,000 acre-feet per year since the program was initiated. Currently a neutron probe is used once a week at 300 sites during the irrigation season (May-September). The probe is a great tool but crop coefficient models must be developed to predict crop water use between monitoring events. EID received NRCS/CIG funding in 2006 to place 4 soil moisture sensors, one termistor and one data logger at all monitoring sites. Fifty sites will be monitored during the 2007. If this initial study indicates that this arrangement can be used effectively in the EID service district then loggers will be placed at all monitoring sites. The neutron probe will be used to generate site specific calibration curves so that the sensor readings can be correlated to inches of water depleted. This will allow the neutron probe to be phased out over time. The nearly continuous measurements from the data logger will allow the growers to fine tune deficit irrigation practices to increase the quality of their crops and further improve irrigation water efficiency.

Progress and Expected Benefit:

In addition to benefits noted above, the project will allow the development of soil moisture depletion correlations between neutron probe depletion information and soil moisture sensor information for a number of soil types in the soil triangle. The resulting correlations should allow the use of soil moisture sensor information with ETo-based crop coefficient models to schedule irrigation events. EID will ultimately analyze more than 300 monitoring sites to generate the correlations. This information can then be used across the country as a starting point to develop irrigation scheduling programs based on soil moisture sensor information. The only limitation will be in areas of moderate to high soil salinity; EID's service area has very low salinity.

Quote: *"This funding has allowed EID to initiate studies that will allow the District to automate and expand its agricultural water conservation program with little or no impact to ratepayers."*

Air Quality, Water, and Soil Conservation Demonstration Project at Lincoln, California High School

Grant Year: 2005

Location: California

Resource Issues: Energy, Air Quality

Partners: Propane Education and Research Council

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and
John Beyer, Air Quality Specialist
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559-2191, john.beyer@ca.usda.gov

Background and Project Premise:

Working with the school district, placing and evaluating the performance of environmentally beneficial alternative-fueled agricultural equipment at the 210-acre Lincoln High School farm in northern California

Progress and Expected Benefit:

Air quality benefits will be realized with routine use of a lower-emitting propane-fueled agriculture irrigation pump engine in lieu of higher-emitting diesel; soil benefits will be realized by the routine operation of a thermal weed control system (greatly reducing the use of chemical herbicides); and both water and energy conservation will be realized by a “smart” AVL irrigation system that monitors soil moisture levels from remote field sensors and automatically allows for intelligent management of irrigation pumping equipment to conserve energy and water while maintaining crop productivity.

Quote: *“Project managers hope to offer use of the innovative technologies to more local farmers through PlacerGrown. PlacerGrown is a nonprofit membership organization formed to assist Placer County farmers with marketing their products and bringing producers together to maintain and enhance the viability of agriculture in the county.”*



Poultry Litter Energy Conversion Project

Grant Year: 2006

Location: Arkansas

Resource Issues: Waste management and biomass technology, Water quality and quantity

Sponsor: Southwest Arkansas Resource Conservation and Development Project Area, Inc.

Partners: Southwest Arkansas RC&D Project Area
Arkansas River Valley RC&D Project Area
Northwest Arkansas RC&D Project Area
Ozark Foothills RC&D Project Area
Natural Resources Conservation Service
Power Reclamation Incorporated
Four EQIP Eligible Farmers

Contact: Otto Cowling, Chairman
Southwest Arkansas Resource Conservation and Development Project Area, Inc.
217 South Jefferson Street, Suite 105
El Dorado, AR 71730-5900

NRCS Contact: Wavey Austin
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Stan Hitt, Physical Scientist
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Background and Project Premise:

The purpose of this Conservation Innovation Grant Project is to convert biomass, specifically chicken litter, into an energy source that can be easily used by producers. An innovative technology has recently been developed and has been incorporated into a unique patented device called a “NOAHTM” unit. The “NOAHTM” unit accepts biomass and agricultural waste as input which it converts to a medium-BTU (over 600 BTUs per cubic foot) hydrocarbon fuel gas with similar uses to natural gas. The unit produces only one other output besides the fuel—an ash that, when using chicken litter, is equivalent to a 3-3.5-7 non-toxic fertilizer, suitable for vegetables and pasture.

This project intends to demonstrate the Process Unit technology as an innovative means of converting chicken litter into usable energy resources. The project will demonstrate the unique capabilities of NOAHTM Process units for the practical, efficient, low-cost, non-polluting, thermo-chemical conversion of biomass into high-quality (over 600 BTUs per cubic foot) hydrocarbon fuel gas and mineral ash – converting chicken litter to a fuel gas. During the process, the chicken litter is also reduced in volume and weight, making it more economical to transport.

(continued)

Poultry Litter Energy Conversion Project (continued)

This project will install four “NOAHTM” units on poultry farms in major poultry-producing areas in Arkansas. The NOAHTM units convert chicken litter to fuel for generators that will supply the electrical needs of four to six broiler houses. Excess electricity may be supplied to the grid.

Project and Expected Benefit:

A most interesting finding is the reduction in volume. Analysis shows that during the energy production process of the NOAHtm Process unit, the original volume is reduced by up to 93 percent. These results show great promise for simply reducing the total volume of chicken litter which improves the litter application problem.

Tests are also showing an average gas composition of 48 percent hydrogen. This level of hydrogen content was unexpected. The hydrogen reading suggests there might be other beneficial uses for the gas.

Our analysis did not account for all of the phosphorus content of the chicken litter prior to the NOAHtm Processing. The input and output analysis are not balancing and tests to research have been inconclusive.

Initial project intentions were to use technology to provide direct electrical power to chicken house facility. The net-metering process of electrical power generation allows production technologies to generate energy directly into the electrical grid and increases the safety of the bird flock. Due to this and other promising technologies, the Arkansas General Assembly passed Net-Metering legislation that increased the allowable Net-Metering generation from 25 kilowatt hours to 300 kilowatt hours per Net-Metering customer. The new law also provides for the carry-over of metering credits for up to one year.

Two issues have been significant during this project. Making a site applicable for Net-Metering can be cost prohibitive, leaving a need to increase the budget or do fewer demonstration sites. Additionally, it is necessary to have excellent research on state laws on electric energy co-generation, net-metering, and working with utilities. Everyone agrees that the large reduction in initial litter bulk is extremely significant.

Quote: *“The simple fact that the NOAHtm Process unit reduces the volume of chicken litter by 93 percent holds great hope for resolving the concern of having more chicken litter than what is environmentally safe to be applied on land in some areas of the State.”*

Marketing Carbon Sequestration Credits from Reduced Grazing and Conservation Practices on South Dakota Farmlands

Grant Year:	2004	
Location:	South Dakota	
Resource Issues:	Market-based Conservation	
Partners:	South Dakota School of Mines & Technology, 501 East Saint Joseph St., Rapid City, SD 57701	
Contact:	Karen Updegraff, 605-394-1989, karen.updegraff@sdsmt.edu P.V. Sundareshwar, 605-394-2492, pv.sundareshwar@sdsmt.edu	
NRCS Contact:	Jim Millar, Soil Scientist NRCS 200 Fourth Street SW Huron, SD 57350 605-352-1258 james.millar@sd.usda.gov	Greg Johnson, Team Leader, Air Quality & Atmospheric Change West NTSC 1201 NE Lloyd Blvd, Suite 1000 Portland, OR 97232 503-273-2424 greg.johnson@por.usda.gov

Background and Project Premise:

This project is intended to facilitate the development of a site-specific online farmland registration and soil carbon quantification tool and aggregation and marketing system (C-Lock) as well as the implementation of a pilot trade in agricultural carbon sequestration in South Dakota. Ultimately, NRCS and participants in NRCS conservation programs will have access to a high-quality system for quantifying soil carbon sequestration resulting from the implementation of conservation practices on working farmlands. The development of a market for carbon emissions offsets will further encourage the adoption of soil-conserving practices and measures.

