**PROJECT TITLE: Developing Cover Crop Systems for Sugarbeet Production**

**I. 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. 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: $68,404** |  |

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

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **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: $232,142**

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

 |  |

**III. PROJECT PARTNERS AND COLLABORATORS:**

*No ENRTF funding required:* 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.

*ENRTF funding required:* **Dr. Lindsay Pease**, Assistant Professor and Extension Specialist of Nutrient and Water Management, Department of Soil, Water, and Climate, UMN, Crookston, MN. Lead on Crookston site management, surface runoff measurements, graduate student co-advisor. **Ms. Jodi DeJong-Hughes**, Regional Extension Educator in Crops and Soils, UMN, lead on Central MN work. **Mr. Dorian Gatchell**, MN Ag Services Consultant. **Sugarbeet farmers,** to be identified. **Graduate Research Assistant**, UMN, field sampling and analysis. **Mr. Jeff Nielson**, NWROC Field Technician, manage NWROC Field Plots. **Mrs. Heidi Reitmeier**, NWROC Lab Technician, collect and process soil, water, and plant samples.

**IV. 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.