On-Farm Research Measures Management Changes

Dane County Farms first to implement new technology to better evaluate effectiveness of conservation practices

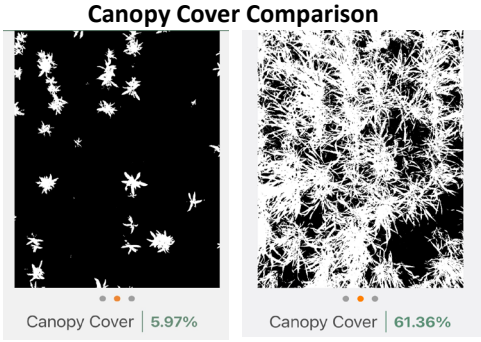
Situation: Farmers have limited options for overwintering cover crop species after corn and soybean crops due to a short time window for establishment before freezing. Cereal rye has been a reliable option that can help mitigate nitrate leaching that often occurs in the spring before the next cash crop is planted and the ground is typically fallow. However cereal rye can impact the following year's corn yield by reducing nitrogen availability. Farmers are interested in new species that can provide the environmental benefits without the agronomic tradeoffs. Winter camelina is an oil seed crop that the University of Minnesota has bred to overwinter and become a cover crop option in northern climates. Water quality monitoring on-farms is often expensive and disruptive, and therefore typical on-farm research and demonstration is limited to agronomic and proxy water quality measurements. In addition, very little groundwater quality monitoring has occurred within Wisconsin. The Ag community is interested in local on-farm data that can help quantify the impact of management changes.

Response: After identifying the need for more information on winter camelina and nitrate leaching within the county. Will Fulwider, Crops & Soils Educator, and Chelsea Zegler, Ag Water Quality Specialist, convened colleagues from Extension, UW-Madison CALS, and local producer-led groups to create a research protocol and recruit 3 farmers for participation in the study. Initial research has been conducted on winter camelina at the Dairy Forage Research Center (USDA) in Sauk County, but typically after corn silage harvest not soybean harvest. The goals of the research are to learn more about appropriate seeding rates and typical biomass accumulation, and to measure cover crop species' impact on nitrate leaching and corn yield. Farmer collaborators are members of Farmers for the Upper Sugar River or Yahara Pride Farms and have not conducted on-farm research before.

Chelsea and Will worked with Dr. Steven Hall, Agriculture water quality faculty member in the College of Ag and Life Science, to conduct nitrate leaching estimates. Resin "lysimeters" were placed below the root zone before cover planting in each plot to compare cumulative nitrate concentrations after the spring (when a majority of nitrate leaching occurs). The resin "lysimeters'' are a low cost alternative to tension lysimeters that measure both quality and quantity of water leaving the root zone. The Dane County on-farm research sites were the first implementation of this technology and will allow the agriculture and conservation communities to better evaluate outcome effectiveness of each conservation practice.

Chelsea and Will just finished removing over 80 resin lysimeters, 50 soil samples and 25 cover crop biomass samples from the research locations and will continue to monitor the fields throughout the growing season. Farmers for the Upper Sugar River have already discussed initial growth of the cover crop at a spring meeting and we envision results from the project will be presented at both producer-led groups annual meetings. Discussing research results will give Extension an opportunity to connect practices with outcomes and focus on factors that contribute to nitrate leaching. This is a vital next step since most of the programming in Dane County has focused on phosphorus and surface water quality.

Canopy Cover Comparison



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Results: Samples are still being processed and corn is still being planted, but initial results demonstrated differences in cover crop species establishment success. Cereal rye out performed winter camelina at most locations, indicating adjustments in seeding rate or drill settings are necessary. However, winter camelina survived the winter and at one location was a similar height to cereal rye. Winter camelina was starting to flower May 6th in Verona, showing its benefit to pollinators. There has been initial excitement from farmers in using winter camelina as a forage or cash crop. Using winter camelina in a cover crop species mix may help farmers qualify for different cost-share opportunities and increase diversity into their systems. We plan to continue the research project in 2025, including adding a drone seeding treatment.

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