Progress and Expected Benefit:

Farmers are very interested in the possibility of monetary reward for ongoing land stewardship and the offset market is interested in access to “win-win” agricultural greenhouse gas credits. However, the market still requires education with respect to the quality and reliability of agricultural sequestration of carbon as an offset product.

The C-Lock system aims to create a high-quality offset that reduces risk for buyers and maximizes benefits for sellers. To accomplish this, we have required a higher level of information from farmers than is used by other quantification protocols. Farmers need to be educated regarding the costs and benefits of this approach in comparison to others. On good quality, well-managed land, the C-Lock system may yield twice as many marketable credits as a generic emission-factor based system

There is also a need to clarify land ownership and eligibility. It was necessary to re-design the project approach after encountering unexpected ownership issues with our original target population group.

The C-Lock system is close to commercial deployment based on the strength of this pilot project. The first offer of 60,000 MTCO_{2e} verified C-Lock agricultural credits (VERs) has recently been posted by the Environmental Resources Trust which has registered these credits. We will continue to explore grant-based funding for further technical development and the expansion of the system into other states and other types of offset projects.

Quote: *The CIG program has provided us with valuable, flexible support for development work that is otherwise difficult to fund within the competitive grant system.*

Cooperative Sagebrush Steppe Restoration Initiative — Removing western juniper from rangelands through biomass utilization

Grant Year: 2006

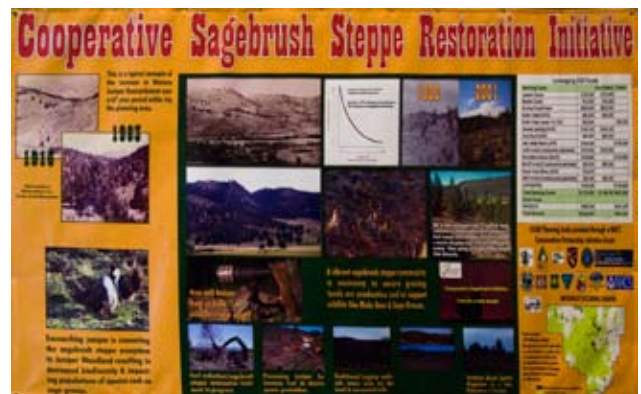
Location: California

Resource Issues: Control of invasive species; Wildlife habitat: Productive rangelands

Partners: Lassen County, California
Modoc County, California
U.S. Forest Service
California Fire Safe Council
Lassen County RAC
Burney Forest Power
USDA - NRCS

Contact: Pit Resource Conservation District
P.O. Box 301, Bieber, CA 96009
Tom Esgate, Project Director
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NRCS Contact: Jim Briggs, Plant Materials Specialist
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503-273-2427
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CIG Poster - July 2007

Background and Project Premise:

This project is designed to test and prove sagebrush steppe restoration practices for removing western juniper using biomass utilization techniques. It will apply post-treatment adaptive range management to ensure restoration and ultimately, provide practice descriptions for the NRCS Field Office Technical Guide.

Progress and Expected Benefit:

A critical part of the project will be writing practice descriptions for juniper management/sagebrush steppe restoration for the NRCS Field Office Technical Guide. The practices will be used by producers and agencies to restore millions of acres of sagebrush steppe that have been impacted by the invasive western juniper in the western United States. The end result will be more productive rangelands, reduced hazardous fuel loads, improved wildlife habitat, and restored watersheds.

The first treatments began in August on a demonstration basis. Additionally, there is a limited operation season; basically from about July through October. The first findings are expected at the close of this operation season.

Project activities were noticed by a Sand County Foundation partnership, the Cooperative Sagebrush Initiative (see <http://www.sandcounty.net/programs/cbcn/sagewise/>). As a result, our Project Director was elected to their Board of Directors to assist with partnership building. Interest and support for the project have been so high that Lassen and Modoc Counties have allocated funds to finance all of our administrative activities through 2009. Because of this, we will be submitting a formal request to amend our budget accordingly and extend our project at no cost to NRCS. We have now leveraged the \$500,000 NRCS contribution to over 2.5 million dollars and more funding is on the way!

Quote: *"The grant has provided us the ability to engage new partners and leverage a tremendous amount of implementation funding for our initiative. Thank you! We couldn't have done this without NRCS help and support!"*

Conservation and Producer Benefits of a Bedded Pack Management System

Grant Year:	2006
Location:	New York
Resource Issues:	Water Quantity and Economic and Labor Impact on Farmers
Partners:	Cornell University Cooperative Extension USDA Natural Resources Conservation Service Delaware County Soil and Water Conservation District New York City Watershed Agricultural Council
Contact:	John M. Thurgood, Cornell Cooperative Extension, jmt20@cornell.edu Brian K. LaTourette, Watershed Agricultural Council, blatourette@nycwatershed.org
NRCS Contact:	William Reck USDA NRCS – East NTSC 200 E. Northwood Street Suite 410 Greensboro, NC 27401 336-370-3353, bill.reck@gnb.usda.gov

Background and Project Premise:

Animal waste is one of the main management challenges for dairy farms. Systems must be environmentally sound, socially responsible, and economically sound for the farmer. One manure management system in limited use is a bedded pack — a covered barnyard and feeding area that holds a variety of dairy cattle, storing their manure through the accumulation of unturned bedding of dry material for later use as a nutrient amendment.

The purpose of this project is to construct a bedded pack system and assess its impact on the farmer and water quality through a comprehensive investigation of the producer-based experience of managing a bedded pack system. Bedded packs may provide an effective alternative to the traditional suite of best management practices—manure storage, barnyard runoff management systems, and improved feeding areas. This system, in conjunction with grazing, provides for the economical feeding and management of dairy cattle. Small farms that graze cattle may especially find this system more economical and practical.

Progress and Expected Benefit:

The following issues were important to the study:

- The amount of labor required to bed cows and remove bedding annually
- Quantity and cost of bedding
- Final height of the pack at the end of the winter
- Best time to clean and way to remove the pack from the facility
- Compostability of the removed material
- Effect on the level of mastitis and milk quality
- Effect on the farm's total costs and returns

(continued)

Conservation and Producer Benefits of a Bedded Pack Management System (continued)

Dairy farm business summaries using the Cornell University Top Dairies Tool have been completed for the years 2005 and 2006 with another planned in 2007. The farmer's accounting of labor used in various activities, including the time to feed, bed, and milk cows; bedding use and cost; a measurement of bedding height at year's end; animal health conditions; and an Annual Environmental Status Review of the facility and farm were used to develop a baseline and observe changes.

Construction of the facility was completed in December 2006 and the producer moved his herd into the structure. Animal welfare (animal comfort, air quality, etc.) has improved, all barnyard runoff from the loafing and feeding area has been eliminated, and the facility effectively contains the dairy herd's manure.

Quote: "With its positive environmental benefits, this system may provide a larger economic return due to a significant reduction in labor."

