

 **ONFARM**

FORUM2022

Summary Report



WILTON
CONSULTING GROUP

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1.0 Executive Summary

The 2022 ONFARM Forum, hosted by the Ontario Soil and Crop Improvement Association (OSCIA), showcased the important work underway through the On-Farm Applied Research and Monitoring (ONFARM) program. This applied research initiative supports soil health and water quality research on farms across Ontario.

The main takeaways from the Forum are as follows:

- A. On-farm research positively impacts the agri-food sector.
- B. Collaboration is a key strength of the ONFARM program; this collaboration must be supported through meaningful relationships and strong communications.
- C. A systems approach, involving a range of agri-environmental stakeholders, is necessary to improve soil health and water quality.
- D. Given the variability across landscapes and soil types, it is important to study BMPs at the local level.
- E. Long-term on-farm research is vital to understand the effects of BMPs on soil health and water quality.

Through the discussions at the Forum, the following next steps were identified:

- 1) Host a series of ONFARM Data Dashboard Lunch & Learns to support industry use and analysis of ONFARM data.
- 2) Convene a roundtable of ONFARM Cooperators and industry researchers to increase collaboration among industry stakeholders.
- 3) Create a series of soil health two-pagers to explain the soil health indicators and summarize key research findings.
- 4) Host ONFARM Field Days to showcase the soil health and water quality best management practices in action.
- 5) Plan the 2023 ONFARM Forum to increase engagement with the agri-environmental community.

The report that follows provides an overview of the ONFARM program as well as a summary of the discussions and key takeaways from the Forum.

2.0 Introduction

The Ontario Soil and Crop Improvement Association (OSCIA) hosted the 2022 On-Farm Applied Research and Monitoring (ONFARM) Forum on Zoom the morning of February 10th.

The Forum provided an update on the latest on-farm findings in support of soil health and water quality. Dr. Joshua Faulkner, a Research Assistant Professor for University of Vermont Extension, provided the keynote presentation. He discussed on-farm water quality research and networking for climate resiliency. The Forum also highlighted the successes and challenges in the second year of the program. ONFARM cooperators shared their experiences with best management practices and applied research, and researchers from OSCIA, the Soil Resource Group, Conservation Authorities, and the University of Guelph discussed their findings. Attendees participated in one of two concurrent sessions to take a deeper dive into either ONFARM soil health case studies or ONFARM edge-of-field water quality case studies.

The event facilitated the following outcomes:

- ✓ Supporting soil health and water quality knowledge translation and transfer
- ✓ Building the profile of the ONFARM program
- ✓ Fostering collaboration and enthusiasm for on-farm research

In total, 232 people registered for the event. The top three primary professions of registrants were government staff/officials (28%), farmers (21%), and non-profit/non-government organization (NGO) staff (16%).

Over 168 people participated in the Forum. Participants joined the Forum from across Ontario, with most (67%) connecting from Southwestern Ontario. (See Appendix 7.2 for more information about Forum registrants and participants.)

3.0 Context: ONFARM Program

The ONFARM program is a four-year applied research initiative that began in 2019. The project supports soil health and water quality research on farms across Ontario. This program is funded by the *Canadian Agricultural Partnership*, a five-year federal-provincial-territorial initiative. ONFARM was developed by the Ontario Ministry of Agriculture, Food and Rural Affairs (OMAFRA) and delivered by OSCIA with the support from various organizations including Agriculture and Agri-Food Canada (AAFC), five Conservation Authorities and the Soil Resource Group. ONFARM is also supported by a network of farmer cooperators, who are essential to the success of this program.

ONFARM builds on work completed under the Great Lakes Agricultural Stewardship Initiative's (GLASI's) Priority Sub-watershed Project (PSP). ONFARM supports Ontario's Soil Health and Conservation Strategy, and helps the industry meet commitments under the Great Lakes Water Quality Agreement.

The three pillars of ONFARM that will benefit Ontario's agricultural industry are:

- 1) Continuation of the monitoring and modelling established in the Priority Sub-watersheds,
- 2) Establishment of on-farm paired trials in-field to identify soil health indicators and test the effectiveness of best management practices in cooperation with farmers,
- 3) Enhanced engagement opportunities with stakeholders and farmers to foster a network of demonstration farms.



Figure 1. Pillars of ONFARM

ONFARM stakeholders operate eight edge of field sites in the PSP regions, and 25 soil health best management practice (BMP) sites across five regions of the province. (See Figure 2.)

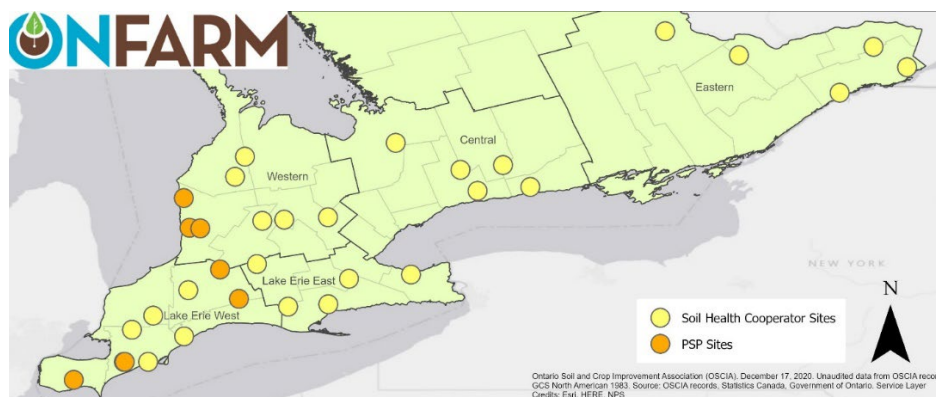


Figure 2. Location of edge of field and soil health BMP sites across Ontario

4.0 Summary of Forum Discussions

4.1 Welcome & Setting the Stage

The Forum began with a welcome from Dr. Angela Straathof of OSCIA, as well as Andrew Jamieson and Assistant Deputy Minister Kelly McAslan of OMAFRA. The Forum Introduction can be viewed [here](#).

Key Points:

- The ONFARM program is key for OMAFRA, as it supports several Ministry initiatives, such as [Ontario's Agricultural Soil Health & Conservation Strategy](#), and the [Canada-Ontario Lake Erie Action Plan Initiative](#).
- The partnerships at each site are key to building stronger understanding of the BMPs and their effects on soil health and water quality on Ontario farmland.
- ONFARM sites provide an excellent bridge between academic research and the real-world, field-scale experience. This bridge is a critical steppingstone on the path from pilot-scale research to accepted BMPs on the farm.
- ONFARM provides evidence to motivate further adoption of water quality and soil health BMPs through on-farm knowledge sharing; this work complements the efforts of farmers, landowners, conservation authorities, government, and NGOs in increasing the adoption of BMPs.
- Economics are top of mind for farmers. So, ONFARM also focuses on cost efficacy of the implementation of BMPs, as this information helps to inform the adoption of BMPs.
- ONFARM results will help OMAFRA be more strategic in forming program development and thinking on important environmental stewardship initiatives, such as the [Lake Erie Agriculture Demonstrating Sustainability](#) program.



4.2 Keynote: On-Farm Water Quality Research and Networking for Climate Resiliency

Dr. Joshua Faulkner, who coordinates the Farming and Climate Change Program in the University of Vermont's Extension's Center for Sustainable Agriculture, provided the keynote address. Joshua's keynote can be viewed beginning at approximately minute 13 in [this video](#).

