Final Abstract

Final Report Approved on October 12, 2024

M.L. 2021 Project Abstract

For the Period Ending June 30, 2024

Project Title: Reducing Plastic Pollution with Biodegradable Erosion Control Products

Project Manager: Matthew Leiphon

Affiliation: Agricultural Utilization Research Institute

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Funding Source:

Fiscal Year:

Legal Citation: M.L. 2021, First Special Session, Chp. 6, Art. 6, Sec. 2, Subd. 08i

Appropriation Amount: $200,000

Amount Spent: $163,437

Amount Remaining: $36,563

Sound bite of Project Outcomes and Results

Erosion control products are important in protecting Minnesota's soil and water during construction, but they often contain plastic that can pollute the environment. Hemp fiber offers a locally grown, renewable, biodegradable alternative. Effective hemp-based prototypes successfully developed and tested in Minnesota offer a path toward more sustainable erosion control options.

Overall Project Outcome and Results

Erosion and sediment control products play an important role in protecting Minnesota's waters from pollution during construction projects. While an incredibly useful tool, these products are often made from plastic. As part of its sustainability goals, MnDOT is focused on developing and adopting biodegradable alternatives, reducing the amount of plastic that ends up in Minnesota's soil and water.

Hemp is a locally grown, sustainable, biodegradable fiber crop with the potential to replace plastic in these products, creating new economic opportunities for Minnesota's farmers and manufacturers.

Seeking to identify solutions to this challenge, the Agricultural Utilization Research Institute (AURI) collaborated with MnDOT, the Minnesota Department of Agriculture (MDA), and private sector partners to produce hemp-based erosion

control products for lab and field testing.
AURI's Bioindustrial Innovation Center in Waseca, Minn., produced hemp fibers for testing in erosion control blankets, hydraulic mulch, sediment control logs, and silt fences. Hemp fibers were also spun into yarn to assess potential use as netting material in erosion control products.
Guided by findings from initial tests and trials, AURI connected with private industry partners to develop and refine erosion control prototypes. Some prototypes included blends of other biodegradable materials with hemp fibers. MnDOT provided guidance on key performance specifications and managed field trials of the most promising prototypes.
The results of these tests and trials were promising, providing proof of concept for the use of hemp in multiple classes of erosion control products. The partnerships developed during this project also created a strong foundation for future research and innovation. The findings of the project were compiled into a report, and will be shared with project partners, industry stakeholders, and other interested parties to build awareness of hemp's potential and support the development of new products to protect Minnesota's resources.

Project Results Use and Dissemination

The highlight of the project's dissemination activities was an AURI-MnDOT hosted field day at the MnROAD research facility, with research presentations and tours of the prototype test sites. The event was attended by industry stakeholders from Minnesota and several other states.
In addition to presenting at the field day, project team members presented at multiple events around the state, on podcasts, and at erosion control industry conferences.
AURI also highlighted the project via its media channels, publishing a feature article in its newspaper, producing a podcast, developing informational materials, and preparing a full report on the project's findings.

Environment and Natural Resources Trust Fund

M.L. 2021 Approved Final Report

General Information

Date: November 27, 2024

ID Number: 2021-212

Staff Lead: Noah Fribley

Project Title: Reducing Plastic Pollution with Biodegradable Erosion Control Products

Project Budget: $200,000

Project Manager Information

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Project Reporting

Final Report Approved: October 12, 2024

Reporting Status: Project Completed

Date of Last Action: October 12, 2024

Project Completion: June 30, 2024

Legal Information

Legal Citation: M.L. 2021, First Special Session, Chp. 6, Art. 6, Sec. 2, Subd. 08i

Appropriation Language: $200,000 the first year is from the trust fund to the Agricultural Utilization Research Institute in partnership with the Departments of Transportation, Agriculture, and Natural Resources to demonstrate use of regionally grown industrial hemp to create biodegradable alternatives to plastic-based erosion and sediment control products used in transportation construction projects.

Appropriation End Date: June 30, 2024

Narrative

Project Summary: Utilization of Industrial Hemp to create biodegradable alternatives to plastic-based erosion and sediment control products.

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

Erosion and sediment control are required on construction projects to protect surface waters from pollution and resulting eutrophication. The Minnesota Department of Transportation (MnDOT) installs enough erosion and sediment control products to protect 1,100 acres from erosion and prevent 125,000 tons of sediment from entering surface waters each year. These significant water quality benefits are tainted by the fact that many of these products are made of plastic, a pollutant of emerging concern. Since these products are intended for temporary use, MnDOT construction projects cause over 30 tons of plastic to be landfilled or remain on the landscape, inevitably degrading into micro-plastics. One of MnDOT's sustainability goals is to reduce the use of plastic by requiring biodegradable erosion and sediment controls. However, the state cannot specify products that do not exist and manufacturers cannot be expected to develop products that are not specified. Seed money is needed to demonstrate that biodegradable alternatives can be produced so that the state can start specifying them and manufacturers can start producing them. This project looks to provide a clear path to long-term public-private industry partnerships to ensure without additional grant dollars there are ongoing environmental benefits for decades to come.

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 proposal will establish a unique public-public-private partnership between AURI, MnDOT and regional private industry to develop methods to produce biodegradable erosion control products made from regionally grown feedstocks such as hemp. The project will receive technical support from the Minnesota Department of Agriculture and Minnesota Department of Natural Resources. Project partners will seek input from regional biomass growers (including tribal hemp producers), manufacturers, and installation contractors to guide the effort. The team will then develop methods of processing hemp fibers into biodegradable prototypes of erosion control blankets, hydraulic mulch, sediment control logs, and silt fence. These prototypes will be evaluated through laboratory and field testing. After demonstrating that biodegradable erosion control products are possible, MnDOT can phase in specifications to allow their use. The environmental benefits will be amplified in several ways. The use of these products will extend far beyond state construction projects because MnDOT specifications are also used by local government and private construction projects. Such widespread use will expand opportunities for local hemp production, which is more sustainable than other row crop production. Strong interest by other state DOT's, who face similar obstacles, indicates that what is developed in Minnesota will eventually become adopted nationwide.

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?