Conservation and Producer Benefits of a Bedded Pack Management System

By John M. Thurgood, Cornell Cooperative Extension and Brian K. LaTourette, Watershed Agricultural Council

Situation

Small dairy farms in the Adirondack region face many challenges. Limited resources, increasing labor costs, and rising input prices are forcing many to re-evaluate their operations. The region's dairy farms are facing a number of challenges that have led to a decline in the number of dairy farms. The region's dairy farms are facing a number of challenges that have led to a decline in the number of dairy farms.

Purpose

The purpose of this project is to construct a bedded pack system and evaluate its impact on the farmer and the environment. The project will evaluate the impact of the system on the farmer and the environment.

Design







The design of the system is based on the principles of animal welfare and environmental conservation. The system is designed to provide a comfortable and healthy environment for the dairy herd.

Evaluation Methods

The evaluation methods used in this project include a baseline assessment of the current system, a detailed cost analysis, and a comprehensive environmental impact assessment.

Outcomes

The outcomes of this project include a significant reduction in labor costs, improved animal welfare, and a more sustainable and environmentally friendly dairy farming operation.

CIG Poster - July 2007

EcoApples: Economic Benefits for Northeast Apple Growers Who

Grant Year: 2006

Location: CT, MA, NH, NY, VT

Resource Issues: Water Quality

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and
tom.green@bmpchallenge.org

NRCS Contact: Robert Escherman
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Washington, DC 20013
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Background and Project Premise:

More consumers are seeking products that meet high ecological standards. The eco-market is estimated to be 60 million US consumers, or 30% of the overall market. The EcoApple project is a collaboration of growers, buyers, scientists, crop advisors, funders and an innovative, non-profit marketing agent, Red Tomato, working to serve this market segment. Participating growers follow a production protocol developed by the collaboration and revised annually to reflect new practices, products and information. The IPM Institute maintains the protocol and certifies qualifying product. Red Tomato develops and coordinates systems for aggregation, transportation, storage and marketing which have been lost to small scale producers in the Northeast through industry consolidation, and returns price premium and access to markets. Red Tomato also hosts in-store tastings, educating thousands of consumers about the benefits of local, ecologically grown produce. Since 2004, sales have increased by 300% to approximately 200 retailers including Whole Foods and Trader Joe's. A 2005 post-season survey indicated 95% grower satisfaction; access to markets and price and net return were the most important benefits. We have eliminated the most toxic pesticides as defined by our work group with specific reference to criteria set by recognized authorities including USDA, US EPA, International Agency for Research on Cancer, California EPA and others, and have increased adoption of conservation practices listed in the protocol. The project has been funded by the USDA NRCS Conservation Innovation Grant Program, US EPA Region I Strategic Agriculture Initiative, USDA Crops at Risk Program, USDA Northeastern IPM Center, and an anonymous foundation.

Participating growers follow a production protocol developed by the collaboration and revised annually to reflect new practices, products and information. The IPM Institute maintains the protocol and certifies qualifying product. Red Tomato develops and coordinates systems for aggregation, transportation, storage and marketing which have been lost to small scale producers in the Northeast through industry consolidation, and returns price premium and access to markets. Red Tomato also hosts in-store tastings, educating thousands of consumers about the benefits of local, ecologically grown produce.

Progress and Expected Benefit:

Since 2004, sales have increased by 300% to approximately 200 retailers including Whole Foods and Trader Joe's. A 2005 post-season survey indicated 95% grower satisfaction; access to markets and price and net return were the most important benefits. We have eliminated the most toxic pesticides as defined by our work group with specific reference to criteria set by recognized authorities including USDA, US EPA, International Agency for Research on Cancer, California EPA and others, and have increased adoption of conservation practices listed in the protocol.

Quote: *"More consumers are seeking products that meet high ecological standards. The eco-market is estimated to be 60 million US consumers, or 30% of the overall market. The EcoApple project is a collaboration of growers, buyers, scientists, crop advisors, funders and an innovative, non-profit marketing agent, Red Tomato, working to serve this market segment."*

Economic Feasibility of Using Prescribed Extreme Fire as an Invasive Brush Management Tool in Texas

Grant Year: 2005

Location: College Station, Texas

Resource Issues: Range Management

Partners: Texas Agriculture Experiment Station and Texas A&M University

Contact: Dr. Urs P. Kreuter
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USDA NRCS
Central NTSC
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Fort Worth, TX 76115
817-509-3227, homer.sanchez@ftw.usda.gov



CIG Poster — July 2007

Background and Project Premise:

The CIG Summer Burning Project evaluates the economic feasibility of using prescribed fire exceeding current NRCS technical standards as a rangeland restoration practice on privately-owned land. This study has three objectives:

- Evaluate the economic effectiveness of using prescribed summer burns compared to more commonly used restoration strategies;
- Provide economic research results to facilitate the review of NRCS technical standards, specifications, and policies with respect to prescribed fire; and
- Assess the economic effects of summer fire on livestock grazing and wildlife hunting lease rates. (The research covers four contiguous counties in each of three Texas eco-regions.)

Progress and Expected Benefit:

Focus group meetings were held with landowners and NRCS/Extension personnel to obtain preliminary information including common rangeland uses (livestock and/or wildlife), the most problematic invasive brush species, and the most commonly used treatment practices and the associated costs for controlling invasive plants. The primary invasive species identified in each eco-region include: Rolling Plains – Prickly Pear (*Opuntia phaeacantha*); Edwards Plateau – Redberry and Ashe juniper (*Juniperus ashei* Buchh. And *J. pinchotii* Sudw., respectively); South Texas Plains – Huisache (*Acacia smallii* Isely). Mesquite (*Prosopis glandulosa* Torr.) was identified as the secondary invasive species in each eco-region.

Preliminary results indicate that in all three regions, summer fire was economically feasible and was the only treatment alternative that resulted in positive Net Present Values and Benefit-Cost Ratios greater than 1.

Quote: *“The results of this study indicate that the use of extreme fire may be economically superior to other woody plant management options for restoring rangelands invaded by woody plants to open grassland and savannas.”*

Field Scale Evaluation and the Technology Transfer of Economically and Ecologically Sound Liquid Swine Manure Treatment and Application Systems

Grant Year: 2006

Location: Illinois

Resource Issues: Nutrient Management; Water Quality

Partners: Illinois State University Research and Sponsored Programs

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Background and Project Premise:

Establishing a demonstration project on a production scale will allow a true evaluation of this system approach and allow the transfer of this technology to the private sector via a variety of outreach activities directed towards grain farmers, livestock producers, extension specialists, and government agency staff.

This project is innovative in that it is the first time a controlled drainage system has been coupled with polymer-assisted separation and the resulting separated effluent spread through subsurface irrigation to decrease odor and non-point source (NPS) pollution.

Project and Expected Benefit:

Additional efforts will take place to develop educational materials, offer workshops/field days, and provide outreach activities to inform farmers, educators (extension specialists, government agency staff, etc.), and other interested parties about BMPs to reduce NPS pollution originating from the land application of manure.

Quote: *“We have used the USDA CIG grant to leverage additional funding. We recently were awarded approximately \$124,000 from the Illinois C-FAR external grant program to expand the project and evaluate applying SE on switchgrass.”*



Minnesota Conservation Drainage Demonstrations: Improving Impaired Waters

Grant Year: 2004

Location: Minnesota

Resource Issues: Water Quantity and Quality

Partners: Minnesota Department of Agriculture

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CIG Poster - July 2007

Background and Project Premise:

Conservation drainage practices have the potential to reduce the loss of nutrients through surface and subsurface runoff. These practices are being demonstrated and monitored in three of Minnesota's major river basins. The conservation drainage practices include installation of subsurface drainage pipe at a shallower depth than normal (3 feet), managing the depth of the water table with control structures, and treating subsurface drainage water with a woodchip bioreactor. Another benefit of the project is the promotion of more resilient cropping, planting, and drainage systems that together generate biofuels and protect the environment.

