



Environment and Natural Resources Trust Fund (ENRTF)

M.L. 2020 ENRTF Work Plan (Main Document)

Today's Date: September 26, 2019

Date of Next Status Update Report: April 1, 2021

Date of Work Plan Approval:

Project Completion Date: December 31, 2022

Does this submission include an amendment request? NO

PROJECT TITLE: Developing Cover Crop Systems for Sugarbeet Production

Project Manager: Dr. Anna Cates

Organization: University of Minnesota

College, Department, or Division: Department of Soil, Water, and Climate

Mailing Address: 1991 Upper Buford Circle Room 439

City, State, Zip Code: St. Paul, MN 55108

Project Manager Direct Telephone Number: 612 625 3135

Email Address: catesa@umn.edu

Web Address:

Location: NW, Central, SW

Total Project Budget: \$300,000

Amount Spent: \$0

Balance: \$300,000

Legal Citation: M.L. 2020, Chp. xx, Sec. xx, Subd. xx

Appropriation Language:

PROJECT STATEMENT:

This project will address a threat to water quality in western Minnesota by developing soil health management systems for sugarbeet production, focusing on successful integration of cover cropping to reduce erosion, nutrient leaching, and weed pressure. Sugarbeet production leaves soils vulnerable to erosion, nutrient loss, and slow degradation of soil health. To address these concerns, we'll investigate cover crops both before and after beets in regionally-specific crop rotations.

- **In West-Central Minnesota**, interseeding cover crops with strip-tilled corn prior to sugarbeets could reduce spring soil loss and save farmers time and money.
- **In Northwest Minnesota**, late-summer harvest of winter wheat provides an excellent window for establishment of pre-beet cover crops.
- **In both regions**, interseeding cover crops into standing beets will reduce fall erosion.

Successful fall cover crops reduce soil, phosphorous and nitrogen losses during the fallow period. This presents an opportunity for savings on fertilizer costs while improving water quality. In addition, a robust pre-beet cover crop could suppress competitive herbicide-resistant weeds, which are spreading throughout the state. In order to mitigate risk for farmers adopting these new practices, our research will evaluate different planting and termination timings and methods and develop initial recommendations. Working with the Southern Minnesota Beet Sugar Cooperative (SMBSC), Minn-Dak Farmers Cooperative, and American Crystal Sugar (ACS) agronomists and producers, we will establish large-scale on-farm trials and plot-scale trials at the University of Minnesota Northwest Research and Outreach Center (NWROC) in Crookston, MN. **We will evaluate regionally-specific systems for sugarbeet yield and quality, troubleshoot agronomic best practices, and measure soil health metrics, wind erosion, surface runoff, and associated nutrient loss.** Growers are duly wary of adopting new practices without a clear understanding of the benefits and risks, so this groundwork is necessary for workshops, technical assistance, and promotion of sustainable sugarbeet production in Minnesota.

II. OVERALL PROJECT STATUS UPDATES:

First Update April 1, 2021

Second Update October 1, 2021

Third Update April 1, 2022

Fourth Update October 1, 2022

Final Report between project end (December 31, 2022) and February 15, 2023

III. PROJECT ACTIVITIES AND OUTCOMES:

Activity 1: Central Minnesota: Integrating cover crops in strip-till corn-sugarbeet crop rotations

Description: We will evaluate three treatments for soil protection and agronomic best practices: (1) pre-beet cover crops, (2) post-beet cover crops, and (3) both pre- and post-beet cover (corn-cover-beet-cover rotation). Building on SMBSC research on interseeding brassica, legume and grass cover crops into standing sugarbeets and UMN-Extension evaluations of strip-till corn to sugarbeets, we will establish large replicated on-farm strip trials of a variety of cover crop species, seeding and termination timing. Minn-Dak and SMBSC will assist in identifying grower cooperators and managing the plots. We will use dust collectors to quantify soil and nutrients lost to wind erosion and measure soil health metrics (biologically active soil C and N). Field days will be held each year to address grower concerns and share best management practices developed.

ENRTF BUDGET: \$125,142

Outcome	Completion Date
<i>1. Select on-farm research sites, interseed cover into V4-V6 corn, and evaluate fall erosion</i>	<i>Fall 2020</i>
<i>2. Evaluate cover establishment, spring erosion, and sugarbeet production</i>	<i>Summer-fall 2021 and 2022</i>
<i>3. 2 field days to disseminate results</i>	<i>Fall 2021, fall 2022</i>

First Update April 1, 2021

Second Update October 1, 2021

Third Update April 1, 2022

Fourth Update October 1, 2022

Final Report between project end (December 31, 2022) and February 15, 2023

Activity 2: Northwest Minnesota: Integrating cover crops in wheat-sugarbeet rotations

Description: It is critical to quantify nutrient losses from sugarbeet fields in this region in order to meet Minnesota's Nutrient Reduction Strategy targets for the Red River Valley (10% in phosphorous and 13% in nitrogen by 2025). In order to evaluate surface runoff, we will compare pre-beet cover, post-beet cover, and both (wheat-cover-beet-cover rotation) in large plots at the UMN NWROC, monitoring for cover crop success, weed pressure, wind erosion, nutrient loss, and surface runoff as well as sugarbeet yield and quality, disease pressure, and soil health metrics. American Crystal Sugar will help to identify farmer cooperators for on-farm trials where all metrics except surface runoff will be monitored in the same manner.

