Environment and Natural Resources Trust Fund

2026 Request for Proposal

General Information

Proposal ID: 2026-294

Proposal Title: Regenerative Agriculture: Sustaining Rural Livelihoods and Protecting Water

Project Manager Information

Name: Samantha Wells

Organization: U of MN - College of Food, Agricultural and Natural Resource Sciences

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Project Basic Information

Project Summary: This project advances Regenerative Agriculture by integrating wide-row corn with forage crops to improve farm profitability and water quality, reducing nitrate leaching while supporting rural economies through sustainable livestock grazing.

ENRTF Funds Requested: $300,000

Proposed Project Completion: July 31, 2029

LCCMR Funding Category: Small Projects (G)
Secondary Category: Water (B)

Project Location

What is the best scale for describing where your work will take place?
Statewide

What is the best scale to describe the area impacted by your work?
Statewide

When will the work impact occur?
During the Project

Narrative

Describe the opportunity or problem your proposal seeks to address. Include any relevant background information.

Minnesota's agriculture supports rural livelihoods but contributes to groundwater and surface water nitrate contamination. Excess nitrogen from fertilizers degrades the environment, increases farm costs, and threatens public health. In southeastern Minnesota, over 500,000 residents face nitrate-contaminated drinking water, exceeding safe limits. This issue impacts rural farm communities and urban water supplies, requiring innovative, research-based, balanced solutions.

Traditional best management practices (BMPs) focus on fertility timing, placement, and quantity, but these strategies can increase financial burdens on rural farming families. More intensive solutions often require costly infrastructure, specialized supply-chains, and established markets, limiting farmer participation. Solar Corridor Cropping Systems (SCCS) provide an alternative, integrating wide-row corn with forages to reduce nitrogen runoff, strengthening the economic resilience of family-owned beef and dairy operations. By producing high-quality forage alongside corn, SCCS allows farmers to offset potential yield reductions, lower input costs, and create additional revenue streams, making their operations more sustainable and financially viable.

Despite its promise, limited research exists on SCCS's effectiveness in nitrogen mitigation, soil health, and economic feasibility. This project will quantify SCCS's impacts and provide research-based recommendations shared through UMN-Extension, policy briefings, and farmer outreach, ensuring broad adoption of SCCS to improve water quality and sustain rural livelihoods.

What is your proposed solution to the problem or opportunity discussed above? Introduce us to the work you are seeking funding to do. You will be asked to expand on this proposed solution in Activities & Milestones.

This project advances Regenerative Agriculture through Solar Corridor Cropping Systems (SCCS)—a wide-row corn system interseeded with high-quality forage crops—to optimize nitrogen use, reduce nitrate leaching, and improve farm profitability (Image 1, Appendix). With over 20,000 beef operations in Minnesota, SCCS can impact thousands of farmers by lowering input costs and enhancing economic resilience. By testing nitrogen placement (banded vs. broadcast) and timing (pre-plant vs. split application), we will evaluate SCCS's ability to sustain corn yields, support livestock grazing, and reduce water contamination risks.

Our approach includes:

- Field trials at Rosemount Research and Outreach Centers (RROC) to measure productivity, nitrate leaching, and soil health.
- Stratified deep soil sampling (0-90 cm) to assess nitrate retention and movement.
- Economic analysis of SCCS, quantifying targeted fertilizer placement, improved livestock gains, and lower forage storage costs.
- Evaluating SCCS's role in sustaining rural livelihoods by lowering feed costs and generating additional revenue.

Findings will be shared through on-farm demonstrations, UMN Extension workshops, and digital outreach, equipping farmers, conservation groups, and policymakers with scalable strategies. SCCS offers a pathway for young and beginning farmers, preserving family farm legacies and slowing rural depopulation, ensuring a sustainable future for Minnesota agriculture.

What are the specific project outcomes as they relate to the public purpose of protection, conservation, preservation, and enhancement of the state's natural resources?

This project will enhance water quality, protect soil resources, and sustain rural livelihoods through innovative nitrogen management strategies. By reducing nitrate leaching, SCCS helps safeguard rural and urban communities' groundwater and drinking water supplies. Soil health improvements through interseeded forage crops promote carbon sequestration and erosion control, reinforcing climate resilience. The project also supports Minnesota's farm economy by reducing input costs, diversifying farm income, and improving profitability for 20,000+ small beef operations. Findings will guide

evidence-based conservation policies, ensuring long-term protection of Minnesota's natural resources while fostering economic sustainability for future generations.