- Eliminating a significant source of microplastics in soil and water by replacing single use plastic materials with locally grown biodegradable products
- Proof of concept that biodegradable alternatives to plastic erosion and sediment control products can meet or exceed current specifications
- Development and sharing of methods for processing industrial hemp into functional erosion and sediment control products
- Expanded opportunities for hemp production, which offers significantly greater water quality, soil erosion and C02 sequestration benefits than other crops
- Facilitation of partnerships with growers and manufacturers to encourage ongoing product development and further innovation which will support both the environment and economy

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 and In the Future

Activities and Milestones

Activity 1: Develop Methods of Processing Hemp Stalks into Prototype Erosion and Sediment control products

Activity Budget: $101,959

Activity Description:
AURI will collaborate with manufacturers of erosion control blankets, hydraulic mulch (hydroseeding), sediment control logs and silt fence in order to identify the technical specifications of fibers and yarns necessary to meet state and manufacturer specifications. AURI will then network with textile/fabric experts and manufacturers in order to understand the steps and specifications necessary to achieve a hemp yarn that can be spun or woven into a prototype product. With key variables identified, AURI will source hemp stalks from Minnesota growers and/or tribes and conduct separation work at the Waseca lab and selected private partner sites. Stalks will be processed using AURI's new decorticator and the resulting fiber and hurd will be analyzed for cleanliness and quality. The research and purchase of a fiber cleaning device under this activity will be used to achieve fiber quality necessary for yarn spinning. AURI will then work with selected manufacturer partners in order to transform decorticated and cleaned hemp fibers and hurds into end-product prototypes. Product blends with other agricultural fibers will be explored throughout.

Activity Milestones:

Description	Approximate Completion Date
Identify Process for decorticating hemp fiber of necessary quality for use in Erosion Control Products	March 31, 2022
Identify process for twisting yarns of sufficient quantity and quality to create woven materials	June 30, 2022
Prototypes of Hydraulic Erosion Spray and Erosion Control Blanket	December 31, 2022
Sediment Control Log and Silt Fence Prototypes	June 30, 2023
Estimation of Material and Processing Costs to Understand Economic Feasibility	June 30, 2023

Activity 2: Testing yarns, fabrics, and fill materials (loose and blanket materials) in laboratory and field demonstrations to evaluate against performance standards

Activity Budget: $66,958

Activity Description:
MnDOT will coordinate testing of the prototype fabrics, erosion control and sediment control products which are produced through AURI's decortication and identified manufacturer partners. The products will be tested using standardized ASTM testing methods. MnDOT will coordinate and manage the field demonstrations of the prototypes compared to the current standard product, in a standardized setting.

Activity Milestones:

Description	Approximate Completion Date
ASTM standards lab testing of yarns, fabrics and fill materials to evaluate performance	December 31, 2023
Field demonstrations of prototype products to evaluate installation, performance, and estimation of service life/biodegradation	March 31, 2024
Report of lab and field-testing results	June 30, 2024

Activity 3: Collaboration with growers, manufacturers, and contractors to inform product and business development and disseminate findings to the public

Activity Budget: $31,083

Activity Description:

AURI and MnDOT will work with product manufacturers, hemp growers and applicators to support the development and commercialization of these bio-based products. Through AURI and MnDOT driven networking and events, the findings will be shared and disseminated with various industry groups. Another dissemination effort will include the development of a one-page fact sheet which highlights the project and product specs developed. MDA will support the efforts of MnDOT and AURI to promote the use of hemp as an alternative to plastic materials in roadside restoration materials. MDA will also provide regular updates on project development and results to hemp licensees, hemp organizations, and agricultural commodity groups throughout Minnesota.

Activity Milestones:

Description	Approximate Completion Date
Field Day to promote project findings to public audience	June 30, 2024
Development of 1-page fact sheet summarizing various product specifications, manufacturing process and key benefits	June 30, 2024
Presentation of project findings at specific team selected events	June 30, 2024
Ongoing manufacturer and grower collaboration and networking to inform product and business development	June 30, 2024

Project Partners and Collaborators

Name	Organization	Role	Receiving Funds
Ken Graeve	Minnesota Department of Transportation	Ken will oversee all of MnDOT's activities on this project. Ken will plan and coordinate all lab and field testing of the prototype products, and also guide the development of products, to ensure that MnDOT's standards are being considered throughout. MnDOT is providing In-Kind support to project for Kens time.	No
Anthony Cortilet	Minnesota Department of Agriculture	Anthony will be the primary contact at the MDA providing industry and grower connections, as well as overall advocacy of the project. Having a primary involvement in the industrial hemp program at the MDA, Tony will provide a valuable resource to this projects third activity, surrounding dissemination and state collaborations	No
Peter Leete	Department of Natural Resources (MnDOT Liason)	Peter is a Transportation Hydrologist for the DNR. Peter will provide any technical support needed along the way from the DNR. He will be the contact for the DNR providing industry connections and overall advocacy for the project.	No
Erik Evans	AURI	Erik is AURI's communications director. Erik will serve the project by aiding in the development of one page fact sheets and presentation materials. Erik will also be the primary editer and packager of any final reporting documents back to the LCCMR.	Yes
Matthew Leiphon	AURI	Matthew will be the lead project manager. He will ensure all project tasks and deliverables are completed in a timely manner, and on budget. He will coordinate team meetings periodically throughout the project in order to maintain oversight and keep everyone connected and focused on the milestones.	Yes
Abel Tekeste	AURI	Abel is a laboratory technician at the Coproducts lab in Waseca. Abel will provide laboratory assistance in producing the decorticated, cleaned and carded hemp fiber. The decortication equipment requires several people to operate at any given time and Abel's role in operation of this equipment will be critical	Yes
Alan Doering	AURI	Alan is AURI senior Coproduct scientist, and operates the lab in Waseca where the fiber decortication equipment is housed. Alan will be a primary operator of the equipment and will be supporting the project by producing decorticated, cleaned and carded hemp fibers.	Yes
Harold Stanislawski	AURI	Harold will be the co-lead on the project for AURI. Harold is a project development director at AURI and has significant connections in the hemp industry. Harold will serve as the lead on the business development and networking components of the project.	Yes
Riley Gordon	AURI	Riley will serve as the lead Principal Investigator. He will be the primary contact for the project. Riley will oversee all technical project tasks including decortication of fiber to meet specs, prototype development, lab and field testing as well as the presentation and dissemination of results through multiple channels.	Yes