ENRTF BUDGET: \$174,858

Outcome	Completion Date
<i>1. Establish cover crops in wheat at Crookston and on-farm sites</i>	<i>Summer 2020 and 2021</i>
<i>2. Evaluate cover establishment, spring erosion, and sugarbeet weed pressure, production.</i>	<i>Summer 2021 and 2022</i>
<i>3. 3 field days to disseminate results</i>	<i>Fall 2021 and 2022</i>

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IV. DISSEMINATION:

Description:

Cates and Peters work with UMN Extension and will speak about the project in multiple regional and statewide events sponsored by the University, including the Institute for Ag Professionals and the winter Research Updates. Peters will disseminate results through winter Grower’s Seminars and American Crystal Sugar’s “Way to Grow” series. A webinar will be offered for continuing education for the local government staff from soil and water and watershed districts as well as NRCS employees. The annual Conservation Tillage Conference organized by DeJong-Hughes will also highlight results. The MN Office for Soil Health website and the UMN Extension website will both summarize results. Cates, Pease, Peters and DeJong-Hughes are all active on Twitter, with a combined ~3,000 followers. All events will be advertised on social media and the MN Crop News blog. Data will be stored using Google Drive products with the UMN license. Peer-reviewed publications will be developed by the graduate student with guidance from project PIs, possibly for submission to Agriculture, Ecosystems and the Environment, Agronomy Journal, or Soil Science Society of America Journal.

The Minnesota Environment and Natural Resources Trust Fund (ENRTF) will be acknowledged through use of the trust fund logo or attribution language on project print and electronic media, publications, signage, and other communications per the [ENRTF Acknowledgement Guidelines](#).

First Update April 1, 2021

Second Update October 1, 2021

Third Update April 1, 2022

Fourth Update October 1, 2022

Final Report between project end (December 31, 2022) and February 15, 2023

V. ADDITIONAL BUDGET INFORMATION:

A. Personnel and Capital Expenditures

Explanation of Capital Expenditures Greater Than \$5,000: N/A

Explanation of Use of Classified Staff: N/A

Total Number of Full-time Equivalents (FTE) Directly Funded with this ENRTF Appropriation:

Enter Total Estimated Personnel Hours for entire duration of project: 4,810	Divide total personnel hours by 2,080 hours in 1 yr = TOTAL FTE: 2.3125
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Total Number of Full-time Equivalents (FTE) Estimated to Be Funded through Contracts with this ENRTF Appropriation:

Enter Total Estimated Contract Personnel Hours for entire duration of project: 120	Divide total contract hours by 2,080 hours in 1 yr = TOTAL FTE: .058
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VI. PROJECT PARTNERS:

- A. Partners outside of project manager’s organization receiving ENRTF funding **Mr. Dorian Gatchell**, MN Ag Services Consultant. **Sugarbeet farmers**, to be identified.
- B. Partners outside of project manager’s organization NOT receiving ENRTF funding The UMN Extension Northwest Regional Sustainable Development Partnership will assist with outreach activities associated with this project, including grower workshops and fact sheet distribution. Dr. Thomas Peters, Extension Sugarbeet Agronomist, North Dakota State University and University of Minnesota will lead weed pressure evaluation. Staff at the West Polk Soil & Water Conservation District, MN Wheat, SMBSC, Minn-Dak, and ACS will assist in identifying growers for on-farm research.

VII. LONG-TERM- IMPLEMENTATION AND FUNDING:

This project addresses basic questions of cover crop management for sugarbeet growers; however, we expect to continue to refine these systems. Cates, Peters, Pease, and DeJong-Hughes will disseminate these results through field days on farms, at the NWROC Crop and Soils Field Day, UMN-Extension website, and two peer-reviewed research publications. Peters will share results at winter Grower’s Seminars and ACS’s “Way to Grow” series. Federal, state and local cost-share is available to individual

growers for cover cropping. Commodity crop research organizations including the Sugarbeet Research and Education Board, MN Wheat, MN Soybean Growers Association, and MN Corn Growers Association all offer cover crop research funding which may be used to delve deeper into questions raised by this study.