Project and Expected Benefit:

Measuring the drainage and water tables in and under cropland is complex. It was determined that electromagnetic flow sensors are very accurate for determining subsurface drainage flows, though they will not measure flows below two gallons per minute. Crop yield measurements also provide valuable information and are a complex part of examining the impact of drainage designs.

Project results are showing that controlled subsurface drainage dramatically reduces drainage volume and therefore nitrate N losses from agricultural land, as well as the fact that controlling water tables within one foot of the surface, will impact crop establishment and performance.

Rainfall patterns during 2006 had a major impact on the amount of drainage flows (very dry July – October) and the differences between drainage system designs (shallow, conventional and controlled). However, 2006 crop yields varied little by drainage system design.

There was a high level of accuracy regarding electro-magnetic flow sensors. They were recalibrated after the first season through the cooperation of the University Of Minnesota, Dept. of Bioproducts and Biosystem Engineering Laboratory in St. Paul.

Quote: *"Principles to develop lasting partnerships must guide the process and the partners must bring an open mind and willingness to cooperate on a level playing field."*

High Quality Fiber and Fertilizer as Co-Products from Anaerobic Digestion

Grant Year: 2004

Location: Washington

Resource Issues: Water Quality - animal waste management is the primary resource issue addressed with this project. Creating additional revenue from anaerobic digesters and enhancing the economic and environmental sustainability of dairy farms across rural America is a secondary benefit.

Partners: Washington State University

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Background and Project Premise:

NRCS recently introduced new National Technical Standards for anaerobic digesters (AD) as a practice to be used for dealing effectively with animal waste management. Despite many benefits, anaerobic digesters are capital-intensive structures and the typically offered EQIP cost-share is inadequate for widespread adoption.

To make ADs more attractive for a producer to install, additional revenues besides methane are needed to improve the feasibility of the technology. Additionally, the AD process alone contributes little to reducing manure nutrients. Complementary processes are required to meet excess nutrient-related environmental issues.

The goal of this project is to improve the feasibility of AD by also producing high quality fiber and struvite ($MgNH_4PO_4 \cdot 6H_2O$). The high quality fiber can be sold as a substitute for peat moss while the struvite, produced through precipitating P and N from liquid manure by adding Mg ions, can be used as a slow-release fertilizer.

Amended, anaerobically-digested fiber from plug-flow digesters has been demonstrated to perform at or better than the peat moss standard as a potting substrate for the ornamental industry. Additional revenue streams other than electricity production are ESSENTIAL to making dairy digester projects financially viable.

Negotiations are underway for licensing the fiber product to a national nursery products supply company. Additional approaches are being evaluated for removal of phosphorous and nitrogen from anaerobically-digested dairy manure. Evaluation of the impact of non-manure feedstocks on economic and technical performance of the digester will continue. The implications of the farm management of non-manure feedstock also need to be evaluated. Options for higher-value uses (not electricity) of digester bio-gas need to be evaluated as well.

Quote: *“The development of value-added co-products from the anaerobic digestion of dairy manure is critical for digesters to become a standard dairy waste management technology.”*

National Feed Management Education and Assessment Tools as part of a Comprehensive Nutrient Management Plan

Grant Years: 2005

Location: Iowa, Indiana, Nebraska, Washington

Resource Issues: Nutrient Management

Partners:

Washington State University	Oregon State University
University of Idaho	University of California Davis
Purdue University	Texas A&M University Cooperative Extension
Iowa State University Extension	University of Nebraska Lincoln
Cornell University	Virginia Polytech Institute & State University
University of Georgia	Natural Resources Conservation Service

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Background and Project Premise:

The goal of the project is to increase the understanding of agricultural professionals about the area of Feed Management, with an emphasis on the environmental and financial sustainability of livestock and poultry operations. The project is designed to provide a simple and effective set of tools for implementing feed management practices in each state and to encourage the adoption of feed management practices that can have a positive impact on soil, water, and air quality as part of a comprehensive nutrient management plan (CNMP).

(continued)

Posters

National Feed Management Education and Assessment Tools as part of a Comprehensive Nutrient Management Plan (continued)

Outcomes of the project will be in the form of decision aid tools and include:

- Feed management plan development and implementation flow chart
- Opportunity check list
- Feed management plan checklist
- Feed management plan template
- Whole farm balance tools
- Manure excretion estimator
- Relative economics of a ration change vs transporting manure.

The primary audience for the education program will be Animal Nutritionists, NRCS staff, Technical Service Providers (TSPs), and advisors.

Project and Expected Benefit:

The Feed Management Plan (FMP) Development and Implementation curriculum has been organized in a four-hour workshop format for both technical service providers and nutrition consultants. Real farm case studies are used to provide training in the use of on-farm assessment checklists for assessing the opportunity of an FMP to impact whole farm nutrient balance, and in developing and implementing an FMP. In addition, species-specific and practice-specific fact sheets are provided to assist with evaluating the relative merit of feed management practices listed in the on-farm assessment checklists.

For those that choose to develop a CNMP, there will be an immediate need for an understanding of the Feeding Management element of the CNMP. Although NRCS staff and technical service providers are trained in most components of a CNMP, they have little or no educational background in Feed Management. Where professional nutrition-management consultants have been trained in diet formulation and ingredient management, they are, in some cases, not aware of the most recent information about the environmental and economic merits of the newest feed management technologies.

The main efforts will be centered to provide training for NRCS staff, agricultural professionals, and technical service providers in feed management concepts and practices that focus on whole farm nutrient balance, and to provide training on the use of computer models and software for strategic ration balancing, whole farm nutrient balance, and nutrient excretion estimates based upon feed and animal performance inputs. Additionally, a chapter for the NRCS Agricultural Waste Management Field Handbook (AWMFH) on Feed Management will be developed.

Quote: *“Feed represents the largest import of nutrients to a farm, followed by commercial fertilizer.”*

CIG Poster - July 2007

Precision Dairy Feeding to Reduce Nutrient Pollution in Pennsylvania's Waters and the Chesapeake Bay

Grant Year: 2005

Location: Chesapeake Bay Watershed, Pennsylvania

Resource Issues: Water Quality

Partners: The Chesapeake Bay Foundation
University of Pennsylvania
Penn State Cooperative Extension
USDA Natural Resources Conservation Service
Pennsylvania Department of Agriculture
Pennsylvania Department of Environmental Protection
Pennsylvania Center of Dairy Excellence

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Background and Project Premise:

Almost 4,000 miles of Pennsylvania streams are impaired by agricultural non-point source pollution, primarily excessive nitrogen and phosphorus from livestock manure. Reducing the nutrient content in livestock rations is one of the keys to achieving healthy streams in Pennsylvania and the Chesapeake Bay watershed.

Precision feeding reduces nitrogen and phosphorus inputs to the levels required to maintain optimum production and herd health. This results in manure nitrogen reductions of 30–50 percent and phosphorus reductions of 40–60 percent. When herds are fed nutrients that do not exceed their production requirements, they utilize nutrients more efficiently, reduce the amount of excreted nutrients, and maintain or improve production.