Dissemination

Describe your plans for dissemination, presentation, documentation, or sharing of data, results, samples, physical collections, and other products and how they will follow ENRTF Acknowledgement Requirements and Guidelines.
The dissemination strategy, as discussed under Phase three of the results and deliverables section, will have AURI and MnDOT working with product manufacturers, hemp growers and applicators to support the development and commercialization of these bio-based products. Through AURI and MnDOT driven networking and events, the findings will be shared and disseminated with various industry groups. Another dissemination effort will include the development of a one-page fact sheet which highlights the project and product specs developed. MDA will support the efforts of MnDOT and AURI to promote the use of hemp as an alternative to plastic materials in roadside restoration

materials. MDA will also provide regular updates on project development and results to hemp licensees, hemp organizations, and agricultural commodity groups throughout Minnesota. The Environment and Natural Resources Trust Fund will be acknowledged through use of the trust fund logo or attribution language on any project print and electronic media, publications, signage, or other communication pieces that result from the work per the ENTRF Acknowledgment Guidelines.
Early conversations surrounding this project have indicated a high interest level in the outcomes of this research and the team has had requests to provide presentation updates on outcomes to various groups nationwide, including tribal nations, departments of agriculture and departments of transportation.

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 will develop prototype products to demonstrate how industrial hemp can be processed to create biodegradable erosion and sediment control products. The testing will evaluate the various prototype products abilities to meet or exceed current specifications. This will enable MnDOT to update specifications for biodegradable erosion and sediment control products. Growers and manufacturers will be able to use the processing methods developed by this project to produce products that meet or exceed the updated specifications. The long-term implementation will be sustained by market mechanisms.

Budget Summary

Category / Name	Subcategory or Type	Description	Purpose	Gen. Ineligible	% Benefits	# FTE	Classified Staff?	$ Amount	$ Amount Spent	$ Amount Remaining
Personnel										
AURI Outreach and AURI Connects Team		Plan, organize and execute a field day showcasing the developed processes and prototype products developed			27.27%	0.06		$6,710	-	-
AURI Communications Director		Aid in the development of one page fact sheet and presentation materials. Lead editer and packager of final report			27.27%	0.02		$3,300	-	-
AURI Project Manager		Continually track project progress and oversee that completion of deliverables meet timelines and project stays on budget			27.27%	0.06		$6,600	-	-
AURI Senior Coproduct Scientist and Coproduct Lab Technician		Primary Operation of AURI Decorticator and Cleaning and Carding of Fibers			27.27%	0.06		$6,600	-	-
AURI Project Development Director		Co-lead of project and head of business development, networking and project collaboration efforts			27.27%	0.12		$13,200	-	-
AURI Engineer		Principal Investigator			27.27%	0.21		$24,750	-	-
							Sub Total	**$61,160**	**$51,920**	**$9,240**
Contracts and Services										
TRI Environmental	Professional or Technical Service Contract	Initial Lab Testing of Prototype Products. Pricing obtained from MnDOT. -Hydraulic Mulch: $500/prototype product * 2 Products -Erosion Control Blanket: $3,500/prototype product * 2 Products -Silt Fence: $2,500/ prototype product * 2 Products				0.19		$22,000	$19,553	$2,447

		-Sediment Control Log: $4,500/ prototype product * 2 Products								
MNL (Formerly Minnesota Native Landscapes), TBD	Professional or Technical Service Contract	Full-scale field testing to meet specifications and prototype product installation in-field by contractors --Erosion Control Blanket - $11,500 (breakdown of testing can be provided upon request) --Sediment Control Log - $4,500 (breakdown of testing can be provided upon request) Prototype product installations by contractors - $10,000				0.23		$26,000	$12,743	$13,257
American Excelsior & Hamilton Manufacturing	Professional or Technical Service Contract	Erosion Control Product Prototype Development (based on quotes gathered from private contacts) - Mat Development: $450/hour *10 hours = $4,500 - Hydraulic Mulch Development: $150/hour (100 sy of 3 different hemp fiber inclusions) * 6 hours = $900 - Sediment Control log and silt fencing development = $350/hr * 10hrs = $3500				0.08		$8,900	$8,813	$87
Rach-Al-Paca, Denero Industrial, Formation Ag	Professional or Technical Service Contract	Hemp yarn Development (based on quotes gathered from private industry contacts) 200lb of yarn at $25/lb				0.04		$5,000	$488	$4,512
							Sub Total	**$61,900**	**$41,597**	**$20,303**
Equipment, Tools, and Supplies										

	Tools and Supplies	Hemp Bales	Various Hemp Stalk Bales for Processing					$400	$351	$49
	Tools and Supplies	Miscellaneous Supplies	INCREASED THIS LINE USING PERSONNEL HOURS TO COVER COSTS RELATED TO HEMP FIBER THAT WAS PROVIDED FROM COMMERCIAL PLANTS WHICH AURI WAS NOT ABLE TO PROVIDE EFFICIENTLY GIVEN SCALE OF MATERIAL NEEDED. Miscellaneous Supplies throughout project- Shipping containers, wearable lab supplies, Dust masks, gloves, goggles, etc.					$5,010	$4,571	$439
							Sub Total	**$5,410**	**$4,922**	**$488**
Capital Expenditures										
		Carding Device	Carding equipment to clean and align hemp fibers into a roving quality necessary for yarn production					$55,000	$51,335	$3,665
		Stationary Bale Unroller	A bale unroller will be purchased in order to safely and efficiently prepare biomass to be fed into the decorticator. Stalks will be delivered in large round bales, which will need to disassembled and properly aligned before feeding into the decorticator. This equipment will streamline this process, saving significant man hours and increasing the safety of the operation.					$5,000	$4,187	$813
							Sub Total	**$60,000**	**$55,522**	**$4,478**

