PROGRESS REPORT

PROJECT TITLE: Impact of Cover Crop Strategies on Productivity of Corn
PROJECT NUMBER: 4123-16SP
REPORTING PERIOD: Jul 1 – Sep 30, 2018
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1.) PROJECT ACTIVITIES COMPLETED DURING THE REPORTING PERIOD. (*Describe project progress specific to goals, objectives, and deliverables identified in the project workplan*)

The objectives of the project are to a) assess the viability of cover crop strategies on corn-soybean rotation under different tillage practices and b) determine the effect of cover crop strategies on growth and yield of corn and soybean produced across multiple environments. Experiments for objective (a) are conducted within the Long-Term Tillage Trial platform (LTTT) located in Lamberton and Waseca. Experiments for objective (b) are conducted within the Long-Term Agricultural Research Network (LTARN) located in Grand Rapids, Lamberton, and Waseca.

Both graduate students finished processing remaining samples from 2017, collected all planned data from the 2018 growing season, seeded cover crops, harvested grain of corn and soybean for yield, presented partial results at local and regional events, and prepared for poster and oral presentation at the meeting of the American Society of Agronomy in Baltimore. Our group actively participated in extension and outreach activities.

Cover crops and tillage practices (objective a)

Most activities during the reporting period were dedicated to crops management, data collection and lab analyses. The growing season ended well; we performed all activities as planned with eventual delays due to weather conditions that did not compromise our results.

As an example, our preliminary results show that [NO_3-N] in the leachate was different among locations, major crop, and cover crop strategy, and that was highest in conventional tillage plots without cover crops in Waseca (Fig. 1)

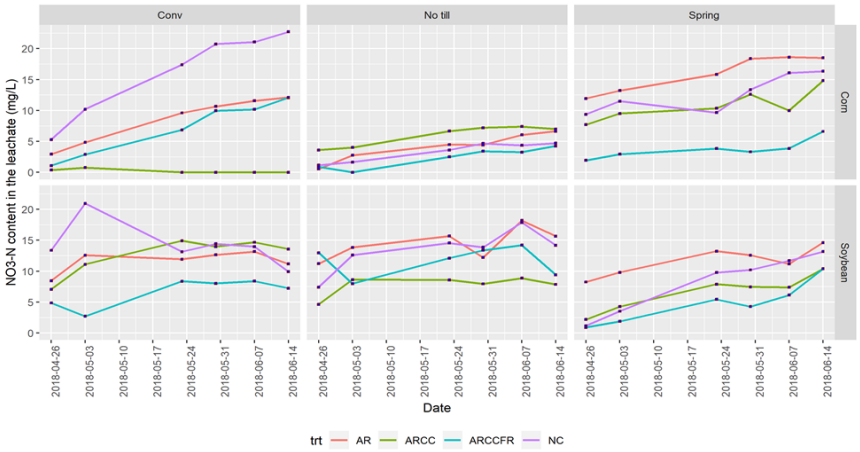


Figure 1 – NO_3-N in the leachate during the spring of 2018. Treatments are AR = annual rye, CC = crimson clover, and FR = forage radish.

Cover crops in multiple locations (objective b)

For both, early- and late-season interseeding of cover crops, most activities during the reporting period were dedicated to crops management, data collection and lab analysis. The growing season ended well; we performed all activities as planned with eventual delays due to weather conditions that did not compromise our results.

As an example, our preliminary results show that [NO_3-N] in the leachate was different among locations, major crop, and cover crop strategy, and that was similar among cover crops strategy in corn but different among cover crops strategy in soybean, with higher potential of nitrogen loses in plots with no cover crop and lowest in plots with cereal rye as monocrop (Fig. 2)

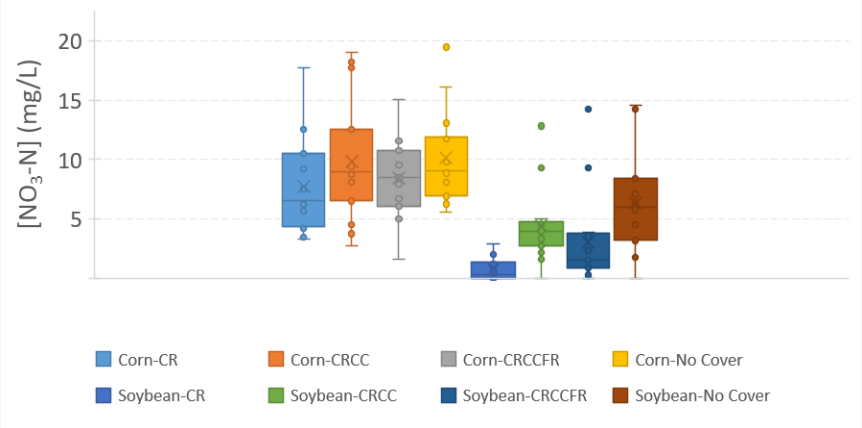
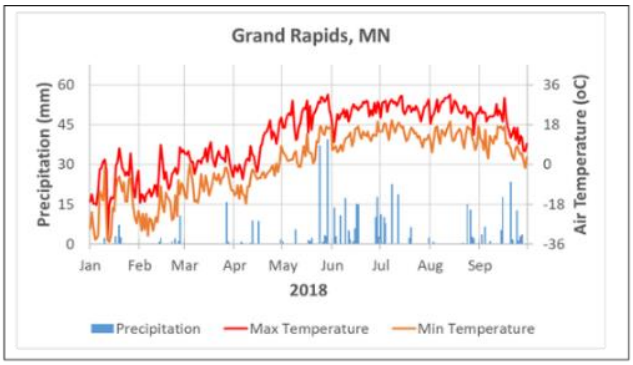