Feeding dairy cattle is more complex than feeding other livestock because it requires balancing the requirements of animals at many stages of their lactation and pregnancy cycles, as well as balancing the needs of the rumen's microbial population. Additionally, a dairy farm often utilizes hay and silage grown on the farm, providing the animals with variations in quality and nutrient content due to differences in soil, weather when harvesting, and storage conditions.

Historically, some livestock are fed extra nitrogen-containing protein and phosphorus to maximize production and guarantee animal health and reproductive performance, often 130 to 160 percent more phosphorus than needed. Most of the excess nutrients are excreted in manure and urine, exacerbating many producers' problems with manure management.

(continued)

Precision Dairy Feeding to Reduce Nutrient Pollution in Pennsylvania's Waters and the Chesapeake Bay (continued)

Premise:

If the nitrogen and phosphorus content is reduced by 30% in the rations of 75% of the dairy cows in the Chesapeake Bay watershed in Pennsylvania, loads to the Bay would be reduced by approximately 23.6 million pounds of nitrogen and 9.5 million pounds of phosphate per year.

This project plans to provide significant changes in the dairy industry through precision feeding and to improve water quality. The precision feeding project's three-year goals are to:

- Initiate precision dairy feeding on 55 farms that represent the diversity of the dairy industry in Pennsylvania.
- Comprehensively educate farmers and those who advise them, laying a foundation for the broad implementation of precision feeding throughout Pennsylvania.

Progress and Expected Benefit:

In 12 workshops across Pennsylvania, Penn State Cooperative Extension has trained 136 dairy professionals to use the "Profitability Assessment Dairy Tool" to examine the whole farm system and identify the areas of greatest financial loss and opportunities for improving their dairy's profitability. One component of the Dairy Tool is the precision feeding "drill down," which focuses on nutrition, feeding management, and forage quality. The drill down tool determines which of those 3 factors present the highest risk of delivering excess nutrients. The tool, along with supplemental educational materials, will be available online in the summer of 2007.

University of Pennsylvania's New Bolton Center is currently providing individualized technical assistance to nutritionists on 40 farms using diverse management systems and with herd sizes ranging from 50 to over 700 cows. Milk, manure, forage, and feed samples are analyzed to adjust rations to more precisely meet the nutrient needs of the herd and maintain or improve production and reproductive health. An additional 15 farms will soon be added.

Recommendations for many farms have included matching the amino acid balance in the feed ration to the animals' needs, reducing crude protein levels and excess nitrogen. This is accomplished by 1) using highly digestible feeds such as high quality forages, 2) using finely processed corn or correctly roasted soybeans, 3) reducing or removing inorganic phosphorus supplements from rations, 4) minimizing the use of byproduct feeds with high phosphorus levels, and/or 5) phase feeding so livestock are consuming the nutrients appropriate for their needs. One farm is implementing several of these recommendations and is saving about 68 cents/cow/day on feed, while increasing milk fat and protein.

Quote: "When significant amounts of technical assistance and education are provided, precision feeding has the potential to significantly reduce phosphorus and nitrogen loads to surface water."



Purple Sulfur Bacteria Management in Dairy Lagoon Systems

Grant Year: 2004

Location: San Joaquin Valley

Resource Issues: Water quality, nutrient management

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Background and Project Premise:

Purple sulfur bacteria (PSB), naturally occurring phototrophic anaerobes, have been reported to be effective at reducing odors, VOC's, and VFA's in hog lagoons in the Midwest. Little or no work has been done in the west, particularly with dairy lagoons. This project proposes to establish purple sulfur bacteria in lagoons on 10 dairies in the San Joaquin Valley. Effects on soil, water, plants, animals and air will be determined and documented.

Project Objectives: Evaluate the effects of PSB in waste lagoon management on soil, water, air, plants, and animals. Generate interest in applying existing and new technology with an important sector of agriculture not normally affiliated with NRCS. Incorporate new technology into FOTG conservation practice standards. Transfer technology to other parts of the state, nation and beyond, and demonstrate to the public that dairies are doing their part to maintain and improve the environment while maximizing production.

Progress and Expected Benefit:

Plans will be prepared on ten dairies and practices/measures applied. Three systems of waste lagoon management integrated with irrigation water and nutrient management will be evaluated. One will involve different waste loading schemes, another will involve solid separators with and without circulators, and another will involve circulators with and without solid separators. Social, economic, and environmental effects will be measured, evaluated and documented. Successful practices/measures will be incorporated into the FOTG. A video will be prepared from workshops/field days and distributed. Coordinate with California Air Resource Board and the SJVAPCD to integrate PSB in dairy lagoon mitigation procedures.

Project Update: Ten dairies have conservation plans developed with supporting systems cost shared through EQIP contracts. Over \$1,000,000 have been spent on systems-half of this provided by the dairymen. System components include receiving pits, solid separators (mechanical and gravity retention basins), waste storage facilities, waste treatment facilities, circulators, pumps, pipes, measuring devices, and irrigation delivery and return systems. Other cost share items include tests for soil, plant tissue, water and record keeping. All dairies have achieved purple sulfur bacteria (PSB) in their systems at some level. Approximately \$260,000 is being used for monitoring and documenting effects on soil, water, plants, animals and air, half being local dollars. Information is being collected by numerous means. On site visits using the Nasal Range Finder, indicate significant odor reductions from PSB. Farm irrigators indicate that the water is easier to manage and has little or no odors, slime, or film. More information is being gathered through contracts with private labs, ARS, and Fresno State University. Data gathered includes information on microbial population and density, soil, water and plant tests, and air emissions tests. Floating flux chambers and lasers will be used in the FSU study. Another study comparing traditional black water and PSB water used to grow field corn was completed in late 2006. Another contract includes eight dairies being monitored monthly in various locations on the farm for physical and chemical changes as systems transcend from black to PSB. Preliminary data will be presented at this session. Data from all of these studies will be available in November 2007.

Quote: *"This represents a huge commitment by NRCS leadership - it is very much appreciated."*

Irrigator Pro Incentive Program – Irrigation Management Technology for Water Conservation in Georgia

Grant Year: 2005

Location: Georgia

Resource Issues: Water Quantity

Partners: Georgia Soil and Water Conservation Commission
USDA Agricultural Research Service

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Background and Project Premise:

Next to land, water available for crop irrigation is arguably the most important natural resource in production agriculture. Irrigation in peanuts, cotton, and corn has stabilized crop yield and quality, reducing farmer risk and sustaining farm income and survivability. However, farmers must better manage irrigation scheduling to ensure sustainability. An increasing demand for water, coupled with higher than average irrigation costs from fuel prices, mandate that farmers more effectively manage irrigation scheduling.

Irrigator Pro for Peanuts, Cotton, and Corn were developed at the USDA/ARS National Peanut Research Laboratory in Dawson, Georgia to improve irrigation scheduling (time and amount), to increase crop yields, and conserve natural resources. A joint partnership between the USDA-ARS National Peanut Laboratory and the Georgia Soil and Water Conservation Commission was established to expedite the technology transfer of Irrigator Pro to agricultural water users.

Progress and Expected Benefit:

Irrigator Pro, in combination with the Conservation Commission's Mobile Irrigation Lab (MIL) and agricultural water metering devices, provides producers with a complete tool kit to carry out an effective water conservation plan on their farm. The Conservation Incentive Grant allowed the partnership to be successful in transferring Irrigator Pro technology to producers, evaluating Irrigator Pro, and making models for specific growing regions.