Acquisitions and Stewardship										
							Sub Total	**-**	**-**	**-**
Travel In Minnesota										
	Miles/ Meals/ Lodging	Travel to prototype development and product testing sites for AURI Engineer (from Lakeville) and Project Development Director (from Fergus Falls) - (4X trips to erosion and sediment product manufacturer, 2X trips to MNRoad site in Albertville) 460 miles x 4; 460 miles x 2 @ $0.575/mile = $1590; Lodging (4 nights hotel stays) - $350; Meals and Incidentals ($50/day for standard areas) - $300	Oversee prototype development efforts, develop personal relationships with key partners and gather pertinent information and pictures for reporting out					$2,240	$2,105	$135
	Miles/ Meals/ Lodging	1 trip per year for AURI Engineer (from Lakeville) and Project Development Director (from Fergus Falls) - 460 miles x 1 total trips per year x $.575/mile = $275; 1 hotel stay/year = $175; 2 people x 1 day of meals of incidentals =$125	Travel for networking with collaborators to inform business and product development					$1,725	$1,379	$346
	Miles/ Meals/ Lodging	Meals and Incidentals - 2 x $71/day (rounded)= $150; Lodging - 3 hotel stays - $350; Mileage - 350 miles x 3 events x $.575/mile = $400	Travel to two in-state related industry conferences to disseminate project findings and grow interest and collaborations					$900	-	$900
	Miles/ Meals/ Lodging	AURI Staff Field Day Travel - 3 AURI Staff to travel to field day in Waseca. 2 from Twin Cities, 1 from Fergus Falls. Mileage = 800 miles x $.575/mile = $475. 1 nights hotel ($175). 3 x standard Meals and Incidentals ($50/day) = $150	AURI communications, event planning and business development staff attendance at field day					$800	$780	$20
							Sub Total	**$5,665**	**$4,264**	**$1,401**
Travel Outside Minnesota										

	Miles/ Meals/ Lodging	1 trip to Colorado to visit Formation Ag to view cleaning equipment being considered for purchase for producing yarn quality hemp fiber. 2 plane tickets = $750; 1 rental car x 4 days = $500; 4 nights Hotel stay x 2 people = $1210; Per Diem Meals x 4 days x 2 people = $375	Visit Formation Ag, an equipment manufacturer who has demonstrated success in cleaning MN grown and AURI processed hemp into yarn quality material. After initial trial, AURI worked with MN yarn partner who confirmed the material is of quality to make yarns for erosion products. AURI would like to visit the manufacturers test facility to evalute the equipments ability to continuously process the hemp fiber to a clean material and obtain free training on the equipment. If the visit is a success, AURI will use equipoment funds to move forward with purchasing the equipment with project dollars, to complete project objectives.	X				$2,835	$2,625	$210
	Conference Registration Miles/ Meals/ Lodging	1 Trip for AURI Principal Engineer. 3 nights for IECA conference. Round trip flight to Kansas City, MO from MSP - $340; Per Diem - $140; Lodging - $640; Airport to Hotel Transportation - $60; Registration (with speaker discount) - $800.	Hemp Fiber In Erosion Control Products Panel at International Erosion Control Association Conference in Kansas City, MO - Feb. 6th-8th, 2023	X				$1,980	$1,980	-
							Sub Total	**$4,815**	**$4,605**	**$210**
Printing and Publication										
	Printing	fact sheets + other handout materials	Printing of one page fact sheets and presentation materials for field day					$200	-	$200
							Sub Total	**$200**	**-**	**$200**
Other Expenses										

		Product Shipments	Hemp Fiber shipping to yarn spinners and prototype development groups					$400	$400	-
		Field day associated costs	Field day resources					$450	$207	$243
							Sub Total	**$850**	**$607**	**$243**
							Grand Total	**$200,000**	**$163,437**	**$36,563**

Classified Staff or Generally Ineligible Expenses

Category/Name	Subcategory or Type	Description	Justification Ineligible Expense or Classified Staff Request
Travel Outside Minnesota	Miles/Meals/Lodging	1 trip to Colorado to visit Formation Ag to view cleaning equipment being considered for purchase for producing yarn quality hemp fiber. 2 plane tickets = $750; 1 rental car x 4 days = $500; 4 nights Hotel stay x 2 people = $1210; Per Diem Meals x 4 days x 2 people = $375	REDUCED IN STATE TRAVEL BUDGET TO MOVE DOLLARS TO REQUIRED OUT STATE TRAVEL, ACCOUNTING FOR VISIT TO HEMP FIBER CLEANING EQUIPMENT MANUFACTURER, OVERALL TRAVEL BUDGET REMAINS THE SAME. AURI has recently discovered a piece of hemp cleaning equipment which has changed the game in terms of cleaning hemp fiber and maintaining fiber length. Combined with an adjustment to AURI's decorticator, an intial trial on this cleaner has produced a fiber of quality that our original MN yarn partner has been able to successfully card, draft and twist the hemp as a blend with wool. Given our interest in keeping the project based in MN as much as possible, AURI would like to reallocate the funds set aside to visit the New Orleans lab for yarn twisting in order to visit the test lab of the cleaning equipment to watch it run continuously with our decorticated hemp fiber. If the equipment can continuously produce the product recently received, the equipment funds set aside in this grant to enable yarns being made from hemp will be purchased to enable project activites to continue in a successful direction.
Travel Outside Minnesota	Conference Registration Miles/Meals/Lodging	1 Trip for AURI Principal Engineer. 3 nights for IECA conference. Round trip flight to Kansas City, MO from MSP - $340; Per Diem - $140; Lodging - $640; Airport to Hotel Transportation - $60; Registration (with speaker discount) - $800.	AURI has been asked to sit on a panel for utilizing hemp fiber in erosion control products at the annual International Erosion Control Association Conference. Also sitting on the panel is the hemp fiber processor in Montana (IND Hemp) who AURI has worked closely with on this project as well as the Dwayne Stenlund who writes erosion control specs from the MN department of transportation. It is a wonderful opportunity to give updates and progress made on this project to a national audience and will showcase MN as a leader in this area of researching the use of hemp fiber in erosion control products. This event satisfies well the third objective of this project, focused on dissemination of our efforts to the public.

Non ENRTF Funds

Category	Specific Source	Use	Status	$ Amount	$ Amount Spent	$ Amount Remaining
State						
In-Kind	MnDOT In-kind cost share of unrecovered ICR (100hrs/yr at $60/hr - ($45/hr salary + $15/hr fringe)	MnDOT will supply in-kind hours for lab and field testing of prototype products as well as reporting out of the results. In addition, they will provide ongoing support and guidance of product development	Secured	$18,000	$18,000	-
			State Sub Total	**$18,000**	**$18,000**	**-**
Non-State						
			Non State Sub Total	**-**	**-**	**-**
			Funds Total	**$18,000**	**$18,000**	**-**

Attachments

Required Attachments

Visual Component

File: a2a37497-36a.pdf

Alternate Text for Visual Component

The visual showcases the project opportunity to be explored, which is replacing plastics in soil and erosion control products with biodegradable materials, such as industrial hemp.
Project Partners include the Agricultural Utilization Research Institute, Minnesota Department of Transportation, Minnesota Department of Agriculture and the Minnesota Department of Transportation. Several contracted partners that currently produce erosion and sediment control products will also be key participants...

