1.) PROJECT ACTIVITIES COMPLETED DURING THE REPORTING PERIOD. *(Describe project progress specific to goals, objectives, and deliverables identified in the project workplan.)*

The first field season of this project was completed this past year. Soil samples that were retrieved late in the fall were sent to a commercial lab to analyze for pH, electrical conductivity, inorganic nitrogen, Bray phosphorus, exchangeable cations, and organic matter (Task 1C). We normally would run many of these tests ourselves, but due to pending lab shutdowns with the spread of COVID-19, we felt it would be best to send them to a commercial lab which has a higher capacity to run samples.

2.) IDENTIFY ANY SIGNIFICANT FINDINGS AND RESULTS OF THE PROJECT TO DATE.

We summarized the fall cover crop biomass findings, although no statistical analyses have been performed yet. Preliminary results from the soybean project are as follows:

- Drilled cover crops were not able to establish by winter (Figure 1).
- Non-manured cover crop plots had greater biomass production compared to manured plots (Figure 2).

Preliminary results from the corn project are as follows:

- The cover crop mixture had the greatest biomass production (Figure 3).
- Like the soybean plots, non-manured plots had the greatest cover crop biomass production, followed by the early manure application (Figure 4).

![Cover Crop Biomass by Seeding Method Following Soybean](image-url)

**Figure 1.** Impact of cover crop seeding method on cover crop dry matter production.
**Figure 2.** Impact of manure application on cover crop dry matter production.

**Figure 3.** Impact of cover crop treatment on cover crop dry matter production. Mixture consisted of cereal rye, whole oats, and radish.

**Figure 4.** Impact of manure application timing on cover crop dry matter production.
3.) CHALLENGES ENCOUNTERED. (Describe any challenges that you encountered related to project progress specific to goals, objectives, and deliverables identified in the project workplan.)

The total shutdown of the University of Minnesota and the “shelter in place” ordinance issued by the State of Minnesota in response to the COVID-19 outbreak significantly reduced our operating capacity late this winter. As such, data from soil and cover crop plant biomass samples that were in queue to be analyzed for total carbon and nitrogen had to be postponed until the reopening of the Wilson Lab. However, as this research project is considered essential the University of Minnesota granted us special permission to continue our research in the field this upcoming spring and summer seasons.

4.) FINANCIAL INFORMATION (Describe any budget challenges and provide specific reasons for deviations from the projected project spending.)

The financial information for this project has been forwarded. The only challenge with the budget is that we had remaining funds left over and wanted to continue to fund our graduate student. He did not start until July 2019 (the grant started April 2019) so we had more funds left over than anticipated. We requested a no-cost extension to use those funds up over the summer.

5.) EDUCATION AND OUTREACH ACTIVITIES. (Describe any conferences, workshops, field days, etc attended, number of contacts at each event, and/or publications developed to disseminate project results.)

A poster was presented at the MN Ag Expo in January 2020 with an estimated 15 participants interacting with our presenter and many more that passed through the poster session. Due to the COVID-19 outbreak, the scheduled in-person field day in June at the Southern Research and Outreach Center will likely be cancelled.