The Irrigator Pro Incentive Program is in its second year. There were 77 contracts consisting of 14,343 acres completed in 2006. Positive responses from growers, as well as the data collected, indicate that the program is a success. Another indicator of program success is the 126 applications received for 2007.

Quote: *“Even though South Georgia has been under an extreme drought, the Irrigator Pro Corn program has helped growers better utilize their water resources.”*

Outcomes Based Nitrogen Efficiency Project for Corn Production

Grant Year: 2004

Location: Iowa

Resource Issues: Water Quality

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Background and Project Premise:

Nitrogen (N) fertilizer management is a major resource management concern for both economic and environmental reasons. The factors that effect N availability and loss are complex and difficult to accurately predict. In Iowa, a national Conservation Innovation Grant matched by state and private funding has been used to increase the use of outcome-based tools that assist in adaptive management.

The primary focus of the innovation grant was to increase growers evaluating what worked on their farm. The Iowa Soybean Association provided guidance and support to growers and TSPs on over 1,000 fields for two years in Iowa. This evaluation strategy permitted growers to evaluate how much N was available to the crop, including excess N, for different areas/environments in their field. This type of evaluation provides not only a basis for adaptation, but also the means to monitor change in behavior of the grower.

While evaluation methods were helpful within a given year, the greatest impact occurred when using a combination of data from multiple growers over multiple years. Results from this program show that evaluations, when executed and interpreted correctly, can be a tremendous tool that leads to adaptation. The biggest barrier for expansion is transitioning is figuring out how to transfer this strategy into existing government programming that has not focused on evaluation or combining results across individual growers for a larger benefit.

Progress and Expected Benefit:

The primary focus of the innovation grant was to increase growers evaluating what worked on their farm. The Iowa Soybean Association provided guidance and support to growers and TSPs on over 1,000 fields for two years in Iowa. This evaluation strategy permitted growers to evaluate how much N was available to the crop, including excess N, for different areas/environments in their field. This type of evaluation provides not only a basis for adaptation, but also the means to monitor change in behavior of the grower.

Quote: *“The biggest barrier for expansion in transitioning is figuring out how to transfer this strategy into existing government programming that has not focused on evaluation or combining results across individual growers for a larger benefit.”*

Development and Implementation of Fertilizer BMP Guides for Six Selected Major Cropping Systems

Grant Year: 2005

Resource Issues: Nutrient Management

Location: Arkansas, Idaho, Illinois, Kansas, North Dakota, and New York

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Background and Project Premise:

Most fertilizer recommendations are based on relatively old university research and do not include new products and technologies to the extent that they should. Most NRCS state guidelines are based on the local university recommendations and are also out-of-date. University members agreed that updates were needed and were willing to come together to complete the work.

Project and Expected Benefit:

This grant is designed to support the development and implementation of guidelines and best management practices for the use of fertilizer in six major cropping systems. Looking forward to a better understanding on how fertilizer can best be managed in selected cropping systems, initial work focused on the production of a set of guidelines using the latest technology in materials and application methods for using fertilizer in nutrient management plans. That was followed by a set of decision aids and training materials for teaching producers and their advisor how to use the proposed BMPs. Stakeholder, NRCS, and Extension Service training sessions have helped to implement the new BMP guides.

Quote: *“Fertilizer is an essential component in nutrient management for cropping systems. The use of modern technologies can help maintain productivity and protect soil, water, and air resources.”*

Conservation Tillage Demonstration Project – Heron Lake, MN

Grant Year:	2005	
Location:	Minnesota	
Resource Issues:	Soil erosion, water quality, soil fertility	
Partners:	Heron Lake Watershed District, University of Minnesota Extension, Fairland Management Company, Alba Grain, Inc., Pietz Farms, and the North Heron Lake Game Producers Association.	
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Background and Project Premise:

This project was implemented to demonstrate and evaluate the viability of various conservation tillage systems, including strip-tillage. The project timeline has been through a long-term, on-farm, research trial in southern Minnesota with subsequent field days and winter workshops for producers and agricultural professionals.

Soil erosion from cropped agricultural land continues to be a major source of sediment in surface waters and also results in an irreversible loss in soil productivity. Strip tillage is a promising and relatively new conservation tillage system that removes residue in the fall in a 6- to 10-inch wide strip where the crop will be planted in the spring. Residue between the crop rows is maintained.

Significant public investments have been made in structures (waterways and terraces) and in land conversion (Conservation Reserve Program, Reinvest in Minnesota, and Conservation Reserve Enhancement Program) to reduce erosion effects. Insufficient progress has been made, however, in reducing soil detachment and transport from row-cropped fields where soil is exposed to direct rainfall impact. Soil detachment and transport can be effectively reduced in row-crops by maintaining the plant residue of the previous crop until the new crop canopy is in place.

Progress and Expected Benefit:

Tillage treatments systems were replicated on corn and soybean crops in individual blocks of land as a demonstration project to show farmers the differences. Treatments included fall strip tillage (ST), no-tillage (NT), fall chisel plow followed by spring field cultivation (CP), one-pass of a field cultivator in the spring (OP), ridge-tillage (RT), and an alternative chisel-plow treatment where approximately 25% more nitrogen was applied to validate University of Minnesota nitrogen recommendations (CPA).

Fertilizer was applied according to University of Minnesota recommendations and application methods appropriate for each tillage system. In both years and in both crops, NT resulted in the highest amount of residue after planting.

No statistical difference was detected in yield among tillage systems for either crop. No statistical difference was detected in gross revenue or net revenue for either crop.

(continued)


Posters

Conservation Tillage Demonstration Project - Heron Lake, MN

A field day was held at the site the fall of 2006. A survey taken that day indicated 72% of the participants believed conservation tillage was important for improved water quality and erosion control. Participants were concerned about yield effects (42%), the cost of switching equipment (35%), and the compatibility of the tillage system with their soil type(s).

Work has commenced on the second year of the project and continuation funds will be sought. Project partners look forward to providing pertinent information to local landowners and producers through additional field days and workshops. More research and demonstration is needed for farmers to implement this practice.


Quote: "This project is providing us with an awesome opportunity to give landowners first-hand information about conservation tillage on our soil types."



UNIVERSITY OF MINNESOTA
EXTENSION

CONSERVATION TILLAGE DEMONSTRATION PROJECT

L. Stahl and D. Bau - University of Minnesota and M. Luinburg and J. Voit - Heron Lake Watershed District



INTRODUCTION

Soil erosion from eroded agricultural land continues to be a major source of sediment in surface waters and also results in air emissions from soil particles. Soil erosion prevention has been made in reducing soil detachment and transport from eroded fields where till is subjected to direct rainfall impact. Soil attachment and transport can be effectively reduced in row crops by maintaining 30% residue from the previous crop until the time of tillage (Stall).

Strip tillage is a promising and relatively new conservation tillage system that reduces residue on the soil in only a 6 to 10 ft wide strip where the crop will be planted in the spring. Residue between the row is shredded. More nitrogen and potassium is retained with the tillage system for farmers to implement this practice.

This project was implemented to demonstrate and evaluate the viability of various conservation tillage systems, including strip-tillage, through an on-farm research plot in western Minnesota with subsequent field days and workshops.


METHODS

Tillage systems were established the fall of 2005. Using farm-type equipment, tillage treatments were replicated and replicated three times on both corn and soybean. Pre-tillage strip was custom 200 ft wide for corn in 2005 equivalent to a continuous stubble. A continuous stubble fall was followed after.