Financial Capacity

File: cd950332-0ae.pdf

Board Resolution or Letter

Title	File
AURI Board Resolution	a9a4062a-f7d.pdf

Supplemental Attachments

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

Title	File
Research Addendum	4e0a3387-cf2.docx
Background Check Form	508b6c84-6ef.pdf
Hemp Erosion Control Field Day- Promotional Flyer	a9b9dd9b-176.pdf
AURI Hemp Field Day Presentation: Finding End Use Opportunities for Hemp Fiber	05371ab8-64d.pdf
Hemp-Based Biodegradable Erosion Control Products- Project 2021-212 Report FINAL	80a8e2be-baa.pdf
AURI Ag Innovation News- "Industrial Hemp Holds Its Own For Erosion Control" (Aug 2024)	dc967687-e86.pdf

Media Links

Title	Link
AURI Podcast- "Possibilities of Utilizing Hemp Fiber to Control Soil Erosion"	https://blubrry.com/1471757/122329628/possibilities-of-utilizing-hemp-fiber-to-control-soil-erosion/

Difference between Proposal and Work Plan

Describe changes from Proposal to Work Plan Stage

Reduced overall budget from $227,000 to $200,000 through a combination of a reduction of AURI internal hours, reduction of capitol equipment, reduction of supplies, reduction of out-state and in-state travel for dissemination of results and removing the expanded lab and field testing of 1 prototype product from each of the four product categories (previously 3 for each category, now planning for 2 from each category). Also added language to further define the dissemination strategy, and filled out all other '(new)' workplan fields accordingly.

Additional Acknowledgements and Conditions:

The following are acknowledgements and conditions beyond those already included in the above workplan:

Do you understand and acknowledge the ENRTF repayment requirements if the use of capital equipment changes?

Yes

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 Commissioner's Plan 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?

No

Work Plan Amendments

Amendment ID	Request Type	Changes made on the following pages	Explanation & justification for Amendment Request (word limit 75)	Date Submitted	Approved	Date of LCCMR Action
1	Amendment Request	• Budget • Budget - Professional / Technical Contracts • Budget - Capital, Equipment, Tools, and Supplies • Budget - Travel and Conferences • Budget - Other	USDA-ARS Cotton lab in LA is a partner of utmost importance to researching viability of hemp yarn. Their expertise or capability simply does not exist in MN, which was learned through project work to date. In order to build expertise and capability in MN to create hemp yarn, a trip to better understand what our partners in LA are doing is very important to the project. See also expanded explanation under new travel budget item.	May 25, 2022	Yes	May 27, 2022
2	Amendment Request	• Budget - Personnel • Budget - Travel and Conferences	AURI has been asked to sit on a panel for utilizing hemp fiber in erosion control products at the annual International Erosion Control Association Conference. It is a wonderful opportunity to give updates and progress made on this project to a national audience and will showcase MN as a leader in this area of researching the use of hemp fiber in erosion control products. See expanded explanation & justification under new travel budget item.	August 22, 2022	Yes	September 1, 2022
3	Amendment Request	• Budget • Budget - Personnel • Budget - Professional / Technical Contracts • Budget - Capital, Equipment, Tools, and Supplies • Budget - Travel and Conferences • Budget - Printing and Publication	AURI would like to reallocate out of state travel dollars to visit the identified fiber cleaner manufacturer to view our hemp being run on the equipment and to gain equipment training. If successful, AURI will use project budget to purchase equipment to enable 100% MN produced hemp yarn production for the project. Personnel hours were moved to supply budget to cover cost of larger quantities of processed hemp fiber than AURI is able to produce.	November 29, 2022	Yes	December 6, 2022

4	Project Manager	Previous Manager: Riley Gordon (rgordon@auri.org) New Manager: Matthew Leiphon (mleiphon@auri.org)	Riley has accepted a new job and is no longer working for AURI. Matthew Leiphon will take over as project manager for AURI on this project.	April 13, 2023	Yes	April 17, 2023
5	Amendment Request	• Project Collaborators - Project Manager Info • Budget - Professional / Technical Contracts • Budget - Capital, Equipment, Tools, and Supplies	After discussion with LCCMR staff, adjusted assignment of $913 that had been assigned to "Initial Lab Testing" Contracts line. Now in supplies and yarn development lines. Added names of several contractors/service providers to provide more detail on spending plan.	June 30, 2023	Yes	June 30, 2023
6	Amendment Request	• Budget - Professional / Technical Contracts	AURI and MNDOT have identified a contractor to perform lab testing of prototype products. This amendment request adds this entity's name to the budget line associated with services they will be performing.	December 15, 2023	Yes	December 20, 2023

Status Update Reporting

Final Status Update August 14, 2024

Date Submitted: August 14, 2024

Date Approved: October 4, 2024

Overall Update
Over the past three years AURI, MnDOT, and their project partners were able to make progress on all targeted project outcomes. The processing research and partnerships developed with growers and manufacturers during the project led to multiple hemp erosion control prototype products being developed and tested, providing proof of concept for the use of hemp in biodegradable products. While more research and product development will be needed to move from prototypes to market adoption, the findings of this project provide a foundation for the development of hemp-based product specifications by MnDOT to guide manufacturers and end users. The partnerships with industry that were developed during this project will also enable ongoing information sharing and establish a base for future product development work and innovation. The adoption of standards and knowledge development and sharing enabled by this project establishes opportunities for industry adoption of hemp-based, biodegradable products that can replace plastics, reduce microplastic pollution, and open new markets for Minnesota's farmers and manufacturers.