Dr. Joshua Faulkner is a Research Assistant Professor for University of Vermont (UVM) Extension. He has coordinated the Farming and Climate Change Program in UVM Extension's Center for Sustainable Agriculture since 2013. Joshua conducts applied research, outreach, and education on soil, water, and nutrient-related issues across the state and works with farmers on practices and innovative solutions to improve the management of these resources and enhance farm resilience to climate change. His focus spans all agricultural sectors, and extends from the farmstead to the watershed scale.



Key Points:

- The changing climate, and particularly the increased number of storms with heavy participation, is challenging for farmers, in terms of both soil health and water quality. A key concern is phosphorous loading in Lake Champlain.
- The Extension Centre's work is underway at the watershed, field, large-plot, small-plot, and really small-plot scales.
- The watershed scale involves documenting land use and conversation practices on every field and every farm and correlating water quality and soil health. Researchers also study the effect of the treatment (i.e., the application of the BMP) and the control.
- The field-scale research involves monitoring surface run-off, studying the effects of drainage and what BMPs minimize phosphorous losses.
- Large plot-scale research is underway at Discovery Farms Vermont. Here, researchers monitor four large plots (two drained and two undrained plots) on a single field, studying the effect of tile drainage paired with BMPs on water quality.
- In the small-plot scale work, researchers set up rainfall simulators to produce rainstorms and study runoffs from various manure applications.
- In the really small plot-scale work, researchers measure what leaches down the soil profile on working farms.
- On-farm research can inform programs and policies at the state and federal levels. The goal is to help farmers with cost-share and technical support. However, the process takes time; a minimum of five years is necessary to get good results from paired watershed studies.
- To build relationships with farmers, it is vital to be on farm, talking to farmers and building trust. The assistance of long-term extension staff is also key.

4.3 Highlights from ONFARM's Second Year

Next, a panel of speakers shared highlights from ONFARM's second year. The speakers were as follows:

- Don King of the Soil Resource Group
- Craig Irwin of the Upper Thames River Conservation Authority
- Dr. Wanhong Yang of the University of Guelph
- Dr. Angie Straathof of OSCIA

The video of this panel can be viewed [here](#).

Key Points from Don King:

- BMPs (e.g., cover crops, organic amendments and reduced tillage) are being evaluated for their impacts on soil health.
- Soil health assessments at ONFARM sites identified a range of degradation severity. Across Southern Ontario, historic tillage erosion was the predominant form of soil degradation, followed by near surface soil compaction.
- Degradation impacts plant growth and productivity, which reduces yields.
- Soil health indicators show significant differences by soil type and landscape position. Organic matter increases with clay content and lower position. Indicators have a positive relationship with organic matter.
- Although the effects of BMPs on soil health indicators are unclear after the first year, preliminary results suggest a measurable effect of BMPs at some sites. Sensitive indicators shift more than the change in organic matter.
- Farmer-led research is key to practical BMP knowledge transfer.
- A long-term commitment is necessary to see a change in the soil.

Key Points from Craig Irwin:

- Through the Land Management Surveys, Conservation Authority staff work with producers within Priority Sub-watersheds to collect data about farming practices, crops, fertilizers, cover crops, and BMPs.
- The participating Conservation Authorities are Maitland Valley Conservation Authority, Ausable Bayfield Conservation Authority, Upper Thames River Conservation Authority, Lower Thames Conservation Authority, and Essex Region Conservation Authority.
- Researchers use GIS (geographic information systems) to streamline data collection and the data will be used by the watershed modelling team.

Key Points from Dr. Wanhong Yang:

- Integrated Modelling for Watershed Evaluation of BMPs (IMWEBs) is a cell-based watershed hydrologic model. It is designed for studying water quantity (drought and flooding) and quality (sediment and nutrients) effects of agricultural BMPs at location, field, farm, watershed, and river basin scales. IMWEBs integrates with economic costs, carbon sequestration and biodiversity benefits of BMPs, such as controlled tile drainage.
- The Ecosystem Services Assessment Tool (ESAT) will:
 - Explore watershed conditions (such as hot spots)
 - Assess existing BMP projects (such as water quality benefits)
 - Target BMP projects based on cost effectiveness
- The goal of this work is to:
 - Establish and improve coefficients of BMP effectiveness in reducing nutrient and sediment loss at the Edge of Field and sub-watershed levels
 - Assess the cost effectiveness of these practices
- The ONFARM modelling results will be used to inform and assist with developing phosphorus loss estimates and remediation costs for larger geographies, such as the Lake Erie basin.

Key Points from Dr. Angela Straathof:

- OSCIA hosted two in-person ONFARM demonstration events in Fall 2021, welcoming a total of 75 participants.
- OSCIA partnered with the Ontario Soil Network to include seven ONFARM cooperator sites on the [Ontario Soil Road Trip App](#). Visitors can view the sites on their desktop or mobile devices, or “check-in” at the sites in person.
- Four Enhanced Demonstration Sites will enhance stakeholder and farmer knowledge transfer and will be supported by leveraged collaboration and investment.
 - Selection criteria included location, soil type, operation type, BMPs, commitment to long-term research, engagement with on-farm research or other research networks, etc.
- The Enhanced Demonstration Site cooperators are:
 - Norm Lamothe of Peterborough County
 - Brett Israel of Wellington County
 - Tyler McBlain of Brant County
 - Henry Denotter of Essex County
- Although only four Enhanced Demonstration Sites were established, collaborating with other cooperators on engagement and knowledge transfer activities will remain a priority of the program.



Figure 4. ONFARM Enhanced Demonstration Site Cooperators

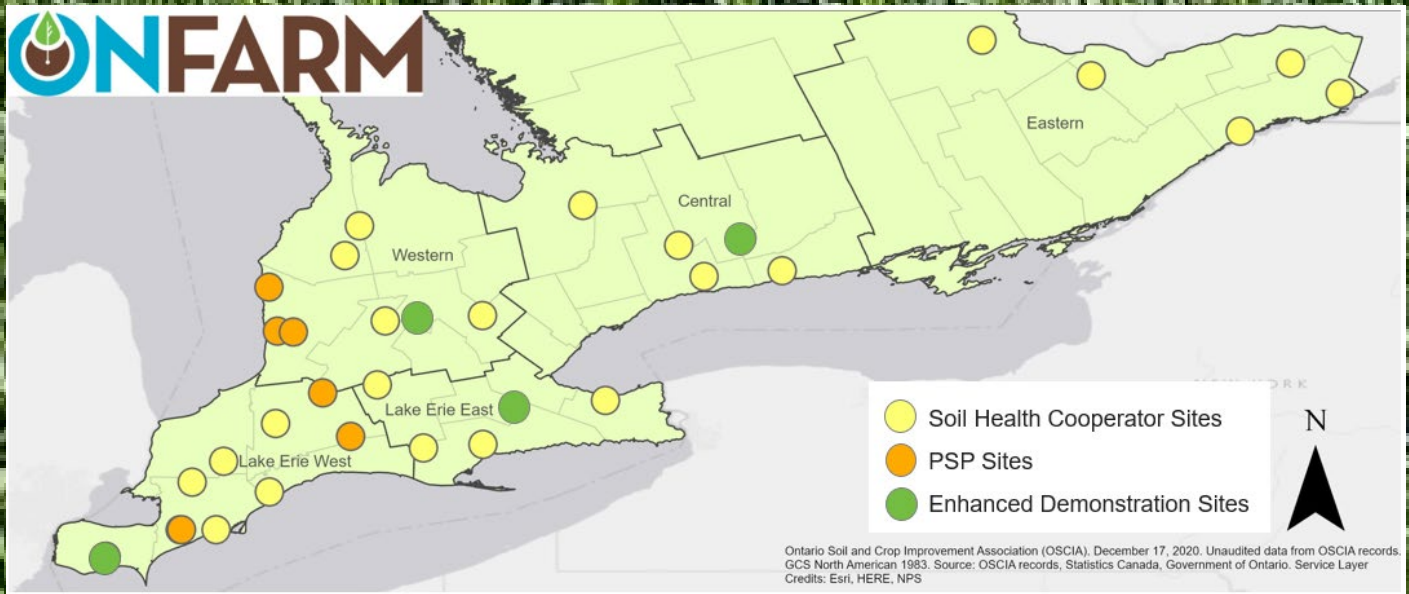


Figure 3. Map of ONFARM Enhanced Demonstration Sites

4.4 Concurrent Session A: ONFARM Soil Health Case Studies

Ed Roodzant and Tyler McBlain, both ONFARM cooperators, shared their soil health journeys and the changes they have seen in their soils. Adam Hayes and Margaret Ribey, both of SRG, shared some preliminary findings from these trials. The video of this concurrent session can be viewed [here](#).