Activities and Milestones

Activity 1: Aim 1: Optimize Nitrogen Management in Wide-Row Corn Systems

Activity Budget: $210,000

Activity Description:
This objective evaluates how nitrogen placement (banded vs. broadcast) and timing (pre-plant vs. split application) influence corn grain yield, forage biomass, and nitrate leaching in Solar Corridor Cropping Systems (SCCS). By examining resource trade-offs between corn and forage crops, we aim to identify nitrogen strategies that balance productivity, water quality protection, and economic feasibility.

In Year 1, field preparation will occur at the RROC, with baseline soil sampling to assess initial nitrogen levels. Research site managment and data collection continue through Year 3. Nitrogen treatments will be applied, forages interseeded, and crop/forage growth will be monitored. Deep soil sampling (0-30 cm, 30-60 cm, 60-90 cm) will track nitrate movement and retention at key stages: pre-fertilization, post-harvest, during livestock grazing, and after spring thaw. In Year 3, a second year of data collection and analysis will ensure robust replication. Trials will conclude with final sampling, and results will be compiled into actionable nitrogen management recommendations for SCCS adoption. Analysis data and submit final report.

Expected Outcomes:
Best management practices (BMP) for agronomic management of wide-row corn with interseeded forage cropping systems
This work will provide farmers with practical, science-based strategies to enhance productivity and environmental sustainability.

Activity Milestones:

Description	Approximate Completion Date
Autumn field selection, baseline soil samples and preparation before freeze up.	September 30, 2026
First growing season complete: data collected, analyzed, and reported	June 30, 2028
Second growing season complete: data collected, analyzed, and reported	June 30, 2029

Activity 2: Aim 2: Assess the Agronomic and Economic Viability of SCCS

Activity Budget: $30,000

Activity Description:
This objective will determine the economic feasibility of SCCS, focusing on cost savings from reduced wide-row corn yield losses, improved forage digestibility and tonnage, increased livestock weight gains, and lower feed storage costs. The analysis will provide farmers with financial insights into adopting SCCS as an alternative to conventional corn production, helping them make informed decisions.

In Year 1, economic models will be developed using historical SCCS trial data to estimate potential cost-benefit scenarios. Baseline cost structures for SCCS implementation will be outlined, laying the groundwork for future analysis.

Year 2 will mark the first year of yield, forage quality, and input cost data collection from trials at the RROC. Livestock grazing impacts on feed costs and weight gains will be assessed, and economic modeling will incorporate real-world performance metrics to refine cost-benefit projections.

In Year 3, a second year of agronomic and financial data collection will ensure robust analysis. The final SCCS financial framework will be developed, detailing expected economic benefits, risk factors, and recommendations for widespread adoption.

Expected Outcomes:
A financial decision-making framework to help farmers evaluate SCCS adoption.
Data-driven insights into SCCS's role in reducing input costs and diversifying revenue streams.

Activity Milestones:

Description	Approximate Completion Date
Develop economic models using historical SCCS data; outline baseline cost structures.	August 31, 2027
Collect yield, forage, and input cost data; assess livestock grazing impacts.	August 31, 2028
Finalize SCCS financial framework with economic benefits and adoption recommendations.	June 30, 2029

Activity 3: Act 3: Expand Adoption through Outreach, Education, and Engagement

Activity Budget: $60,000

Activity Description:
This objective ensures that SCCS findings are translated into practical recommendations for farmers, conservation groups, and policymakers. Outreach efforts will demonstrate SCCS as a scalable, cost-effective strategy for improving farm profitability and water quality.

In Year 1, the outreach strategy will be developed, including identifying stakeholder groups, planning Extension bulletins and policy briefings, and preparing logistics for demonstration sites. This foundational work will ensure targeted and effective communication of SCCS benefits.

Year 2 will focus on initial on-farm demonstrations and field days at the RROC and the UMN Field School for Ag Professionals. Preliminary SCCS adoption guides, based on Year 2 trial data, will be published to provide early insights and encourage farmer engagement.

In Year 3, outreach efforts will expand with regional workshops, UMN Extension materials, and policy briefings to state agencies and conservation organizations. Final recommendations will be developed to integrate SCCS into conservation programs, ensuring long-term adoption and support.

Expected Outcomes:
Increased farmer adoption of SCCS through direct engagement and education.
Policy recommendations to support SCCS inclusion in conservation funding programs.

This work will bridge the gap between research and practice, empowering stakeholders to adopt SCCS for economic and environmental benefits.