Activity 1
Project activities have been completed. AURI, working in coordination with MnDOT and private industry partners, was able to test and assess several hemp processing methods to prepare material for erosion control products. This included fiber decortication and milling research. Processes to manufacture hemp-based yarns were developed and tested, and erosion control product prototypes were developed and assessed with assistance from industry partners. The findings of this research, along with information provided by industry partners, provide a baseline for assessing the economic feasibility of the development and use of hemp-based erosion control products. Information on the findings from this activity are included in a final project report to be submitted to LCCMR.
(This activity marked as complete as of this status update)

Activity 2
Project milestones in this activity are complete. AURI and its project partners assessed the use of hemp in multiple materials and products, leading to the development of prototype products. ASTM lab testing of prototypes utilizing hemp fiber was completed and final results were received and reviewed. Field demonstrations of the selected prototypes were also successfully completed at the MnDOT test facilities at MnROAD, near Otsego, Minn. Since the last project update, MnDOT and AURI reviewed the results and MnDOT prepared a report containing an overview of the lab and field-testing results to be submitted as a final project product.
(This activity marked as complete as of this status update)

Activity 3
All project milestones in this activity are complete. AURI and MnDOT hosted a successful erosion control field day in September 2023 at MnROAD, attended by multiple manufacturers and hemp producers. AURI and MnDOT team members participated in and presented at multiple events throughout the project period, sharing information and updates on the project with key stakeholders. This outreach, along with the partnerships developed during processing and prototype development activities, will enable ongoing collaboration with industry. The fact sheet with information on the project and prototypes will be submitted as a final project product.
(This activity marked as complete as of this status update)

Dissemination
Since the last project update, AURI published an article featuring hemp erosion control products in its newspaper, Ag

Innovation News. The article, released in August 2024, provided an overview of the project as well as additional information on how hemp-based products could serve as alternatives to plastic. AURI and MnDOT also worked over the past several months to develop a final project report, providing an overview of project activities and findings for submission to LCCMR.

Status Update Reporting

Status Update June 1, 2024

Date Submitted: August 14, 2024

Date Approved: October 4, 2024

Overall Update
AURI and its partners made progress on several outcomes targeted by the project since our last update. Lab and field testing of prototype products were completed over the past several months, offering more proof-of-concept data on their use and the development of specifications for hemp-based erosion control materials. This data will also provide feedback and guidance to project partners and other industry stakeholders on product design and processing methods, and potential areas where innovation may offer opportunities to develop more effective products tied to specific design specifications. AURI also continued its efforts to build connections with growers and manufacturers to build a foundation for potential commercialization efforts, connecting with multiple stakeholders to share information and identify opportunities for future product development and deployment. As the project nears completion, these results are being prepared for inclusion in informational materials as well as a final report of project findings with a focus on providing guidance for future product development, commercialization, and deployment efforts by AURI, MNDOT, and key industry stakeholders in Minnesota.

Activity 1
Lab and field testing of erosion control prototypes developed in partnership with manufacturers was completed over the past six months, and AURI team members have been in contact with industry stakeholders to share information about the project and tests and to discuss potential steps for the future development of hemp-based erosion control products. Data from the field and lab tests provided additional information to evaluate potential material and processing specifications and costs as part of assessing the economic feasibility of producing a hemp-based erosion control product. Conclusions from this evaluation, informed by guidance from industry contacts and data from testing, will be included in the final project report.

Activity 2
Over the past six months, ASTM lab testing on prototype materials was completed. Results from the testing lab were received and AURI and MNDOT staff met to review the data and discuss their implications for product design and performance. Field demonstrations of the prototype products were carried out, and the prototypes remain in the field at MnROAD for ongoing assessment. Results of these lab and field tests will be included in the final project report.

Activity 3
The AURI commercialization team continued its efforts to build connections to industry stakeholders in Minnesota and surrounding states with a focus on sharing information and developing potential commercialization pathways for hemp-based erosion control products. AURI's commercialization team is collaborating with Minnesota-based hemp growers as part of its wider hemp market development efforts, which included exploring how the fiber they produce may fit into supply chains for hemp erosion control products. With the completion of field and lab tests of prototype products, AURI technical staff, with guidance from MnDOT, are working to finalize information fact sheets on the tested products. These will be shared with the industry and will be included in the final project report. AURI staff are also planning to continue sharing information on the results of the project over the next several months, including outreach to ag and industry stakeholders at several events around the state, and during a presentation on the project findings at a hemp field day tentatively planned for August 2024.

Dissemination
AURI's dissemination efforts over the past six months focused on continuing efforts to build connections and share

information with industry stakeholders and external researchers, including established and potential hemp processors in Minnesota and surrounding states. In addition to these efforts, AURI's project team is finalizing information for fact sheets on the prototype products, which will be targeted at industry, and is developing a final report to share project findings with stakeholders and other interested parties.

Status Update Reporting

Status Update December 1, 2023

Date Submitted: December 1, 2023

Date Approved: December 20, 2023

Overall Update

The Agricultural Utilization Research Institute (AURI) hemp project team and its project partners at the Minnesota Department of Transportation (MNDOT) made measurable progress toward project completion over the past six months. Of particular note was the initiation of full-scale field testing of multiple erosion control prototypes at MNDOT's MnROAD facility near Otsego, Minn. In coordination with these tests, AURI and MNDOT hosted a field day including tours of the test sites at MnROAD on September 27, 2023. The event was attended by stakeholders from the private and public sectors, with multiple industry partners on hand to learn more about the project and the prototypes being tested. In addition to the field tests, AURI and MNDOT are currently coordinating with outside labs to perform lab testing of the prototypes. AURI business development staff also continue to build connections with potential hemp producers and processors around the state to identify and evaluate options for future product development of hemp-based erosion control materials.

Activity 1

Over the past six months, AURI and MNDOT staff coordinated with multiple external partners to finalize and deliver prototype products for field and lab testing. Prototype materials under final development and production included hydraulic mulch and erosion control blankets. These products are now undergoing field trials at MnROAD. Work also included further assessment of the feasibility of wattle production. Results from field and lab testing of these prototypes will be used to assess the technical and economic feasibility of future production. Test results may also be used by MNDOT to develop standard and specifications for utilization of hemp fiber in future erosion control products. Manufacturing and supply chain issues have continued to cause delays in deployment of the carding machinery being procured for use in ongoing hemp processing trials. AURI technical staff are coordinating with the equipment manufacturer to finalize plans for delivery and installation of the machinery in early 2024, with processing trials to follow.

Activity 2

Prototype hemp erosion control products developed and produced over the course of this project are now undergoing field testing at the MnROAD test facility. Material for these prototypes was sourced from multiple industrial hemp processors. Prototypes being field tested include hydraulic mulch products and erosion control blankets. Information gathered from these field tests will supplement earlier trials performed by manufacturing partners including American Excelsior and Hamiton Manufacturing. MNDOT identified an external lab to coordinate ASTM laboratory testing of prototype materials. Testing plans are complete and lab trials are set to begin as soon as final contracting and material shipping plans are finalized. Results from the field and lab trials will be used to assess and coordinate further product development activities with industry partners in 2024.

