

## EQUIPMENT INSTALLATION AND SAMPLE COLLECTION

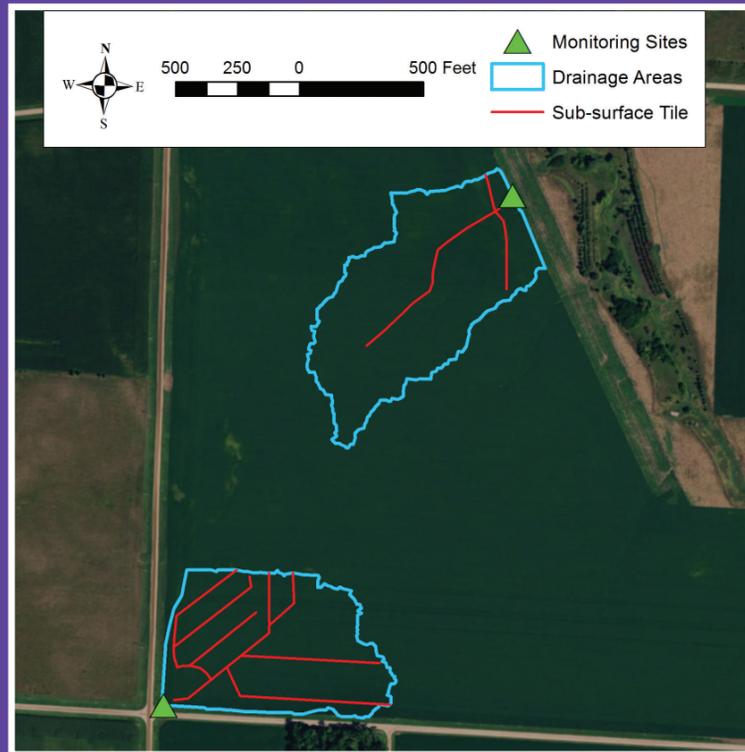
Water samples are collected automatically whenever runoff or tile flow from snowmelt or rainfall occurs. An Agri Drain structure, berm, and flume were installed in the fall of 2016 to connect to the tile system and direct water runoff from the field to a centralized point where water samples and total volume of water runoff data could be gathered. Weather station equipment was also installed to measure precipitation, air temperature, relative humidity, soil temperature, and volumetric water content of the soil.

Collected water samples are analyzed for sediment, total phosphorus, dissolved phosphorus, chloride, total kjeldahl nitrogen, ammonia nitrogen and nitrate-nitrogen. Water flow through the flume is recorded to calculate the total volume of water runoff. By combining the total volume of water runoff with the concentration of nutrients and sediment, it is possible to calculate the total amount of nutrients and sediment leaving the landscape.



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## TROST FARM Farm, Site and Study Design



The area outlined in blue delineates the monitored field. The red lines indicate subsurface tile locations. All surface runoff and tile flow in the monitored field moves in the same direction and flows through the water monitoring stations. The triangle indicates the location of the surface and tile water monitoring stations.

## CONCLUSION

The Discovery Farms Minnesota project at Curt Trost's farm is designed to provide information that will lead to a better understanding of how farm nutrient management practices can impact sediment and nutrient movement to surface waters. It is anticipated that monitoring will continue for five to seven years. The monitoring at Curt Trost's farm will help to identify strengths and challenges of similar farming systems and landscapes.

## FOR MORE INFORMATION, PLEASE CONTACT

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[WWW.DISCOVERYFARMSMN.ORG](http://WWW.DISCOVERYFARMSMN.ORG)



**mn** DEPARTMENT OF AGRICULTURE

**RCRCA**  
Redwood-Cottonwood Rivers Control Area

**MAWRC**  
MINNESOTA AGRICULTURAL WATER RESOURCES COALITION

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**DISCOVERY FARMS  
MINNESOTA**



## OVERVIEW OF OPERATION

Curt Trost's farm is located in Redwood County north of Wabasso, MN. Curt graduated from University of Minnesota, Morris with a degree in Economics and Business Administration in 1980. After graduation, he started farming, purchasing his first equipment from a neighbor who was retiring from farming. Curt started farming 350 acres owned by his Dad, Clete Trost. For 20 years after Clete retired from construction they farmed together. When Clete was ready to fully retire, Curt's son-in-law, Justin, started farming with Curt. Justin shares equipment and provides labor for the farming operation.