Treatments included fall strip tillage (ST), no-tillage (NT), fall strip plus followed by spring strip tillage (CPT), strip plus at a field sublayer in the spring (SP), no-tillage (NT), and an alternative strip-tillage treatment where approximately 25% more nitrogen was applied to reduce leachages of nitrate nitrogen recommendations (CPTN). In ST, nitrogen was established in 2005 by subsoiler. Prior to this, NT was treated similarly to CPT.

Fertilizer was applied to the corn plot according to University of Minnesota recommendations and application methods appropriate for each tillage system. Dry fertilizer was broadcast the fall of 2005 for all treatments except ST where fertilizer was banded with the ST equipment. Method soil moisture was applied to all treatments at the same rate except for the CPTN treatment where approximately 25% more nitrogen was applied. Starter fertilizer (10-34-0 at 1 gpa) was applied at planting in all treatments.

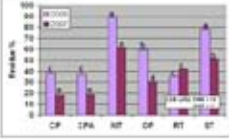
A field day was held at the site the fall of 2006.



Strip areas from eroded agricultural land continue to be a major source of sediment in surface waters and also results in air emissions from soil particles. Soil erosion prevention has been made in reducing soil detachment and transport from eroded fields where till is subjected to direct rainfall impact. Soil attachment and transport can be effectively reduced in row crops by maintaining 30% residue from the previous crop until the time of tillage (Stall).

RESULTS AND DISCUSSION: CORN

Fig. 1: Residue % After Planting in Corn as Affected By Tillage System, 2006-2007



Residue Cover:
To quantify all conservation tillage, a minimum of 20% residue cover must be on the soil surface after planting. All tillage systems evaluated met this requirement in 2006 when corn was planted. In 2007, the CPT and CPTN treatments did not meet this requirement when corn followed outside of 2005. The CP system did not meet this requirement in 2007 with an average residue cover of 20%.

Yield and Grain Moisture:
Yield and grain moisture were calculated using a random-located strip (three-row yield monitor in 2006). No statistical differences were detected among tillage systems in yield or grain moisture in 2006 (Fig. 2).

Yield averaged 161 (17) to 163 bushels for ST and CPT, respectively. Reported moisture ranged from 17.5 to 17.8% for CPT and ST, respectively.

ST was striped from analysis since significant stand loss was experienced in the plot due to late subsoiling.

Economics:
Using actual costs incurred per acre and estimates based on University of Minnesota publications and research, gross revenues were calculated for each tillage treatment. Gross revenue was calculated using a price of \$2.50/bushel. Net revenue was determined by subtracting gross expenses from gross revenue.

No statistical differences were detected among tillage treatments, with net revenue ranging from \$21.61 to \$28.84/acre for CPT, CPTN, and ST, respectively (Table 1).

No statistical differences were detected among tillage treatments, with net revenue ranging from \$21.61 to \$28.84/acre for CPT, CPTN, and ST, respectively (Table 1).

*CP and CPT are considered strip-tillage treatments based on having 20% or more residue cover on the soil surface. **P-values are based on a one-way ANOVA. Gross Revenue estimates based on actual costs. Farm Machinery Expenses Used Estimate for Late 2005. Custom and Other, Fuel, and Oil Costs, etc. are personal communication.

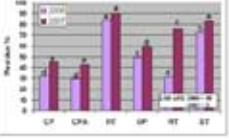
Table 1: Estimated Gross Revenue, Gross Expense, and Net Revenue per Acre as Affected by Tillage System in Corn, 2006.

Tillage	Gross Revenue*	Gross Expense*	Net Revenue
CP*	470.09	379.34	82.15
CPT*	460.33	389.26	76.07
NT	428.31	394.34	63.79
SP	429.17	398.34	60.63
ST	440.94	365.09	81.25
LSD (MS)	NS	NS	NS

*CP and CPT are considered strip-tillage treatments based on having 20% or more residue cover on the soil surface. **P-values are based on a one-way ANOVA. Gross Revenue estimates based on actual costs. Farm Machinery Expenses Used Estimate for Late 2005. Custom and Other, Fuel, and Oil Costs, etc. are personal communication.

RESULTS AND DISCUSSION: SOYBEAN

Fig. 3: Residue % After Planting in Soybean as Affected By Tillage System, 2006-2007



Residue Cover:
All tillage systems resulted in at least 20% residue cover after planting both years (Fig. 3), with NT resulting in the highest amount of residue after planting both years. In 2006, ST resulted in 18.0% less residue than NT, but did not differ from NT in 2007.

NT had the lowest residue on amount of residue between years. This is likely in part due to 2006 being the establishment year of the tillage system. Values in 2007 would likely be more representative of the tillage system over time.

Yield:
Yield was calculated using a continuous-located strip (three-row yield monitor in 2006).

No significant differences were detected in yield among tillage systems (Fig. 4), with average grain yields from 47 to 53 bushels for CPT and ST, respectively.

Economics:
Using actual costs incurred per acre and estimates based on University of Minnesota publications and research, gross revenues were calculated for each tillage treatment. Gross revenue was calculated using a price of \$6.00/bushel. Net revenue was determined by subtracting gross expenses from gross revenue.

No statistical differences were detected among tillage treatments, with net revenue ranging from \$21.61 to \$28.84/acre for CPT and ST, respectively (Table 2).

Fig. 4: Soybean Yield as Affected by Tillage System, 2006.

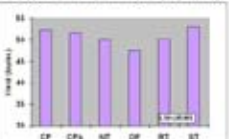


Table 2: Estimated Gross Revenue, Gross Expense, and Net Revenue per Acre as Affected by Tillage System in Soybean, 2006.

Tillage	Gross Revenue*	Gross Expense*	Net Revenue
CP	313.98	264.41	48.57
CPT	310.02	264.41	45.61
NT	300.00	250.41	48.59
SP	280.02	254.41	31.61
ST	301.98	264.41	33.67
ST	318.03	261.41	56.58
LSD (MS)	NS	NS	NS


*Gross Revenue based on a higher price of \$6.00/bushel. Gross Expense estimates based on actual costs. Farm Machinery Expenses Used Estimate for Late 2005. Custom and Other, Fuel, and Oil Costs, etc. are personal communication.

RESULTS AND DISCUSSION: FIELD DAYS

A field day was held at the site in the fall of 2006. There were 100 participants from 11 counties in Minnesota and South Dakota.

Results from a survey distributed to attendees at the field day indicated 72% said a conservation tillage system would save them time and money, 20% said a conservation tillage system would save them time and money, 20% said a conservation tillage system would save them time and money, 20% said a conservation tillage system would save them time and money.

At the 2006 field day, Extension District staff demonstrated increased tillage activity on the soil through the plot.



FUTURE PLANS

Research continues at the site and it is hoped the plot will remain for at least a year to see the long-term effects of these tillage systems on the soil.


Another field day is planned for the fall of 2007 with additional workshops planned for the winter of 2008.

We plan to expand our research at the site to include a continuous conservation tillage plot, due to the increasing amount of research on this high-traffic system in the area.


RELATED REFERENCES

Dusting, H., and Voth, J. 2007. Conservation Tillage Systems for Corn Production. Minnesota Extension Publication. <http://www.extension.umn.edu/extension/publications/CP3403.html>


OTHER PARTNERS




North Heron Lake Game Producers Association



Fairland Management



Pitz Farms



Alfa Grain, Inc.