Activity Milestones:

Description	Approximate Completion Date
Develop outreach strategy, identify stakeholders, and prepare demonstration site logistics.	January 31, 2027
Conduct on-farm station, field days, and publish preliminary SCCS adoption guides.	July 31, 2028
Expand outreach with workshops, Extension materials, and final policy recommendations.	June 30, 2029

Project Partners and Collaborators

Name	Organization	Role	Receiving Funds
Samantha Wells, Ph.D.	University of Minnesota, Department of Agronomy and Plant Genetics	Principle Investigator and Co-Program Director: Dr. Wells will oversee research design, execution, and Extension/Outreach education efforts, focusing on expanding project objectives, mentoring underserved undergraduate researchers in the Experiential Learning for Agricultural Innovation (ELAI) Lab, coordinating field operations, analyzing data, and preparing educational materials and submitting final reports.	Yes
Gregg Johnson, Ph.D.	University of Minnesota, Department of Agronomy and Plant Genetics - Southern Research and Outreach Center	Co-Program Director: Dr. Jonhnson will support the execution of project deliverables and Extension/Outreach education efforts. Dr. Johnson will support scholarship and reporting efforts and lead the agronomic and economic outputs.	No
Alex Hard, M.S.	University of Minnesota, Department of Agronomy and Plant Genetics	Technical Expert and Research Scientist: Mr. Hard will coordinate with the Agricultural Experiment Research and Outreach Center, ensuring the timely deployment and managment of all field-based objectives. Mr. Hard will lead the collection and processing of all samples and data and assist in developing quarterly and final progress reports.	Yes

Long-Term Implementation and Funding

Describe how the results will be implemented and how any ongoing effort will be funded. If not already addressed as part of the project, how will findings, results, and products developed be implemented after project completion? If additional work is needed, how will this work be funded?

This project advances Regenerative Agriculture through SCCS—a wide-row corn system interseeded with forage crops—to optimize nitrogen use, reduce nitrate leaching, and boost farm profitability. Field trials will measure productivity, soil health, and nitrate retention. Economic analysis will quantify savings from improved forage and livestock gains. Findings will inform UMN Extension and farmer education, supporting SCCS adoption through USDA-NRCS and MDA grants. Partnerships with SWCDs, producer groups, and state agencies will drive outreach. Future research will leverage federal funding (SARE, NRCS Conservation Innovation Grants) to expand SCCS, ensuring long-term benefits for water quality, soil health, and rural economies.

Project Manager and Organization Qualifications

Project Manager Name: Samantha Wells

Job Title: Associate Professor: Sustainable Cropping Systems Specialist

Provide description of the project manager's qualifications to manage the proposed project.

Dr. Samantha Wells, the Principal Investigator (PI) and Project Manager, is an Associate Professor of Sustainable Cropping Systems at the University of Minnesota with extensive expertise in applied agronomy, regenerative agriculture, and nitrogen management. With over 65 peer-reviewed publications, she has led multi-year, field-based research trials focused on optimizing cropping systems to improve soil health, nutrient efficiency, and farm profitability. Her background in statistical experimental design, data analysis, and stakeholder engagement makes her uniquely qualified to oversee this project's research and outreach components.

Dr. Wells has secured and managed over $14.8 million in competitive research funding, demonstrating her ability to design, execute, and deliver complex, multi-year agricultural research projects. She has successfully coordinated large-

scale field trials, integrating soil nutrient monitoring, crop productivity assessments, and economic feasibility studies. Her experience working with farmers, Extension professionals, and policymakers ensures that research findings are effectively translated into actionable recommendations for adoption.
As the director of the Experiential Learning for Agricultural Innovation (ELAI) Lab, Dr. Wells has mentored undergraduate and graduate students, research scientists, and technical staff, fostering hands-on training in field research, data collection, and agricultural technology. She has also led numerous Extension and outreach initiatives, hosting field days, workshops, and grower meetings to promote research-based conservation strategies.

Dr. Wells will coordinate field operations, oversee data collection and analysis, and manage stakeholder outreach in this project. She will ensure that the research aligns with scientific rigor and real-world application. Her leadership will ensure that Solar Corridor Cropping Systems (SCCS) are rigorously evaluated for nitrogen efficiency, forage production, and economic viability. This will help Minnesota farmers implement sustainable nitrogen management strategies that protect water resources while enhancing farm resilience.

Organization: U of MN - College of Food, Agricultural and Natural Resource Sciences

Organization Description:
The University of Minnesota College of Food, Agriculture, and Natural Resources (CFANS) is dedicated to a healthier Minnesota through innovative research and education that addresses challenges in food security, sustainable agriculture, and environmental stewardship. Our Mission is to inspire minds, nourish people, and enhance the natural environment. CFANS is positioned to advance Minnesota as a global leader in food, agriculture, and natural resources through extraordinary education, science-based solutions, and dynamic public engagement that nourishes people and enhances the environment in which we live.