Speakers: Adam Hayes, SRG
Ed Roodzant, PER Farms Corp. & ONFARM

Key Points:

- Ed Roodzant's soils range from loamy sand to sand textured soils. The soils in the plot range from rapid to poorly drained, and the lower landscape position has high organic matter at about 6%.
- Ed's soil health journey is documented in Figure 5 below.
- Since implementing the BMPs of no-till/reduced tillage and organic amendment applications in 2005, Ed has seen:
 - A 1.2% increase in organic matter levels on sandy soil
 - Improved drainage
 - Decreased erosion of soil and nutrients
 - Increased earthworm activities
 - Darker and richer-in-colour soils
 - Increased and more resilient yields in adverse growing conditions

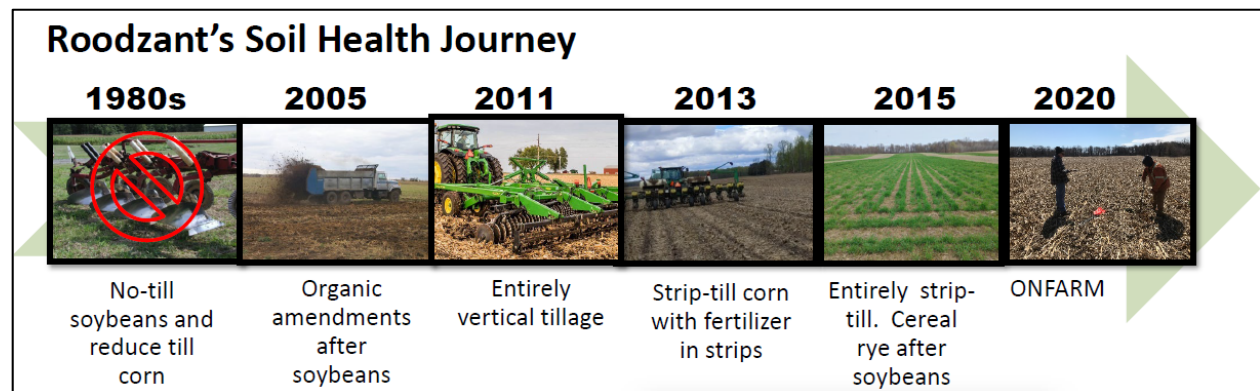


Figure 5. Ed Roodzant's soil health journey

Speakers: Margaret Ribey, SRG
Tyler McBlain, McBlain Farms & ONFARM

Key Points:

- Tyler McBlain’s soils range from silt loam to clay textured soils. The soils range from poor to moderately drained. There is a 5% slope in the plot. The more recently acquired farm, next door to the home farm, has lost about 41 centimetres of topsoil on the upper slope position.
- The McBlain family’s multi-generation soil health journey is documented in Figure 6 below.
- Since 1995, the McBlain family has seen:
 - Improvements in their soil structure
 - The clay soils become more forgiving
 - Improved water-holding capacity and drainage
 - Higher earthworm populations
 - Reduced erosion
 - Increased yields
 - An evening out in the variability of the farm
- Tyler is conducting side-by-side trials on the home farm and the neighbouring farm, with the same treatments on each farm.
- Organic matter levels and aggregate stability values on the home farm indicate improvements to soil health due to BMPs.

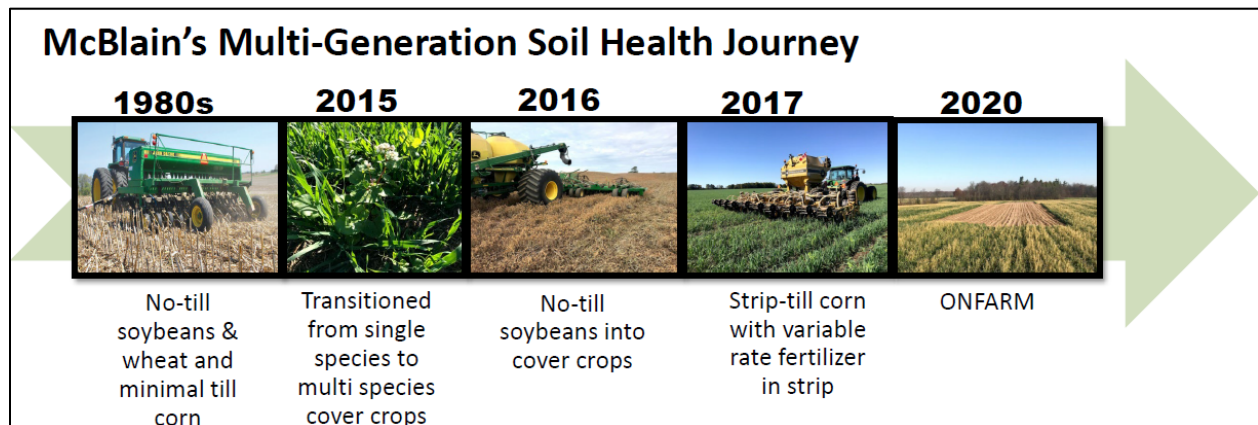


Figure 6. The McBlain family’s multi-generation soil health journey

4.5 Concurrent Session B: ONFARM Edge-of-Field Water Quality Case Studies

Henry Denotter, an ONFARM cooperator, and Dr. Katie Stammler, the Water Quality Scientist with Essex Region Conservation Authority, shared their journey investigating the effects of cover crops and other BMPs on the quality of water run-off in Essex's priority sub-watershed, Wigle Creek. The video of this concurrent session can be viewed [here](#).

Key Points:

- The priority sub-watershed within Essex Region is Wigle Creek which is a fast-moving municipal drain located beside the road.
 - Henry farms with his family in Southern Essex County, growing corn, soybeans, and wheat. Henry's farm drains directly into the creek.
- Katie and Henry want to know how much water and nutrients move off the field during rain events. Farm-scale loss of nutrients can be analyzed through water run-off.
 - Measuring run-off can allow Henry and Katie to see how on-farm BMPs (i.e., implementation of cover crops) can change water run-off composition.
- Farm swales (water-harvesting ditches that collect water run-off from the farm fields) were already established. V-notch weirs (a "v" shaped low dam which raises the water on the upstream side allowing water to flow steadily to the other side) were installed recently to ensure the water run-off, and associated nutrients, does not escape into the creek and surrounding land before samples are taken. A level logger was also installed to monitor water level.
- Henry and Katie's "aha" moment sparked when they compared water quality with and without cover crops.
- Successes of the edge-of-field trials include:
 - Building relationships with farmers to solve a common challenge
 - Knowledge and expertise sharing across different watersheds
 - Learning about how nutrients move off the land
- Challenges of the edge of field trials include:
 - Unpredictable weather, as well as snow and melt events
 - Equipment failures
 - COVID-19 restrictions
- A cast-iron fish encapsulates key messages about Henry's on-farm trials focused on water health. See Figure 7 below.
- Projects like Henry's take years to develop. Katie and Henry, in collaboration with all the edge-of-field sites are working hard to get a system going that can be sustainable. Gaining long-term data is important.