Activity 3

As noted in activities 1 and 2, over the past six months, partner manufacturers delivered final prototypes for field and lab trials. AURI business development staff continued to meet with hemp industry stakeholders throughout Minnesota, keeping them informed about the project and identifying potential supply chain connections for future product development. In September, AURI and MNDOT hosted an Erosion Control Field Day at the MnROAD test facility in Otsego, Minn. The field day included presentations on the project and its work to incorporate hemp fiber into erosion control products. The event also included tours of the prototype test sites, providing attendees a chance to see the

hemp erosion control products at work. The 50+ attendees included multiple industry stakeholders from Minnesota and several other states.

Dissemination

In addition to hosting a Hemp Erosion Control Field Day in partnership with MNDOT, AURI's dissemination activities over the past six months included recording and publishing a podcast about the project and its efforts to develop new uses for hemp. This podcast, entitled "Possibilities of Utilizing Hemp Fiber to Control Soil Erosion," featured experts from AURI and MNDOT and was promoted by AURI via social media. Members of AURI's project team also presented at the Hemp Field Day, sharing information about the technical and market development activities pursued as part of this project. Copies of this presentation, a promotional flyer for the field day, and a link to the podcast have been attached to this report.

Status Update Reporting

Status Update June 1, 2023

Date Submitted: June 30, 2023

Date Approved: June 30, 2023

Overall Update
The Agricultural Utilization Research Institute (AURI) technical team and its partners continued to make progress toward field testing of new, hemp-based erosion control products developed as part of this project. Development work on hemp prototypes is progressing, and AURI technical staff are coordinating with partners at the Minnesota Department of Transportation (MnDOT) and other project partners to organize and stage field tests of these products. Field testing of multiple erosion control prototypes is set to begin during Q3 of 2023 at MnDOT's MnROAD testing facility near Otsego, Minn.

Activity 1
Prototypes developed in collaboration with external partners including American Excelsior and Hamilton Manufacturing are under completion and being prepped for shipment to MnROAD for field testing. In addition to progress on external prototype development, AURI identified and purchased a carding device for fiber cleaning which will be used in ongoing product and process development trials at its Waseca facility. Procurement was based on information gathered during consultations with industry experts and tests conducted during an earlier phase of the project. The equipment is currently set to arrive in Minnesota this summer, with AURI technical staff planning for its setup and deployment in support of project activities in the second half of 2023.

Activity 2
American Excelsior completed and provided AURI a report on its development and testing work, and results will be included in the final project report. Hamilton Manufacturing also completed a round of hydroseeding prototype development trials and provided guidance on the product and its potential best uses in erosion control settings. This information will be used to help guide development of field trial protocols. In May, AURI and MnDOT staff met at MnROAD to identify sites and review plans for field testing. AURI is also coordinating with MnDOT to identify and engage with Minnesota-based contractors to conduct site preparation and assist in field trials at the MnROAD facility. Delivery and deployment of hemp and control prototypes is also being coordinated, with MnDOT experts providing guidance on protocols and plans for the test site and material placement.

Activity 3
AURI and MnDOT plan to host a field day/demonstration day in association with the field trials at MnROAD near Otsego. While event details are still being determined and are dependent on the testing schedule, the event will offer an opportunity to share information about the project with industry stakeholders and other interested parties, display the hemp products in development for testing in a field setting and potentially share initial results from the field trials.

In addition to these plans, AURI's business development team has been in contact with several hemp industry stakeholders over the past six months, including researchers, processors and producers, and have shared information about the project, its goals and the prototypes under development. This outreach aims to increase knowledge about hemp's potential as an erosion control material and develop supply chain connections that may offer a path toward commercialization for successful prototype products.

Dissemination
As noted, AURI is currently coordinating with MnDOT to plan a potential field day to demonstrate the products and prototypes developed during this project and share information about the project and its findings. AURI staff continue to

meet and share information with key industry stakeholders as part of our wider efforts focused on hemp market development and plan to develop and release information sheets about the project and its findings once lab and field trials are complete and more data is available. AURI project staff also participated in the International Erosion Control Association's February 2023 conference in Kansas City, Missouri, presenting information about the project as part of a panel on hemp fiber and its uses in erosion control. The conference also offered AURI staff a chance to meet with business leaders in the erosion control industry to share information about the Minnesota hemp industry and the products and concepts under development as part of this project.

Status Update Reporting

Status Update December 1, 2022

Date Submitted: November 29, 2022

Date Approved: December 6, 2022

Overall Update

Despite several project delays related to the overall slowdown of businesses in a post-covid world, the team has made great strides in the project outcomes under activity 1. In partnership with American Excelsior of Rice Lake, WI, the team was able to process hemp fiber to meet the specs for blanket and wattle fill. Prototypes have been developed and AE is running unofficial testing on these materials. Secondly, the team has partnered with IND Hemp and Hamilton Manufacturing to have hydroseeding prototypes developed from 100% hemp fiber. Prototype development is currently underway. Despite our primary yarn twisting partner having to pull out of the project due to covid related job losses and lab shutdown, the team has identified a fiber cleaner that has cleaned MN grown and processed hemp to a suitable spec to be fed into local wool carding, drafting and spinning equipment. Initial yarn prototypes have been developed with Rach-Al-Paca and several hemp inclusion rates with wool and are ready for partner manufacturer consideration to run a blanket and wattle trial with hemp fill and hemp yarn. Overall, project activities are all on track and the team is ecstatic about progress made so far.

Activity 1

In partnership with American Excelsior of Rice Lake, WI, the team was able to process hemp fiber to meet the specs for blanket and wattle fill. Prototypes have been developed and AE is running unofficial testing on these materials to inform official ASTM testing. MNDOT and AURI attended a field day at AE to view the products perform in simulated channel flow, vegetation and filtration trials. Secondly, the team has partnered with IND Hemp and Hamilton Manufacturing to have hydroseeding prototypes developed from 100% hemp fiber. Prototype development is currently underway with testing of product specs to follow. Despite our primary yarn twisting partner from USDA New Orleans having to pull out of the project due to covid related job losses and lab shutdown, the team has identified a fiber cleaner from Colorado that has cleaned MN grown and processed hemp to a suitable spec to be fed into local wool carding, drafting and spinning equipment. Initial yarn prototypes have been developed at Rach-Al-Paca in Hastings, MN and several hemp inclusion rates with wool and are ready for partner manufacturer consideration, tensile strength testing and to consider prototype development.