The project was funded by Minnesota's Strategic Conservation Initiative (SCI) and the Minnesota Department of Agriculture (MDA).

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CIG Poster presented July 2007

Market-Based Incentives for Conservation

Grant Year: 2006

Location: Oklahoma

Resource Issues: Market-based conservation

Partners: Great Plains Resource Conservation & Development Association

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Background and Project Premise:

Market-based environmental stewardship is a new tool to achieve environmental goals. Such an approach can lead to the implementation of more conservation practices and systems by providing added financial incentives. This project will develop the market-based incentives to encourage and promote the adoption of no-till conservation cropping systems which will improve soil resource performance.

The objectives of the Southern Plains Agricultural Resources Coalition include the adaptation of no-till conservation cropping systems to improve soil resource performance and to encourage adoption of the practice through demonstrations, evaluations, showing the utility, affordability, and usability in the field. Our innovative approach will be to develop a market-based system to create incentives for qualified producers.

Project and Expected Benefit:

Changes in management practices made by growers result in measurable environmental benefits including improvements to wildlife habitat, reduced erosion, improved soil quality, improved water quality, increased efficiency in the use of water, decreased toxicity with the reduction of pesticides, reductions in greenhouse gas emissions, and increased carbon sequestration in soils.

Certification and labeling are tied directly to conservation systems applied on the land. Agricultural producers seek Food Alliance certification as a tool for product differentiation and brand enhancement to support transitions from commodity markets in which producers compete primarily on price, to niche markets which are more influenced by product qualities. Market benefits from certification encourage producers to adopt conservation measures while maintaining or enhancing farm income.

(continued)

Market-Based Incentives for Conservation

As a result of large increases in fuel prices and the information provided by our workshops, many producers were able to make well-informed decisions to change their cropping systems to no-till and benefit from the fuel savings. In addition, early soil samplings are showing marked increases in quality and reduction of the plow pan compaction layer.

Ultimately, the quality of the flour produced from wheat grown in no-till conservation cropping systems has been highly praised by many nutritionists, bakers, and taste testers. We discovered that we had to build our own mill to supply the product.

Quote: “The market-based incentive does exist in the power of the purchase by the consumer whereas it is lost in the system by the choice of the taxpayer.”

SPARC Creates Market Based Incentives For Conservation

 <p>History: In 2004 several Oklahoma producers and representatives from supporting organizations met to discuss the improved health of soils on a local, state, and eventually multi-state level. Discussions centered on certification by the Food Alliance Program to provide a market incentive to producers who apply sustainable production practices. As a result of this meeting, the Southern Plains Agricultural Resources Coalition (SPARC) was formed.</p> <p>Mission: The Southern Plains Agricultural Resources Coalition will spark rural sustainability and profitability through greater use of no-till practices and conservation systems for producers, consumer, and communities by promotion of market based incentive, education, demonstration, participation, and research.</p> <p>Conservation Innovation Grant: In 2006, a Conservation Innovation grant was awarded to SPARC to advance their mission, and it broaden their outreach to neighboring states.</p>	<p>No-till farmer delivers whole-wheat flour to Stillwater (OK) School District nutritionist</p>  <p>Primary Concerns:</p> <ul style="list-style-type: none"> •Soil Quality •Rural Economies •Water Resources <p>Strategy:</p> <ul style="list-style-type: none"> •Certify production practices •Foster food businesses •Market certified food products 	<p>Progress:</p> <p>No-till promotion</p> <ul style="list-style-type: none"> •6 workshops with over 1000 participants •SPARC brochures developed and distributed to farmers and conservation districts (8500 copies) <p>Farm to school pilot project: Whole wheat pizza crusts</p> <ul style="list-style-type: none"> •Upper Red Fork Farms milled no-till wheat into whole wheat flour for the test projects with Stillwater Public Schools •Whole wheat flour had excellent baking quality and >18% protein •Brochure distributed to parents in the school district •Flour and pizza received favorable rating by students, cooks, and nutritionists <p>Other outreach</p> <ul style="list-style-type: none"> •SPARC article in <i>Closer to Home: Healthier Food, Farms, and Families in Oklahoma, A Centennial Report</i>, by Kerr Center for Sustainable Agriculture •SPARC presentation at 2007 No-Till on the Plains Conference, Salina, KS 	 <p>Next Steps:</p> <ul style="list-style-type: none"> •Test no-till wheat for quality and nutrition •Monitor soil quality in no-till fields •Promote Food Alliance certification for no-till farmers •Increase milling capacity for SPARC no-till wheat •Identify potential value-added markets for SPARC wheat <p>To Find Out More:</p> <ul style="list-style-type: none"> •Contact Great Plains RC&D, Cordell, OK •www.greatplainsrcd.org •580-832-3661
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*Energy*A*Syst, a Comprehensive Farmstead Energy Self Assessment Tool Kit*

Grant Year: 2006

Location: Illinois, Iowa, Michigan, Minnesota, South Dakota, and Wisconsin

Resource Issues: Energy Conservation

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Portland, OR 97232

Background and Project Premise:

Develop an on-line self energy assessment tool for agricultural producers. The on-line tool will guide producers to take energy efficient measures for their farm operation.

As energy prices continue to rise, agriculture producers seek ways to become more efficient. In addition to individual concerns over energy use, the USDA's EQIP and CSP programs call for producers to analyze and enact energy efficiency planning. Resources for producers have been limited even with great interest in the issue. This poster will present a Conservation Innovation Grant (CIG) project intended to provide agricultural producers with a simple way to assess farm energy use and provide suggestions of appropriate energy conservation measures and potential renewable energy applications. The project involves the development of a web tool, Energy*A*Syst, designed for agricultural producers to conduct self-energy analysis. The CIG project will provide farmers a means for self auditing various and specific uses of energy and resources to determine if they are candidates for specific energy efficient or renewable energy generation technologies. The project will provided direction to farms considering energy saving and renewable energy opportunities on the basis of energy conservation, production, cost savings, and feasibility.

Progress and Expected Benefit:

USDA and NRCS programs with goals of reducing on-farm energy use will benefit from this site as it provides users with an analysis of their energy consumption, and specific steps that can be taken to save energy. Although completing the on-line energy assessment will not function as a complete site energy assessment or audit, it will give a producer a detailed look at several aspects of their agricultural facility.

Quote: *“Energy savings are becoming more and more popular, and this grant allows farm enterprises to access information that will directly guide them in taking energy efficient measures for their farm.”*

Acknowledgement:

As the lead agency with a legislated directive to improve and protect the natural resources on private lands, the USDA Natural Resources Conservation Service is pleased to be able to partner with and support the efforts of other entities involved in those efforts. The CIG Program is certainly a method to sustain continued efforts in this direction while reinforcing the work of America's farmers and ranchers. This publication is a meant to share the new technology currently under development. We gratefully thank the people and organizations who are making these efforts.

Special thanks to: Gus Jordan, Conservation Improvement Programs Branch Chief
Tessa Chadwick, Conservation Innovation Grants Program Manager
Lillian Woods, National Technology Coordinator

National Technology Specialists:

- Cheryl Simmons
- John Copeland
- Kathleen Doebler
- Anthony Burns
- Elvis Graves

National Technology Communication Specialists:

- Stacy Mitchell
- Dorlene Butler



*Moderators, Lillian Woods, Cheryl Simmons, and
timekeeper, Melvin Womack (l to r)*

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