

ONFARM CASE STUDY

OVERVIEW

Henry Denotter, a farmer in southern Essex County, has handcrafted a unique cast iron fish to represent his key messages about his on-farm trials focused on water quality. “It all comes back to the water,” says Henry.

The fish depicts his Signature Philosophy of Conservation Farming and is made up of a patchwork of tools. The body of the fish, made from wrenches, represents the various farming practices Henry uses to keep his yields high and water clean. These practices include no till, strip tillage, and cover crops.

The fish’s eye represents the “watchers” who look out for and monitor the water. These “watchers” are the Essex Region Conservation Authority (ERCA) staff, who collaborate with Henry on his research.

Henry operates Denotter Farms with his wife Kathy and son Jeremy. The family have a corn-soybean-wheat rotation and plant their crops in 20-inch rows. The Denotters farm Brookston Clay, which can be finicky and unforgiving to cultivate. So, they are dedicated to finding the optimal management practices to conserve soil and water health while improving the profitability of their operation.

About eight years ago, Henry spoke with Dr. Katie Stammler, ERCA’s Water Quality Scientist and Source Water Protection Project Manager, at a local Soil & Crop Improvement Association meeting. She sought a site to conduct water quality research, and Henry agreed. They started with some preliminary jar tests, comparing the visual differences between the run-off water from the part of the field with cover crops and the run-off from the part of the field without cover crops. This experience served as an “aha” moment for Henry; he saw vast differences in the run-off and wanted to investigate further.

Since then, Henry and Katie have collaborated on several projects – including the On-Farm Applied Research and Monitoring (ONFARM) program.

Henry Denotter's Signature Philosophy of Conservation Farming

The Henry Denotter Signature Philosophy of Conservation Farming



The fish's eye represents “the watchers” i.e. those looking out for and monitoring our waters

The wrenches represent the various technologies (farming practices) undertaken and developed to keep yields high and water clean.

Denotter Farms



AT A GLANCE

Farmer name: Henry Denotter

Location: Lambton, Essex County

BMP: Comparison of three different cover crop mixes including a biostrip treatment

Soil health goals: Improve nutrient availability and minimize compaction

Edge-of-field site goals: Improve water quality by decreasing the amount of organic or soil matter leaving the field in the surface water

WHAT IS ONFARM?

The On-Farm Applied Research and Monitoring (ONFARM) program is completing extensive soil health and water quality analysis on 32 farm sites across southern Ontario. This network of sites and newly established partnerships will help to build a stronger understanding of best management practices (BMPs) and their effect on soil health and water quality on Ontario farmland.

ONFARM WATER QUALITY DATA COLLECTION

- The Essex Region Conservation Authority (ERCA) team is conducting this research
- Automated sampler in the creek near Henry's site; located downstream from his farm
 - Pulls water samples every two weeks, as well as after each rain or snowmelt event
- Another station further upstream is used to gather water samples every two weeks
- Water samples are analyzed for nutrient content, total suspended sediment, and loading calculations
- Measure the amount of water that leaves Henry's fields
- Collect water samples from surface flow in Henry's fields during the biggest rain events
 - Analyze the nutrients and total suspended sediment in these samples
- The Soil Resource Group, led by Principal and Research Agronomist Don King, is also collecting soil parameters, including conducting soil health indicator tests

THE TRIALS

Through his ONFARM work, Henry is comparing three different cover crop mixes. Typically, he prefers keep things simple by selecting cover crops that will die over the winter. As he has heavy soils, Henry is mindful of residue cover in the spring; he needs to ensure the fields dry out in a timely manner for planting.



V-notch weirs allow for easier data collection at Henry's site.

Henry seeks to learn how the BMPs of cover crop and surface runoff flow path protection influence the nutrient content in the water run-off, improve nutrient availability in the soil, and minimize soil compaction.

In 2020, Henry grew soybeans under no-till management and planted winter wheat in October. In 2021, he seeded a buckwheat cover crop after wheat harvest. In 2022, he burnt down the cover crop and used an air seeder to apply his fertilizer. Then, Henry planted corn under no-till management.

Henry also "rigged up" a machine and planted a 10-foot-wide strip of cover crops into one of the farm swales (water-harvesting ditches) in 2022. Henry is interested to see if this cover crop will "make a notable difference in the quality of the water coming off of the field," he says.

Run-off from Henry's farm goes directly into Wigle Creek, a priority sub-watershed and fast-moving municipal drain located alongside the road.

Henry and Katie collaborate to track how much nutrients and total suspended sediment from the farm end up in the run-off during heavy rain events.

To collect the run-off, previously established farm swales are accompanied by newly installed v-notch weirs ("v" shaped low dams that allow a steady flow of run-off) to allow for easier data collection. All the surface water must flow over the v-notch weirs. When it rains, ERCA technicians come out to Henry's farm and record how much water is moving.

This water quality research is in its beginning stages, says Katie. ONFARM will share the trial results as they become available.

LIVING LABORATORIES

In addition to his ONFARM trial, Henry participates in the [Living Laboratories Initiative](#). Through this project, Henry collaborates with OSCIA, ERCA and scientists from Agriculture and Agri-Food Canada and Environment and Climate Change Canada. The collaborators seek to use a range of BMPs – including a no-till management system, [4R Nutrient Stewardship](#) for fertilizer applications, and a strong crop rotation – to reduce nutrient losses from the field. Researchers are studying water quality, nutrient movement, and soil movement.

THE SUCCESSES AND CHALLENGES OF THE TRIALS

The main success of the ONFARM trial so far has been building relationships with other farmers to solve a common challenge, says Henry. This collaboration is crucial to learning how various BMPs impact both soil and water health.

Through ONFARM, Henry and Katie have had the opportunity to exchange knowledge with farmers and researchers in different watersheds. For example, the pair have consulted researchers at other edge-of-field sites with longer-term trials to learn about their strategies for success.

“These trials have also taught me a lot more about how nutrients move off the land,” says Henry.

The trials underscore the holistic nature of farming, and how soil health and water quality are fundamentally interrelated, he adds.

Although Henry has learned a lot through these trials, he and Katie have also faced challenges. Unpredictable weather, including big snow and melt events, can skew results of the run-off data. For



Snowpacks can pose challenges during snowmelt events.

example, “if you have a snowpack behind the v-notch weir and the snow starts melting, you might not catch the whole melt event” with the system, Katie says.

And the team does not have permanent stations set up in the field, so they must monitor the weather and plan accordingly, Katie adds. When the team expects big rainfall events, they need to put the ISCO portable sampler in the field to gather the water samples. This sampler has an intake line that draws a water sample into a new bottle every four hours. As a result, researchers have access to discrete samples collected throughout the course of the rainfall event.

Water quality projects like Henry’s take years to develop. Katie and Henry, in collaboration with all the other ONFARM edge-of-field sites, are working hard to get a system going that can be sustainable. They are dedicated to the collection of long-term data, which can provide clear insights into how soil health BMPs affect water quality.



ISCO samplers are used to gather samples from field run-off. *Photo courtesy of Maitland Valley Conservation Authority.*