VIII. REPORTING REQUIREMENTS:

- Project status update reports will be submitted April 1 and October 1 each year of the project
- A final report and associated products will be submitted between December 31, 2022 and February 15, 2023

IX. SEE ADDITIONAL WORK PLAN COMPONENTS:

A. Budget Spreadsheet

B. Visual Component or Map



Legal Citation:

Project Manager:

Project Title:

Organization:

Project Budget:

Project Length and Completion Date:

Today's Date:

Dr. Anna M. Cates

Developing Cover Crop Systems for Sugarbeet Production

University of Minnesota- MN Office for Soil Health

\$ 300,000.00

7/1/2020- 12/31/2022

9/26/2019

ENVIRONMENT AND NATURAL RESOURCES TRUST FUND BUDGET		Budget	Amount Spent	Balance
BUDGET ITEM				
Personnel (Wages and Benefits) (for 2.5 years)		\$ 205,118	\$ -	\$ 205,118
Dr Anna Cates, Soil health specialist, Project Director, (1%) \$2,605 salary + Fringe (36%) \$743 Total \$2,808				
Dr Lindsay Pease, Extension specialist, (5%) \$11,597 salary + Fringe (36%) \$4,174, Total \$15,771				
Jodi DeJong-Huges, Extension Educator (2.5%) \$4,990 salary + Fringe (36%) \$1,797, Total \$6,787				
Jeff Nielsen, NWROC Field Technician, (5%) \$6,766 salary + Fringe (29.5%) \$1,996, Total \$8,762				
Heidi Reitmeier, NWROC Lab Technician, (10%) \$10,717 salary + Fringe (29.5%) \$3,162, Total \$13,879				
TBD, Cates Research Technician, (28%) \$30,094 salary + Fringe (29.5%) \$8,877, Total \$38,972				
Graduate Research Assistant, (50%) \$64,099 + Fringe (16.1% + Tuition) \$54,130, Total \$118,229				
Professional/Technical/Service Contracts		\$ 2,400	\$ -	\$ 2,400
Soil sampling, sensor installation (Activity 1) by Dorian Gatchell, MN Agricultural Services, who works closely with farmers in Activity 1. Rate is standard for skilled agricultural labor, since Gatchell has MS in Agronomy, soil sampling equipment, and years of experience with research protocols. \$20/hr * 60 hrs/year				
Equipment/Tools/Supplies		\$ 51,640	\$ -	\$ 51,640
Manufacture dust collectors (\$50/each * 36 in Activity 1, 100 in Activity 2), Total \$6,800				
Manufacture surface runoff collectors (\$200/each * 144), Total \$28,800				
Cover crop seed, \$3,240				
Crookston Experiment Station land use fee, \$1,500				
On-farm land rent, \$750/site * 6 sites * 2 years, \$9,000 (Cash rent on land is about \$200 per acre. We are asking the farmer to slow down during his busiest time of the year - planting and harvesting. The \$750 includes the inconvenience to the farmer and his crew to accommodate our needs. Private companies pay farmers around \$2000 per acre. However, we are fortunate that the farmers we work with are willing to accept a nominal fee due to the research value.)				
Equipment rental (strip-tiller and cover crop inter-seeder, Activity 1 only), \$1,800				
Soil sampling equipment \$500				
		\$ -	\$ -	\$ -
Capital Expenditures Over \$5,000		\$ -	\$ -	\$ -
		\$ -	\$ -	\$ -
Fee Title Acquisition		\$ -	\$ -	\$ -
		\$ -	\$ -	\$ -
Easement Acquisition		\$ -	\$ -	\$ -
		\$ -	\$ -	\$ -
Professional Services for Acquisition		\$ -	\$ -	\$ -
		\$ -	\$ -	\$ -
Printing		\$ 300	\$ -	\$ 300
Distribution of fliers advertising field days, fact sheets of results, \$300				
Travel expenses in Minnesota - in accordance with UMN Travel Policy		\$ 15,622	\$ -	\$ 15,622
Approximately 46 trips/year for field days, sampling and project team meetings at \$.58/mile + lodging (\$1000) + M&IE (\$700), Total \$14,122				
Present results at beet growers meeting, \$1,500				
Other		\$ 24,920	\$ -	\$ 24,920
Water Sample Analysis (8 samples/yr * \$5/sample * 16/field * 4 fields * 2 yrs), Total \$5,120				
Soil Sample Analysis (\$50/sample * 24 plots/site * 7 sites * 2 yrs), Total \$16,800				
Field day logistics (food, travel, porta-potty) \$500/each for 5 field days, Total \$2,500				
Publication costs (2 peer-reviewed publications @ \$250/each), Total \$500				
COLUMN TOTAL		\$ 300,000	\$ -	\$ 300,000
SOURCE AND USE OF OTHER FUNDS CONTRIBUTED TO THE PROJECT				
	Status (secured or pending)	Budget	Spent	Balance
Non-State:		\$ -	\$ -	\$ -
State:		\$ -	\$ -	\$ -
In kind: Agronomic consultation and support from SMBSC, Minn-Dak and ACS		pending		
Other ENRTF APPROPRIATIONS AWARDED IN THE LAST SIX YEARS				
	Amount legally obligated but not yet spent	Budget	Spent	Balance
		\$ -	\$ -	\$ -