Budget Summary

Category / Name	Subcategory or Type	Description	Purpose	Gen. Ineligible	% Benefits	# FTE	Classified Staff?	$ Amount
Personnel								
Faculty (Principal Investigator)		Dr. Wells will provide overall project leadership, overseeing research design, execution, and stakeholder engagement. She will coordinate field research at the Rosemount Research and Outreach Center (RROC), ensuring that experimental protocols are followed and that data collection aligns with project objectives. Additionally, she will synthesize research findings into Extension materials, policy briefings, and academic publications to ensure that results are accessible and actionable for farmers, conservation professionals, and policymakers			36.6%	24		$52,522
Research Scientist		Alex Hard will be responsible for the day-to-day management of field trials at RROC. His work includes establishing and maintaining research plots, coordinating soil and plant sampling, and ensuring data integrity. He will also supervise undergraduate researchers, manage lab processing of soil and plant samples, and contribute to data analysis. Additionally, Mr. Hard will assist in developing farmer-facing materials, ensuring that findings are translated into practical guidance.			32.3%	240		$197,258
Undergraduate Researcher		An undergraduate researcher will be hired each summer to assist with data collection, sample processing, and field site maintenance. This position provides a hands-on learning opportunity for students interested in regenerative agriculture, soil science, and sustainable cropping systems. The student will work under Mr. Hard's supervision to conduct soil sampling, biomass measurements, and data entry, gaining valuable research experience.			0%	75		$30,000
							Sub Total	**$279,780**
Contracts and Services								

							Sub Total	**-**
Equipment, Tools, and Supplies								
	Tools and Supplies	Laboratory and Medical Supplies ($1,200) To ensure accurate soil and forage sample preparation for third-party laboratory analysis, the project requires $400 per year for three years for nitrile gloves, disposable lab materials, sample drying trays, grinding tools for forage preparation, and containers for soil sample storage and shipment.	These supplies are critical for maintaining sample integrity and ensuring reliable laboratory analysis of nitrate retention, soil health, and forage quality.					$1,200
	Tools and Supplies	General Operational Supplies ($3,000) These supplies are essential for establishing and maintaining research plots, collecting soil and plant samples, and ensuring accurate data collection. The $1,000 per year for three years will cover sample bags, labeling materials, flags, stakes, measuring tapes, and small tools such as hand augers and soil probes for efficient field sampling and plot management.	General operational supplies are critical for establishing and maintaining experimental plots, enabling consistent data collection and reliable field assessments.					$3,000
	Tools and Supplies	Outreach and Extension Materials ($5,100) This funding supports educational outreach efforts at the Rosemount Research and Outreach Center (RROC) and the UMN Field School for Agricultural Professionals. The $1,700 per year for three years will provide materials for field days, hands-on demonstrations, and farmer training sessions, including printed handouts, outreach materials, demonstration plot signage, flags, and supplies for farmer-led discussions and Q&A sessions.	Outreach and extension materials facilitate farmer education and engagement, equipping producers with practical, research-based strategies for implementing Solar Corridor Cropping Systems (SCCS). Together, these resources enhance the project's impact by advancing both scientific discovery and real-world agricultural applications.					$5,100
							Sub Total	**$9,300**
Capital Expenditures								
							Sub Total	**-**
Acquisitions and Stewardship								
							Sub Total	**-**

Travel In Minnesota								
	Miles/ Meals/ Lodging	Travel to Research Site ($1,512) Description: 12 research trips per year to RROC for field monitoring and data collection. Sixty miles per round trip between the University of Minnesota's St. Paul campus and RROC. Mileage reimbursement at $0.70 per mile following GSA rates. Annual cost: $504 per year for three years = $1,512 total.	This funding supports travel for field research, sample collection, and project management at RROC. These trips ensure timely data collection, plot maintenance, and research oversight throughout the project. They are critical for ensuring experimental integrity, monitoring crop and forage growth, and managing nitrogen application treatments.					$1,512
	Miles/ Meals/ Lodging	Travel for Field Days and Grower Meetings (total: $888) Description: 4 field day trips per year to RROC (60 miles per round trip) at 240 miles annually field day x $0.70 per mile ($168). The remaining funds ($128 for approximately 182 miles per year) are used for travel to grower meetings and Extension outreach. Annual cost: $296 per year for three years = $888 total.	This funding supports stakeholder engagement, research dissemination, and farmer education. The project will host four annual field days at RROC to showcase SCCS nitrogen management strategies. Additionally, funds support travel to grower meetings and Extension events, ensuring that research findings reach a broad agricultural audience, facilitating the adoption of sustainable cropping practices.					$888
							Sub Total	**$2,400**
Travel Outside Minnesota								
							Sub Total	**-**
Printing and Publication								
							Sub Total	**-**
Other Expenses								
		Field Operations, Site Rental, Field Preparation, and Harvesting ($2,400) Description: Annual site rental and field operations costs at RROC. Field preparation services, including seedbed preparation, fertilizer application, and initial treatments. Harvesting operations for corn grain	These funds ensure that field trials are properly established, maintained, and harvested, supporting the collection of yield, soil, and forage data. Site rental covers access to research facilities, irrigation, and basic maintenance at					$2,400