It is all about the water!

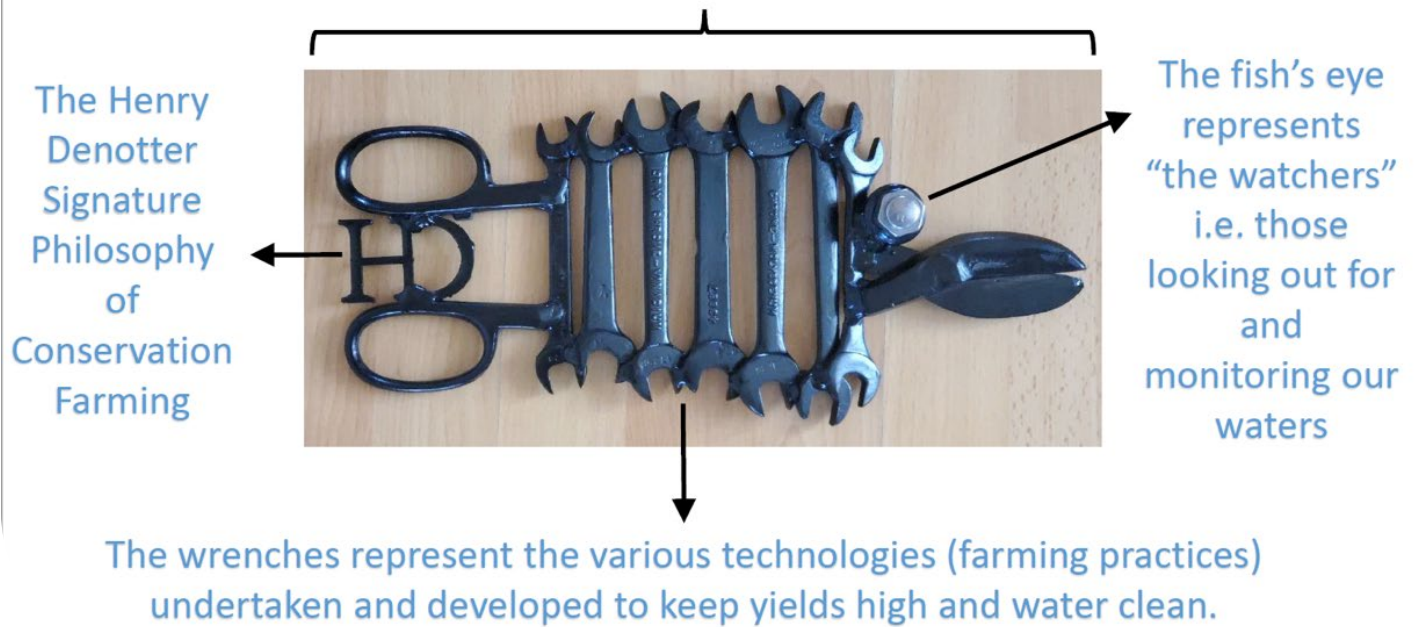


Figure 7. The Henry Denotter signature philosophy of conservation farming

Check out [this video](#) to see how Henry Denotter plants his buckwheat!



4.6 Key Takeaways from Concurrent Sessions

Woody Van Arkel of Van Arkel Farms and the Ontario Soil Network and Mari Veliz of the Ausable Bayfield Conservation Authority shared some key takeaways from the concurrent sessions.

Key Points:

- Implementing BMPs and seeing the results of those BMPs is a long-term journey; soil health and water quality results do not happen overnight.
- Producers can face challenges along the way (e.g., decrease in yields in first year or two using cover crops), but producers make long-term commitments to this work.
- As soil health improves, soils become more forgiving. Crops become more resilient to extreme weather events and become more even across the field. Producers also see reduced erosion and increased organic matter.
- Longer-term data collection is key to ensure accurate results.
- Side-by-side comparisons and water quality samples can provide “aha” moments of the benefits of BMPs. Individual producer stories can resonate with others.
- Collaboration from the field level, through to the University of Guelph modelers, is vital.

4.7 Data Visualization Dashboard Demonstration

James Cober of the OSCIA unveiled the [ONFARM Data Dashboard](#), which is a new tool from OSCIA to share the ONFARM dataset. The Dashboard is designed for users to interact with the soil health data to explore relationships. The video of this demonstration can be viewed [here](#).

The dashboard is a first edition; OSCIA and SRG will update content as new results are analyzed. For example, the dashboard will break down the effects of the many cover crop and organic amendment treatments on all ONFARM sites, and evaluate the data through soil health assessment protocols.

Participant Responses to the Dashboard Demonstration

“The dashboard is great for making ONFARM data accessible.”

“Filtering function 😊 😊”

“The Dashboard is fantastic! So useful.”

“Power BI is powerful for data visualization. In this case, it is very helpful to pull out context of results that may apply to your own farm.”

4.8 Partnership Announcement

Dr. Angela Straathof of OSCIA and Erin MacGregor of Syngenta collaborated to share an exciting ONFARM partnership announcement. In 2022, OSCIA will offer enrollment in Operation Pollinator exclusively to ONFARM cooperators who opt in. These cooperators are well positioned to showcase the benefits of agricultural biodiversity and disseminate their knowledge to other farmers. OSCIA will leverage knowledge transfer and engagement activities at these sites to demonstrate the co-benefits of soil health and biodiversity. The video of this announcement can be viewed [here](#), beginning at approximately minute 8.

Operation Pollinator

- An international biodiversity program from Syngenta
- Helps restore pollinators in agricultural, golf course and other landscapes by creating essential habitats
- Provides participants with the opportunity to redirect land considered to be lower in productivity to the establishment of pollinator-friendly habitats for bees and other insects
- Offers a practical and meaningful way to increase and improve biodiversity on the farm

Participants convert one to two acres of land to a dedicated Operation Pollinator site and receive financial assistance to support site preparation, maintenance costs as well as agronomic information and signs for the site.



4.9 Leveraging the Benefits of On-Farm Research

A panel of farmers, researchers and industry representatives explored how to best leverage the benefits of on-farm research. Participants included Dr. Clint Truman of Syngenta, Jennifer Doelman of Bonnechere Haven Farms and ONFARM, Dr. Joshua Faulkner of the University of Vermont Extension, and Norm Lamothe of Woodleigh Farms and ONFARM. The video of this panel discussion can be viewed [here](#), beginning at approximately minute 15.

Key Points:

- Collaborations and on-farm programs such as on-farm allow farmers to explore and better understand farming practices that work within their zones.
- It is important to generate and share local data to create buy-in and inform policy surrounding soil and water health solutions.
 - Farmers are skeptical of results generated outside of their region due to climate and soil differences.
- Controlled experiments are important and have their place, but they don't showcase real-life conditions. On-farm research is so important for approaching soil and water health challenges from a holistic lens.
- Building trusting relationships between farmers and researchers is one of the most important aspects of on-farm research.
- The ONFARM program allows farmers the ability to quantify results on farm.
- Neighbouring farms can see how ONFARM sites are making the BMPs work. Then, they can implement similar solutions on their farms.
- Panelists shared the following advice for farmers interested in pursuing on-farm research:
 - Start small and start by tackling your biggest barrier.
 - Assume you know nothing. Go in with an open mind, have realistic expectations, and work on one variable at a time.
 - Farmers should ask researchers to explain everything in plain language.
 - Communication and expectations are huge. Walk before you can run. Take a stepwise approach when tackling on-farm issues.