Activity 2

MNDOT is at the ready to begin testing prototypes of hemp-based blanket, wattles and hydroseeding. This activity has already begun with American Excelsior already running some unofficial tests in house on the prototype erosion blankets and sediment control wattles and are putting together a report based on their findings. Once this report is received, the team will make a decision on altering fiber processing to meet specs, or moving forward with having ASTM tests done on the materials. The hemp-based hydroseeding material currently being developed by Hamilton Manufacturing is also going to be tested in-house to give a feel for performance compared with wood based product currently being used today. MNDOT will also get samples of these materials to run ASTM standard testing on. Lastly, Hemp-based yarns developed at Rach-Al-Paca in Hastings, MN are going to be tested for tensile strength, to compare performance of these yarns and give insight on how varying the hemp fiber inclusion rate affects yarns functional properties.

Activity 3

This is an ongoing activity, with the project making headlines in the news and the team really impressed with the amount of interest by industry on how this project is progressing. Project lead Engineer Riley Gordon has given several presentations around the project to date, with presentations lined up for 2023. So far, Riley has presented the project progress at the Minnesota Department of Agricultures annual hemp event, which sees a lot of hemp growers,

processors and investors in attendance. Riley has also presented the information at a MNDOT and VTDOT conference focused on erosion control products. Lastly, Riley has presented updates on the project at a spotlight event for the International Erosion Control Association and will be sitting on a panel at the IECA annual conference in february 2023 in Kansas City to provide updates on the project and outlook on utilizing hemp fiber in erosion control products. It is also expected that AURI will dedicate a Webinar Wednesday session to the project some time in 2023 or 2024 to summarize the project to AURI stakeholders for the agricultural industry.

Dissemination

Since activity 3 is essentially our dissemination plan, this is the same response as above. This is an ongoing activity, with the project making headlines in the news and the team really impressed with the amount of interest by industry on how this project is progressing. Project lead Engineer Riley Gordon has given several presentations around the project to date, with presentations lined up for 2023. So far, Riley has presented the project progress at the Minnesota Department of Agricultures annual hemp event, which sees a lot of hemp growers, processors and investors in attendance. Riley has also presented the information at a MNDOT and VTDOT conference focused on erosion control products. Lastly, Riley has presented updates on the project at a spotlight event for the International Erosion Control Association and will be sitting on a panel at the IECA annual conference in february 2023 in Kansas City to provide updates on the project and outlook on utilizing hemp fiber in erosion control products. It is also expected that AURI will dedicate a Webinar Wednesday session to the project some time in 2023 or 2024 to summarize the project to AURI stakeholders for the agricultural industry.

Status Update Reporting

Status Update June 1, 2022

Date Submitted: May 25, 2022

Date Approved: May 27, 2022

Overall Update
To date, connections have been made and work is underway with a variety of project partners. AURI feels good about the progress made on the first activity with several partners involved and initial prototype production of erosion blankets and sediment control logs underway. Testing of these products, once manufactured, will happen in Rice Lake, WI. This testing event will satisfy goals under both activities 2 and 3.

AURI has built a strong connection to the USDA cotton lab who will be exploring the possibility of creating a hemp-based yarn suitable for use in erosion control products. Silt Sock in Fridley, MN has provided several sample jute yarns suitable for erosion control products which the USDA tested for denier and tensile strength to guide the hemp yarn research. AURI also has a partner lined up to create a hydroseeding prototype but have had some delays in starting production. This is expected to move forward in the near future and MNDOT will ultimately be running ASTM testing on these materials, once manufactured, as per activity 2.

Activity 1
Production methods for hemp fiber which will work as fills for both wattles and erosion blankets have been identified with the help of American Excelsior. Of fifteen various samples sent to American Excelsior, they have chosen 2 for the production of blankets and logs. Right now, the group has in their hands 2,000 lbs. of each of these fibers which were covered by this project to produce prototypes. The prototypes, once completed, will be evaluated at the facility in Rice Lake, WI.
Second, AURI has been working closely with the USDA Cotton lab in New Orleans. They plan to run several samples of fiber produced by AURI and partners through cleaning and carding equipment to work out technical aspects of creating hemp yarn suitable for use in erosion control products. COVID-19 has delayed this significantly due to federal lab shutdowns, however lab work on this goal is expected to begin soon.

Last, Hamilton Manufacturing in Idaho has been engaged to create a hydroseeding product using MN sourced and processed hemp fiber. They await repair on one piece of equipment to allow them to properly work with the hemp fiber before beginning production of prototype materials.

Activity 2
Since prototypes have yet to be made, there is little to report on under activity 2 at this time. The plan as stated, is to test the erosion blankets and sediment control log prototypes currently being manufactured at American Excelsior at their Rice Lake WI plant. They are able to simulate multiple ASTM standard field tests at this site and can compare results with current standard products. Several MNDOT and DNR partners will be invited to the American Excelsior facility to demonstrate the testing and products, once scheduled, which will also satisfy efforts under activity 3.

Activity 3
This activity is an on-going effort throughout the project. AURI engaged several growers and product manufacturers in discussions and participation in this project to date. Manufacturing and processing groups who have been consulted and worked with so far include: Silt Sock, American Excelsior, Filtrexx, Rach-Al-Paca Farms and the USDA-ARS Cotton lab. Grower partners in MN are Hemp Acres and the Lower Sioux Indian Community, who provided hemp stalks and fiber for the project. Dissemination efforts have begun despite slower than anticipated progress of some activities due to COVID-19. See Dissemination update below for complete update.

Dissemination

While still in the early stages of the project and with COVID-19 delaying some of the efforts, progress has been made on dissemination of the efforts of this project. AURI gave a well-received keynote presentation at the MN Department of Agriculture annual hemp event which gave an overview of the project. AURI also presented at the annual national erosion control conference about this project which resulted in significant interest in participation from industry. Most Notably, connections to American Excelsior and Filtrexx were made, which helped further the efforts of this project. Dissemination of efforts, updates and results expects to be an ongoing activity throughout the project, and AURI will plan to engage their AURI connects and communications teams in year three of the project to summarize the project results and next steps.