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

This project aims at evaluating the impact of different irrigation water management strategies including (1) in-field soil moisture monitoring using soil moisture sensors (T1), (2) University of Minnesota checkbook method (T2), (3) Irrigation management assistant tool-IMA (T3), and (4) crop growth model (EPIC) (T4) on corn yield and nitrate leaching. The other objective is to calculate the threshold trigger point for irrigation (comparing depletion in available soil water with soil matric potential) using Electric Resistance Sensors (watermark sensors) in coarse-textured soils. To accomplish these objectives, following activities were performed in this quarter:

- We prepared the plots for planting and planted corn in May 2020. There are total 12 plots (4 treatments replicated three times).
- We installed 12 neutron access tube to measure soil moisture up to 36 inch soil depth every week.
- We installed 24 suction cup lysimeters. There are two lysimeters per plot making total lysimeters in this study to be 24. All lysimeters are installed at 4 ft soil depth to capture nitrate-N leached below the corn root depth. The lysimeters are sampled every week and water samples are analyzed.
- 20 watermark soil moisture sensors (data is accessed online) were installed in the plots to compare them with neutron moisture meter data to develop tension based irrigation threshold trigger points. In addition to neutron access tubes, this year we installed volumetric water content capacitance Vegetronix™ soil moisture sensors connected to data loggers that delivers data on 30 min time interval remotely. This will enable us to
compare matric potential and volumetric water content measured on the same time scale.

- Two split nitrogen applications were done at V2 and V8 growth stage
- Plant samples were collected right before the V8 N application for nitrate analysis.

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

- We found that there is a difference between irrigation amounts and timing when different irrigation management strategies are used. Soil moisture sensor plots received 4.8 inches of irrigation, irrigation management assistant (IMA) plots received 2.85 inches irrigation, checkbook method received 3.85 inches irrigation and EPIC crop growth model 3.3 inches of irrigation.
- We have not yet analyzed the results of weekly water samples and plant samples collected in 2020 from the study.

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

- Working in the field in this COVID 19 situation was a challenge. We use all the safety measures to ensure that our crew as well as people who work with us outside the university are safe. The travel policy of one person per vehicle has increased the cost of travel.

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

- No challenge was encountered.

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.)

- We are organizing a virtual field (scheduled on 27th Aug) at SPRF, Becker, MN to provide technical information to area producers, crop advisors and agricultural dealerships about best water and nitrogen management practices.
- Presented the research update at the Irrigator’s association of Minnesota’s board meeting held on June 30th, 2020.
- Presented a poster titled “Evaluation and Performance of Different Irrigation Scheduling Methods and Their Impact on Corn Production and Nitrate Leaching in Central Minnesota” at the 2020 ASABE Annual conference.
- This research project is providing education and training opportunities for 1 graduate student (Gurparteet Singh) and undergraduate students in SWAC field crew.