"Soil health benefits and water quality management go hand in hand."

- Dr. Clint Truman

4.10 Closing Remarks

The Forum ended with remarks from Nick Stokman, an ONFARM cooperator from Middlesex County.

Speaker: Nick Stokman, ONFARM

Key Points

- Every year is a learning experience.
- While each ONFARM cooperator's farm is different, they have shared overarching goals: improved soil health, water quality, resiliency, and environmental and economic sustainability.
- It takes time to see differences resulting from the implementation of BMPs.



Figure 8. Nick Stokman

Enthusiasm from the chat

"Thanks to all involved in the Forum today. Great sessions and great speakers. I look forward to exploring the Dashboard in the near future."

"Life is easy when the small plot and field scale results match up. Life is real when we get results that appear to be contradictory, and we can dig into what is creating the differences!"

"Brilliant staging of this ONFARM Forum. Awesome speakers and content, well organized, and smooth execution. Kudos to OSCIA, Wilton Group, and OMAFRA."

"Plot work takes the cooperation of all involved – researchers, custom operators, and producers – and setting up trials to be workable for all involved."

"Telling stories and aha moments build the strength of the stories that come from the data and the modelling."

5.0 Main Takeaways

A. On-farm research positively impacts the agri-food sector.

- ✓ On-farm research enables a variety of agri-environmental stakeholders – including farmers, Conservation Authority representatives, government officials, and researchers – to come together and share their knowledge and expertise on topics such as soil health and water quality.

B. Collaboration is a key strength of the ONFARM program; this collaboration must be supported through meaningful relationships and strong communications.

Through collaboration, on-farm researchers can:

- ✓ Enhance troubleshooting strategies
- ✓ Optimize crop quality and yields
- ✓ Improve the sustainability of the agricultural industry by supporting soil health and water quality
- ✓ Develop a foundation for other producers to apply research-based solutions on their farms

C. A systems approach, involving a range of agri-environmental stakeholders, is necessary to improve soil health and water quality.

- ✓ This range of stakeholders allows for a more holistic approach to improving soil health and water quality. Academic researchers working alongside on-farm researchers facilitates the development of a more nuanced understanding of the factors involved in BMP adoption, as well as in soil health and water quality.

D. Given the variability across landscapes and soil types, it is important to study BMPs at the local level.

- ✓ Researchers must gather and analyze local data to better understand the similarities and differences in production systems and soil types.

E. Long-term on-farm research is vital to understand the effects of BMPs on soil health and water quality.

- ✓ It takes time to see the effects of BMPs on soil health and water quality, so long-term partnerships between producers, researchers, and other agri-environmental stakeholders are vital.

6.0 Next Steps

6.1 ONFARM Data Dashboard Lunch & Learns

OSCIA can leverage the industry excitement about the Dashboard by developing a series of Lunch and Learns. These sessions will help to increase the profile of ONFARM in the industry and, in the process, facilitate the leveraging of ONFARM research for broader efforts to improve soil health and water quality.

6.2 Roundtable with ONFARM Cooperators and Industry Researchers

To build on the great discussions at the Forum, OSCIA can host a roundtable with ONFARM Cooperators and industry researchers. This event can help to further advance collaboration within the agricultural community and expand knowledge on soil health and water quality BMPs.

6.3 Soil Health Two-Pagers

To support knowledge translation and transfer related to the ONFARM Data Dashboard, OSCIA can create a series of two-pagers about the soil health indicators. These two-pagers can include an explanation of the soil health indicators and summarize some key findings to date through the ONFARM project.

6.4 ONFARM Field Days

In 2022, OSCIA can build on the success of its 2021 Tailgate Tour and Research Meet-up to host more events at ONFARM Cooperator sites and showcase the BMPs “in action.”

6.5 2023 ONFARM Forum

As OSCIA plans for the 2023 ONFARM Forum, the organization must weigh the merits of an in-person, hybrid, or virtual event.

The breakout sessions provided a good opportunity for a deeper dive into the edge-of-field water quality and soil health research. In 2023, it might be worthwhile extending the length of these breakout sessions slightly to allow for more fulsome discussions.

7.0 Appendices

7.1 Information Package for Attendees

AGENDA

February 10, 2022 via Zoom Videoconference

OSCIA looks forward to welcoming you to the ONFARM Forum! This event will be a unique opportunity to learn about the latest on-farm findings in support of soil health and water quality. The Forum will also highlight the successes and challenges in the second year of the program.

Time	Activity
9:00 am	Welcome & Setting the Stage Speakers: <ul style="list-style-type: none">• Bronwynne Wilton, Wilton Consulting Group (WCG)• Angela Straathof, Ontario Soil & Crop Improvement Association (OSCIA)• Andrew Jamieson, Manager, Innovation, Engineering and Program Delivery Unit (East/Central), Food Safety and Environment Division, Ontario Ministry of Agriculture, Food & Rural Affairs (OMAFRA)• Kelly McAslan, Assistant Deputy Minister, Food Safety and Environment Division, OMAFRA
9:15 am	Keynote: On-Farm Water Quality Research and Networking for Climate Resiliency <ul style="list-style-type: none">• Joshua Faulkner, University of Vermont Extension
9:45 am	Highlights from ONFARM's Second Year Speakers: <ul style="list-style-type: none">• Angela Straathof, OSCIA• Don King, The Soil Resource Group (SRG)• Craig Irwin, Upper Thames River Conservation Authority• Wanhong Yang, University of Guelph
10:10 am	Break

Time	Activity		
10:20 am	<p style="text-align: center;">Concurrent Sessions: A Deeper Dive</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; padding: 5px;"> <p><i>Concurrent Session A</i> ONFARM Soil Health Case Studies</p> <p>Moderator:</p> <ul style="list-style-type: none"> • Jake Munroe, OMAFRA <p>Panelists:</p> <ul style="list-style-type: none"> • Adam Hayes, SRG • Ed Roodzant, PER Farms Corp. & ONFARM • Margaret Ribey, SRG • Tyler McBlain, McBlain Farms & ONFARM </td> <td style="width: 50%; padding: 5px;"> <p><i>Concurrent Session B</i> ONFARM Edge-of-Field Water Quality Case Studies</p> <p>Moderator:</p> <ul style="list-style-type: none"> • Chris Van Esbroeck, Maitland Valley Conservation Authority <p>Panelists:</p> <ul style="list-style-type: none"> • Henry Denotter, Denotter Farms & ONFARM • Katie Stammler, Essex Region Conservation Authority </td> </tr> </table>	<p><i>Concurrent Session A</i> ONFARM Soil Health Case Studies</p> <p>Moderator:</p> <ul style="list-style-type: none"> • Jake Munroe, OMAFRA <p>Panelists:</p> <ul style="list-style-type: none"> • Adam Hayes, SRG • Ed Roodzant, PER Farms Corp. & ONFARM • Margaret Ribey, SRG • Tyler McBlain, McBlain Farms & ONFARM 	<p><i>Concurrent Session B</i> ONFARM Edge-of-Field Water Quality Case Studies</p> <p>Moderator:</p> <ul style="list-style-type: none"> • Chris Van Esbroeck, Maitland Valley Conservation Authority <p>Panelists:</p> <ul style="list-style-type: none"> • Henry Denotter, Denotter Farms & ONFARM • Katie Stammler, Essex Region Conservation Authority
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10:55 am	<p>Key Takeaways from Concurrent Sessions</p> <p>Speakers:</p> <ul style="list-style-type: none"> • Mari Veliz, Ausable Bayfield Conservation Authority • Laurent (Woody) Van Arkel, Van Arkel Farms & Ontario Soil Network 		
11:05 am	<p>Data Visualization Dashboard Demonstration and Partnership Announcement</p>		
11:20 am	<p>Panel Discussion: Leveraging the Benefits of On-farm Research</p> <p>Panelists:</p> <ul style="list-style-type: none"> • Clint Truman, Syngenta • Jennifer Doelman, Bonnechere Haven Farms & ONFARM • Joshua Faulkner, University of Vermont Extension • Norm Lamothe, Woodleigh Farms & ONFARM 		
11:50 am	<p>Closing Remarks</p> <p>Nick Stokman, ONFARM</p>		