Currently the farming enterprise consists of 1,320 acres. Twenty acres were enrolled in the Conservation Reserve Program (CRP) in 2013 with approximately 20 acres in woods and wetland. All of the acres are tile drained. Curt was motivated to participate in the Discovery Farms Program because he wanted to know how fertilizer applications and tillage practices were affecting nutrient and sediment movement on his cropped fields. If management changes are needed, he is willing to adjust farming practices. An excellent example of this willingness was in the first year he was farming. The standard practice was to moldboard plow all acres in the fall. When Curt and his Dad observed the impact on soil erosion due to the moldboard plowing, they changed to the use of minimal spring tillage and fall chisel plowing to



increase the amount of crop residue on the soil surface. This helped to reduce the amount of soil movement. Curt's constant evaluation and conversations with experts has allowed him to improve farming practices, reduce soil losses, and improve water quality in effective ways.

## CROP PRODUCTION PRACTICES

Corn and soybeans are grown in rotation. Vertical tillage is utilized in the spring of the year with one or two passes depending on the amount of residue from the previous crop. A cover crop mixture of rye, clover, rape and radishes are flown on at tasseling time with termination by tillage in the spring of the year. Cover crops are utilized on 450 acres, with greatest success seeded into the soybean crop. Curt continues to investigate timing, application and cover crop mixtures.

Curt works diligently on his nutrient management plans. All acres are soil sampled in 2.5 acre grids every four years with crop nutrients applied based on the grid sampling. Typical corn nitrogen (N) applications are 145 pounds/acre of nitrogen as anhydrous ammonia and 5 gallons/acre of 10-34-0 with zinc as starter planted in 20 inch rows. Phosphorus and potassium applications are made in the fall of the year followed by the anhydrous applicator.

## LOCATION AND CLIMATE

Curt Trost's farm is located in the glacial till lowlands of the western corn belt plains region of Minnesota. The region is characterized by rolling topography and numerous rivers and streams. Rainfall and snowmelt that leave the farm flow to the Redwood River and then on to the Minnesota River. A large percentage of this region is farmed due to the productive agricultural soils. Average annual precipitation is 27.3 inches, most of which occurs during the growing season (May to September - 17.3 inches). The average annual snowfall is 41 inches.



## FARM AND SITE SELECTION

The initial site visit occurred in 2016 with a tour of fields to evaluate potential sites for surface water and tile flow monitoring. The farm was selected for the Discovery Farms program because the management practices used for crop production were representative of practices used in the region and there was a high probability of generating a robust and reliable data set.

Two surface runoff and tile flow monitoring sites have been established, the southern site is dominated with Amiret loam, and the northern site is dominated by Amiret-Swanlake loams. These are moderately well drained soils with good water infiltration, especially when there is residue on the soil surface. Tile drainage is utilized for adequate agricultural production for these soil series. These soil series have a water holding capacity of approximately 2.2 inches of water per foot of soil. The most recent soil sample results (0-6 inches) from the monitored field are summarized in the table below. The values for phosphorus and potassium are classified as medium to high.

Soil Sample Analysis of the Monitored Field		
Property	South	North
pH	6.4	6.2
Organic Matter Content, %	4.3	4.4
Soil Test Phosphorus (Bray Test), ppm	48	34
Soil Test Potassium, ppm	170	143
Nitrate-nitrogen 0-2' (lbs/acre)	39	25