		and forage biomass collection. Annual cost: $800 per year for three years = $2,400 total.	RROC, while field preparation and harvesting services provide essential agronomic support to ensure standardized research conditions and data reliability. This funding is critical for executing large-scale, replicated SCCS trials, ensuring accurate assessments of nitrogen management strategies, crop yield, and forage productivity					
		Soil nitrogen testing to assess nitrate leaching, nutrient availability, and efficiency of nitrogen placement strategies. Corn nitrate and forage quality analysis to evaluate yield impacts under SCCS nitrogen management treatments. Forage quality testing to measure crude protein, fiber content, and digestibility for assessing livestock feed value. Annual cost: $2,040 per year for three years = $6,120 total.	These funds for analysis of soil, crop, and forage samples, providing key data for assessing the effectiveness of banded vs. broadcast nitrogen placement and pre-plant vs. split nitrogen applications. Soil testing will quantify nitrate retention and environmental impact, while crop and forage analysis will determine SCCS's ability to sustain corn yields and improve livestock nutrition. Reliable third-party lab results will allow scientific validation of findings, strengthening research recommendations and farmer adoption strategies.					$6,120
							Sub Total	**$8,520**
							Grand Total	**$300,000**

Classified Staff or Generally Ineligible Expenses

Category/Name	Subcategory or Type	Description	Justification Ineligible Expense or Classified Staff Request

Non ENRTF Funds

Category	Specific Source	Use	Status	Amount
State				
			State Sub Total	**-**
Non-State				
			Non State Sub Total	**-**
			Funds Total	**-**

Total Project Cost: $300,000

This amount accurately reflects total project cost?

Yes

Attachments

Required Attachments

Visual Component

File: c0977419-db2.pdf

Alternate Text for Visual Component

Image 1. This photo depicts a cornfield planted in wide, 60-inch rows near Northfield, Minnesota. The corn plants stand fairly tall and are spaced, so a lush, green forage crop can grow between each row. The corn is mature, with some leaves beginning to dry and turn brownish-gold, while...

Supplemental Attachments

Capital Project Questionnaire, Budget Supplements, Support Letter, Photos, Media, Other

Title	File
RROC Location (map)	54551445-093.png
UMN SPA Letter: Board of Regents of the University of Minnesota	685b6094-9f9.pdf
Letters of Support	8fccc466-01e.pdf

Administrative Use

Does your project include restoration or acquisition of land rights?

No

Do you understand that travel expenses are only approved if they follow the "Commissioner's Plan" promulgated by the Commissioner of Management of Budget or, for University of Minnesota projects, the University of Minnesota plan?

Yes, I understand the UMN Policy on travel applies.

Does your project have potential for royalties, copyrights, patents, sale of products and assets, or revenue generation?

No

Do you understand and acknowledge IP and revenue-return and sharing requirements in 116P.10?

N/A

Do you wish to request reinvestment of any revenues into your project instead of returning revenue to the ENRTF?

N/A

Does your project include original, hypothesis-driven research?

Yes

Does the organization have a fiscal agent for this project?

Yes, Sponsored Projects Administration

Does your project include the pre-design, design, construction, or renovation of a building, trail, campground, or other fixed capital asset costing $10,000 or more or large-scale stream or wetland restoration?

No

Do you propose using an appropriation from the Environment and Natural Resources Trust Fund to conduct a project that provides children's services (as defined in Minnesota Statutes section 299C.61 Subd.7 as "the provision of care, treatment, education, training, instruction, or recreation to children")?

No

Provide the name(s) and organization(s) of additional individuals assisting in the completion of this proposal:

Kelsey Grachek
Senior Grants and Contracts Officer
Sponsored Projects Administration
Authorized Organizational Representative

Do you understand that a named service contract does not constitute a funder-designated subrecipient or approval of a sole-source contract? In other words, a service contract entity is only approved if it has been selected according to the contracting rules identified in state law and policy for organizations that receive ENRTF funds through direct appropriations, or in the DNR's reimbursement manual for non-state organizations. These rules may include competitive bidding and prevailing wage requirements

N/A