MEET THE SPEAKERS

Keynote: On-farm Water Quality Research & Networking for Climate Resiliency



Dr. Joshua Faulkner, University of Vermont Extension

Dr. Joshua Faulkner is a Research Assistant Professor for University of Vermont (UVM) Extension. He has coordinated the Farming and Climate Change Program in UVM Extension's Center for Sustainable Agriculture since 2013. Joshua conducts applied research, outreach, and education on soil, water, and nutrient-related issues across the state and works with farmers on practices and innovative solutions to improve the management of these resources and enhance farm resilience to climate change. His focus spans all agricultural sectors, and extends from the farmstead to the watershed scale.

Highlights from ONFARM's Second Year



Dr. Angela Straathof, Ontario Soil & Crop Improvement Association (OSCIA)

Dr. Angela Straathof is the Program Director at OSCIA. She oversees the facilitation and delivery of cost-share funding and producer education opportunities, including the ONFARM program, the Canadian Agricultural Partnership, Lake Erie Agriculture Demonstrating Sustainability (LEADS), and Species at Risk. Angela holds a PhD in soil chemistry and biology from the Department of Soil Quality at Wageningen in the Netherlands.



Craig Irwin, Upper Thames River Conservation Authority

Craig is an Agricultural Soil & Water Quality Technician at the Upper Thames River Conservation Authority, where he collects and analyzes water quantity and quality data from several sub-watersheds and edge-of-field monitoring stations. Craig has worked at multiple conservation authorities, improving workflows with creative data management solutions. Notably, he leveraged GIS software for data collection as part of the ONFARM program. Craig holds an MSc in Physical Geography from Western University. In his spare time Craig enjoys creating artisanal hot sauces and hiking with his Great Bernese dog.



Don King, The Soil Resource Group (SRG)

Don King, MSc., CCA-ON, is the President, Senior Agronomist, and a Principal of SRG, a resource management consulting firm in Guelph that conducts applied research in the agricultural and environmental sectors. The firm has also provided land resource services to public agencies, government, private firms, and landowners for over 20 years. Don has extensive experience conducting on-farm projects to evaluate the environmental impact of agricultural production on soil, water, and air quality to help determine improved farming practices.



Dr. Wanhong Yang, University of Guelph

Dr. Wanhong Yang is a professor in Department of Geography, Environment & Geomatics at the University of Guelph. He has expertise in GIS, agricultural and environmental economics, and hydrology. Since 2001, Wanhong has developed a research program on integrated economic-hydrologic-GIS modelling for examining the cost effectiveness of agricultural conservation programs. He was the leader for watershed best management practice (BMP) modelling in OSCIA's Great Lakes Agricultural Stewardship Initiative (GLASI) during 2016-2018. Wanhong leads watershed BMP modelling for ONFARM.

Concurrent Session A: ONFARM Soil Health Case Studies



Adam Hayes, SRG

Adam Hayes retired from OMAFRA as a soil management specialist in 2019. He has been doing contract work, helping to coordinate and implement the ONFARM project for the Soil Resource Group. Adam is also assisting with developing soil health training for the University of Guelph, Ridgetown Campus and a number of soil health videos with Farm and Food Care. Beyond these roles, Adam enjoys spending time with family, especially his two grandchildren, and doing volunteer work. He is active with many hobbies.



Ed Roodzant, PER Farms Corp. & ONFARM

For 40 years, Ed Roodzant has farmed cash crops in the Rodney area. He is a member of both the Elgin Soil & Crop Improvement Association and OSCIA. Ed is also an ONFARM cooperator. Ed has practiced no-till and conservation tillage since the 1980s, and he converted his fields to 100 percent strip till in 2013. Ed has also used cover crops since 2015. Ed's soil health goals are to maintain or improve soil organic matter levels with organic amendments and to reduce compaction with cover crops.



Jake Munroe, OMAFRA

Jake Munroe is a Soil Management Specialist for Field Crops with the Ontario Ministry of Agriculture, Food and Rural Affairs (OMAFRA). He has expertise in soil health, soil fertility and cover crop management. Through field days, plot demonstrations, and presentations, Jake shares information with Ontario farmers on best management practices to improve soil health and crop production. He has led a Tier 2 project with OSCIA since 2018 on cover crop management. Jake is a Certified Crop Advisor.



Margaret Ribey, SRG

Margaret Ribey, MSc., CCA-ON, is the Natural Resource Scientist at SRG. Her areas of expertise include soil chemistry and physics, nutrient sourcing and transport, best management practices, soil health, environmental considerations in production agriculture, and nutrient management planning. Margaret coordinates agronomic field sampling, data management and analysis, GIS support, and reporting requirements for SRG projects across several agricultural sectors.



Tyler McBlain, McBlain Farms & ONFARM

Tyler McBlain is an ONFARM cooperator located in eastern Brant County. Alongside his wife and parents, Tyler operates a custom farming business and grows corn, soybeans, wheat, and oats. The soils are mostly heavy Haldimand clay, meaning compaction, crusting and drainage issues are always top of mind. The McBlains have learned to combat these issues with a long-term commitment to no till, strip tillage, variable rate nutrient applications and multi-species cover crops. The family is involved in various applied and farmer-led research projects with the goal of finding a holistic and sustainable approach to improving the health and profitability of their soils.

Concurrent Session B: ONFARM Edge-of-Field Water Quality Case Studies



Chris Van Esbroeck, Maitland Valley Conservation Authority

Chris Van Esbroeck is the Stewardship Coordinator at Maitland Valley Conservation Authority. Chris grew up on a farm in Huron County. He has worked in the agri-environmental field since 2007 and is on the Huron County Soil and Crop Improvement Association board of directors.



Henry Denotter, Denotter Farms & ONFARM

Henry Denotter farms with his family in southern Essex County, growing corn, soybeans, and wheat. Cover crops are also a big part of Henry's rotation. Recently, he has experimented buckwheat. He began adopting soil and water quality best management practices decades ago and continues to practice minimal soil disturbance, in-field erosion control and nutrient management. In addition to being an ONFARM Edge-of-Field cooperater, Henry also participates in other water quality monitoring programs in the Wigle Creek area, including Living Lab. Henry received the 2021 Soil Champion award in the producer category.



Dr. Katie Stammler, Essex Region Conservation Authority

Dr. Katie Stammler has been with the Essex Region Conservation Authority as the Water Quality Scientist and Source Water Protection Project Manager since 2014. She completed her PhD at the University of Western Ontario in 2011, examining the extent, characteristics and effects of stream burial in southwestern Ontario. She was a postdoctoral fellow at the University of Waterloo studying long-term trends in stream water quality across all land use types. Katie is passionate about making a difference in our corner of the world through research, conservation, education and mentoring the next generation of conservationists.