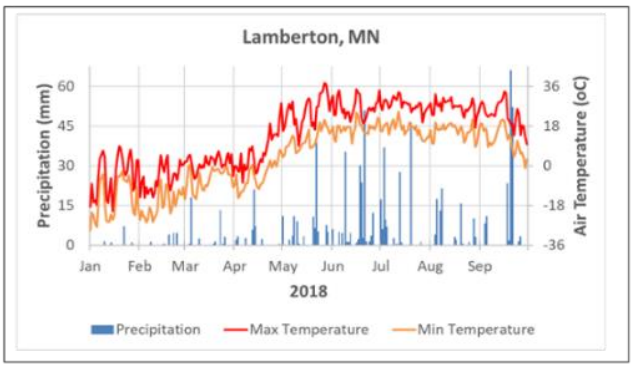
Figure 2 – NO_3-N in leachate during the 2018 growing season in Lamberton. Treatments are AR = annual rye, CC = crimson clover, and FR = forage radish.

Weather conditions in all locations

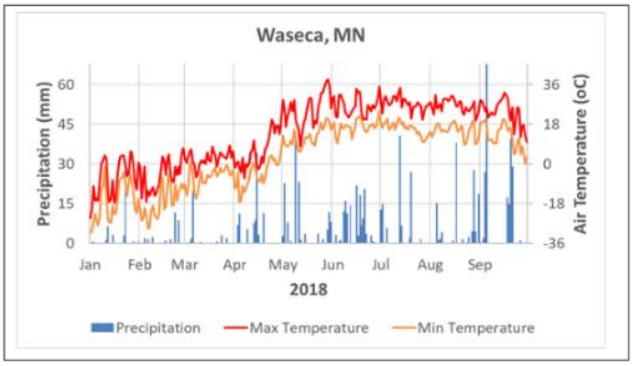
The reported period was wet, mainly in July and September. August was drier in Grand Rapids and wetter in Lamberton. Extremely wet conditions by the end of September difficult end-season activities, including seeding cover crops and harvesting major crops. The length of the growing season for major crops was around 139 days (May 13 to Sep 28) in Grand Rapids and 160 days (May 3 to Oct 9) in Lamberton and Waseca. Because of this, cover crops management in the region should be planned considering, as possible, in-season weather forecast. This is especially important for establishment and termination of the cover crops.



(A)



(B)



(C)

Fig. 6 – Weather conditions during the 2018 growing season at A) Grand Rapids, B) Lamberton, and C) Waseca.

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

1. While we still have to analyze the data, results show the potential benefits of cover crops, mainly reducing nitrogen loses in the leachate.
2. Consistently, since the beginning of this project, we have found that the most important factor affecting the success of cover crops use is the weather conditions during both, establishment and termination.

3.) CHALLENGES ENCOUNTERED. (*Describe any challenges that you encountered related to project progress specific to goals, objectives, and deliverables identified in the project workplan.*)

i. Although difficulties with weather conditions, winter rye was seeded into standing corn and soybean at all locations, major crops were harvested for grain yield, end-season data were collected, and instruments were winterized as needed.
ii. Lab analyses have been concluded on sample collected by mid-August; the remaining samples are being processed for lab analyses

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

No budgetary challenges to report.

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

Garcia y Garcia, A. 2018. Cover Crops in Corn-Soybean Rotations. MN-ASFMRA Meeting. SWROC. Sep 19. Attended: 14

Garcia y Garcia, A. 2018. Cover Crops in Corn-Soybean Rotations: Effects on yield and Environmental Benefits. Northeast Forage and Grassland Council Field Day. Jackson Farms of Blackberry. Grand Rapids, MN. Sep 6, 2018. Attended: 75

Garcia y Garcia, A. 2018. Cover crop research on timing. In: Managing risk with cover crops (Presented by L Stahl). 47th Annual Crop Production Field Day. Clarks Grove, MN. Sep 6, 2018. Attended: 60

Garcia y Garcia, A. 2018. Integrating Cover Crops into Corn-Soybean Rotations. NCIS Crop Hail Corn, Soybean, Dry Beans, and Wheat School Meeting. SWROC. Jul 19 Attended: 70