Key Takeaways from Concurrent Sessions



Mari Veliz, Ausable-Bayfield Conservation Authority (ABCA)

Mari Veliz is the Healthy Watersheds Manager at Ausable Bayfield Conservation Authority (ABCA). She has worked at ABCA since 2000. Mari has managed water quality, bio-monitoring, agricultural and urban best practice evaluation, and community outreach programs.



Laurent (Woody) Van Arkel, Van Arkel Farms & Ontario Soil Network

Laurent (Woody) Van Arkel is a cash crop farmer in Dresden. He grows corn, soybeans, wheat, and sugar beets. He also has a contract hog finishing barn. Woody chairs the Ontario Soil Network oversight committee. He has a keen interest in environmentally sustainable agriculture and cover crops.

Leveraging the Benefits of ONFARM Research



Dr. Clint Truman, Syngenta

Dr. Clint Truman is the Principal Scientist and Science-based Sustainability Lead, Environmental & Product Safety, for Syngenta Crop Protection, LLC, based in Greensboro, North Carolina. He is a technical expert in soils (soil quality/health), runoff (water quantity/quality), erosion, agricultural best management practices (BMPs), and agrichemical fate and transport. Clint brings applicable science to growers by fostering grower relationships to develop and implement science-based, scale-appropriate, and cost-effective solutions/tools to complex agricultural and environmental problems so that growers can make profitable and sustainable decisions.



Jennifer Doelman, Bonnechere Haven Farms & ONFARM

Jennifer Doelman, CCA-ON, is a proud farmer, ONFARM Cooperator, and beekeeper from Renfrew County. She is also a science geek, a canola cheerleader and wannabe soil and water steward. Jenn farms in the Upper Ottawa Valley with her husband, Mike, and their children, AJ and Becky. Farming heavy silty clay in a rain shadow, they learned early in their farming career that good soil health is paramount to their farm's success. The family were early adopters of reduced tillage to the benefit of soil structure and water quality. Cover crops and honeybees are more recent additions to the farm to complement their diverse rotation.



Dr. Joshua Faulkner, University of Vermont Extension

Dr. Joshua Faulkner is a Research Assistant Professor for University of Vermont (UVM) Extension. He has coordinated the Farming and Climate Change Program in UVM Extension's Center for Sustainable Agriculture since 2013. Joshua conducts applied research, outreach, and education on soil, water, and nutrient related issues across the state and works with farmers on practices and innovative solutions to improve the management of these resources and enhance farm resilience to climate change. His focus spans all agricultural sectors, and extends from the farmstead to the watershed scale.



Norm Lamothe, Woodleigh Farms & ONFARM

For six generations, Woodleigh Farms has worked the rolling hills in Peterborough County. Norm Lamothe and his family manage a diverse 500-acre cash crop farm which includes a four-crop rotation of corn, soybeans, wheat and oats. The family has recently transitioned its 1,500-tap maple syrup operation to organic and everyone enjoys spending time in their year-round passive solar greenhouse which supports their three-acre market garden. Norm has a lifelong interest in supporting soil health and biodiversity through the use of soil amendments such as biosolids, green manures as well as compost processed on the farm using municipal leaf and yard waste. Combining extensive soil sampling data, imagery and variable rate technologies, Norm is keen on demonstrating the economic benefits of being ecologically sustainable in a modern cropping system.

Closing Remarks



Nick Stokman, ONFARM

Nick Stokman farms just northwest of Strathroy. He has a mixed operation of poultry (laying hens) and crops, including corn, IP soybeans and hard red winter wheat (usually under-seeded to red clover). Nick has not used primary tillage on his farm in the last 30 years. More recently, Nick has experimented with bio strips after wheat ahead of corn on the clay soils. Nick was also the operator/manager of Middlesex Soil and Crop Improvement Association's Strathmere Lodge Demonstration Farm from 1986 to 2016.

The On-Farm Applied Research and Monitoring (ONFARM) program is a four-year, applied research initiative that began in 2019 which supports soil health and water quality research on farms across Ontario. This program is funded by the Canadian Agricultural Partnership, a five-year federal-provincial-territorial initiative.

7.2 Information About Forum Registrants & Participants

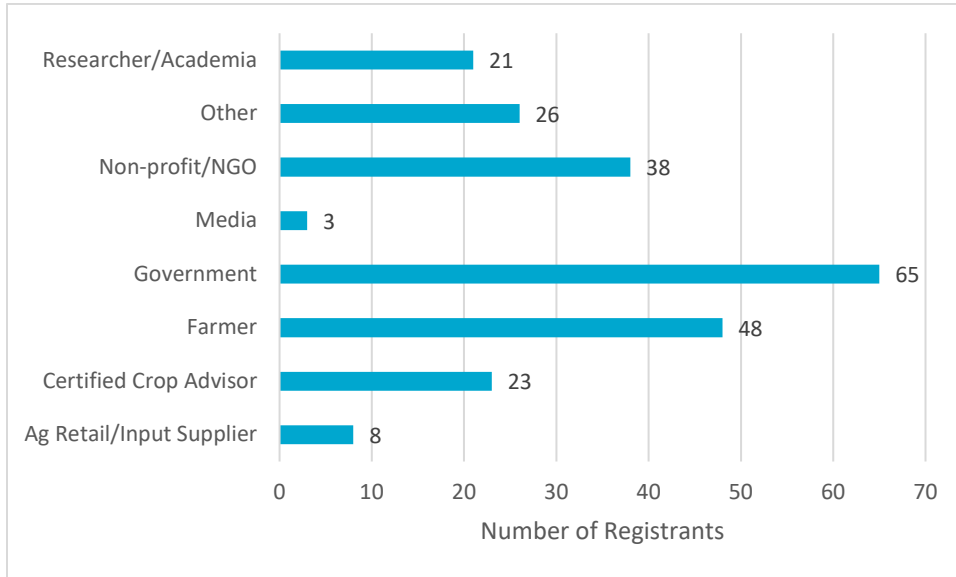


Figure 9. Primary profession of 2022 ONFARM Forum registrants (n=232)

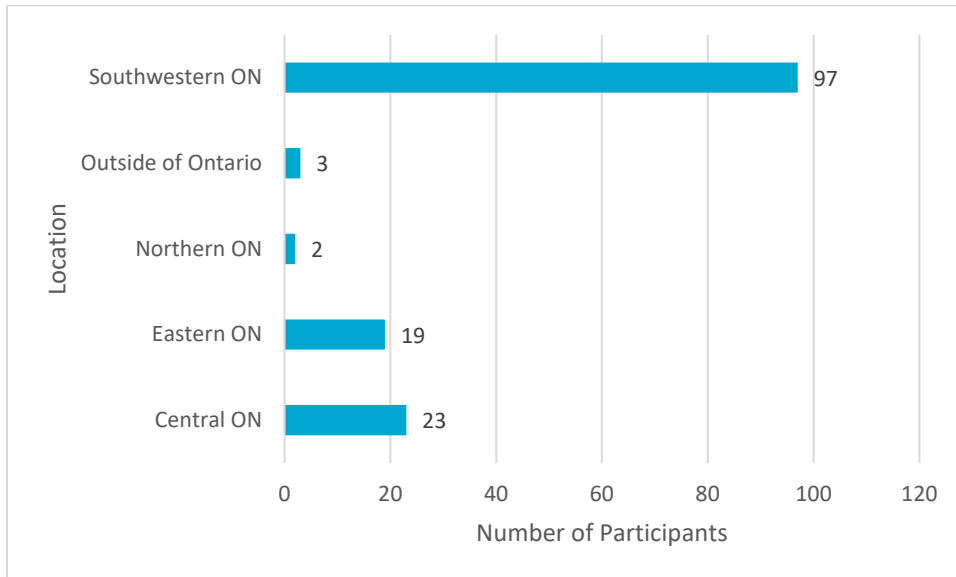


Figure 10. Forum participants' location (n=144)

7.3 Forum Questions & Answers

Keynote: On-Farm Water Quality Research and Networking for Climate Resiliency

How do you define aeration and how does manure aeration increase the volume of runoff?
The hypothesis is aeration (e.g., with an AerWay aerator) of heavy clay soils, even if they are just a bit moist, fractures the soils and increases compaction.
When you speak about using a whole watershed as a BMP treatment, what level of buy in have you seen from those farmers, or what percent of the area have you been able to cover, in implementing a BMP together?
The Center for Sustainable Agriculture has strong relationships with area farmers and expects good buy in with the next stage of the research. Researchers are also working with the agencies that carry financial assistance, meaning some incentives are available for farmers to accelerate conservation practices within the treatment watershed.
What do you do to build relationships with farmers?
It is vital to be on farm, talking to farmers, and developing trust. The assistance of long-term extension staff is also key.

Highlights from ONFARM's Second Year

Were any additional agronomic measurement or observations beyond yield (e.g., pest issues, residue issues, seeding issues) made?
SRG has done emergence counts, plant counts, weed density counts, and residue counts. SRG also noted any insects or diseases that could have affected yields.
Are there plans to integrate the individual soil health indicators into an overall soil health index? A meaningful index (if that's feasible), as well as the context of site, would help make comparisons easier.
<ul style="list-style-type: none">▪ The indicators will be statistically evaluated to determine which ones are making the most impact on agronomic variables to find the most informative combination of factors that might contribute to an index, or at least give more context to the variables being measured in current commercial soil health test packages.▪ The ONFARM program is using the Cornell ratings for the indicators.
Is any of this data used to determine what is happening on farm and how it is affecting the Species at Risk (SAR)?
There is a lot of interest now with federal funding packages about how soil health and, for example, pollinator populations and ecosystems services benefit Species at Risk on farm. There are definitely a lot of synergies to explore there. More information will come.

Concurrent Session A: ONFARM Soil Health Case Studies

How do you think your soil type affects how quickly you see results from implementing these BMPs?
<ul style="list-style-type: none">▪ With the biosolids, see the fastest increase on the organic matter in the sandy soil. The benefits are more evident in stress years, too.▪ Eliminating tillage and growing cover crops improves drainage on heavy soils. The first year no-tilling into a cover crop is nerve-wracking, and there could be a lag in yield in the first year or two with cover crops. But ultimately, cover crops bring yield benefits.
How have you found the balance between rigour and replication versus practicality and making sure it gets done?
<ul style="list-style-type: none">▪ Side-by-side trials, with multiple growers involved, are helpful in creating replication from multiple sites.▪ A lot of information can be gleaned from side-by-side trials, even though they are not replicated and randomized.▪ Researchers collaborated with farmers to design the trials to accommodate everyone's different equipment.▪ On-farm research is key to understand what is working and what is not.
It sounds like your goals for cover crops are to improve soil structure/health and to limit tillage practices. Have either of you seen a difference in cover crop mixes and the impact on soil health goals? We have had red clover in our rotation for over 30 years, and are looking at other mixes and how they would fit in.
<ul style="list-style-type: none">▪ Strong believer in red clover but have seen a benefit in a multi-species mix including oats, peas, radish and buckwheat.▪ It can be difficult to get a good establishment of red clover, especially in dry years. Cereal rye is always an easy option.
Will a portion of the farm neighbouring the McBlain home farm be kept under "poor" management for comparison?
<ul style="list-style-type: none">▪ No, the trial tracks the change/potential improvement over time.
Not at all discounting the effects of BMPs, but how does one parse out the influence of improved soil health from genetic improvements when looking at corn yields over 20 years?
<ul style="list-style-type: none">▪ That's a good question. That's why it's important to have long-term trials that include controls where the only variable you might be changing is the genetics and variety.▪ Parsing out improvement between soil health and genetics is difficult without hybrid comparisons.
Do you find it hard to control buckwheat after including it in your cover crop mix?
Once a buckwheat farmer, always a buckwheat farmer! With modern herbicides we can manage it no problem.

Concurrent Session B: ONFARM Edge-of-Field Water Quality Case Studies

Henry, you talked about that “aha” moment where you saw the two water samples. So, you’re clearly seeing the water quality benefit of cover cropping. Could you elaborate a bit on the other benefits that you’re seeing and some of the challenges?

- The “aha” moment started it all and leveraged conversations with different people about specialized cover crops.
- Many years ago, when Henry Denotter was new to cover crops, he started planting cover crops, but one crop went awry, over-grew and was a hassle.
- Following that experience, Henry pondered the idea of looking at a cover crop that he could harvest. That is when he got into planting buckwheat.
- Buckwheat is a simple yet versatile crop.
 - Pollinator-friendly attitude allows Henry to interact with other members of the agriculture industry.
- Edge-of-field research is great. You are not only sorting out the water quality piece, but also the learning around the actual on-farm BMPs themselves is continual.

I wonder if you could speak a bit about the weather in 2021. What was it? How do you see that impacting the story?

- Every year is different. You start to think you have a handle on the weather and that things are going to go well and then everything changes. We had a very dry summer, so we had very few rainfall events in the summertime, and then we had a very wet fall.
- One of our challenges was that we had such a large rain event that, no matter how we tied up the bins that stored the sampling equipment, the rain knocked them over. So, we lost the samples.
- It takes time and you must have multiple years where you are looking at different crop types and different scenarios. One event is not the end all and be all.
- Weather overwhelms what you are trying to see with the BMP. So, that is why it is important to capture the information for the modeling underway at the University of Guelph. Then, we can take out factors like the weather to evaluate how the BMPs are performing.
- Quite a lot of data is required to make our hydrology similar when we do these models.
- We cannot rely only on those events to demonstrate the BMPs. We must understand those things at the field and watershed scale, which is where some of the modelling work comes in.

When was the buckwheat sown?

All buckwheat, and any cover crop, is seeded with an air-seeder.

When would you really not want to put in a cover crop?

Henry does not plant a cover crop in corn most of the time. He plants all crops in 20-inch rows. That is tight, so he needs that path open.

Is there any preliminary data available?

No preliminary data to share at the moment. Data is shared with Dr. Wanhong Yang as it becomes available so he can incorporate it into his work.

Leveraging the Benefits of On-Farm Research

How is all this great work and science being shared with other farmers who are not early adopters and who do not attend webinars like this?

- Great question. I think we all struggle with ways to engage. I worry more about attracting the attention of young, super busy farmers who also have full time off-farm jobs. We need to be able to convey the information in a way that is concise, regional and applicable. So glad to have a team of communicators developing tools we can use locally.
- I think the pandemic has actually helped on that front. It has encouraged people to become a little more virtually savvy. We are leaning into that through web-based events like this, but also the production of videos and apps like that of the Ontario Soil Network. But that is the million-dollar question – how do we reach those on the fence?

7.4 Post-Forum Survey

A short survey was emailed to participants after the Forum. In total, 49 people completed the survey, which equates to a response rate of approximately 29%.

Most commonly, survey respondents identified as farmers (29%), government staff or officials (20%), or non-profit/NGO staff (16%). The individuals who classified themselves as other were retired, an agronomist/agricultural consultant, a Conservation Authority staff member, and a media representative.

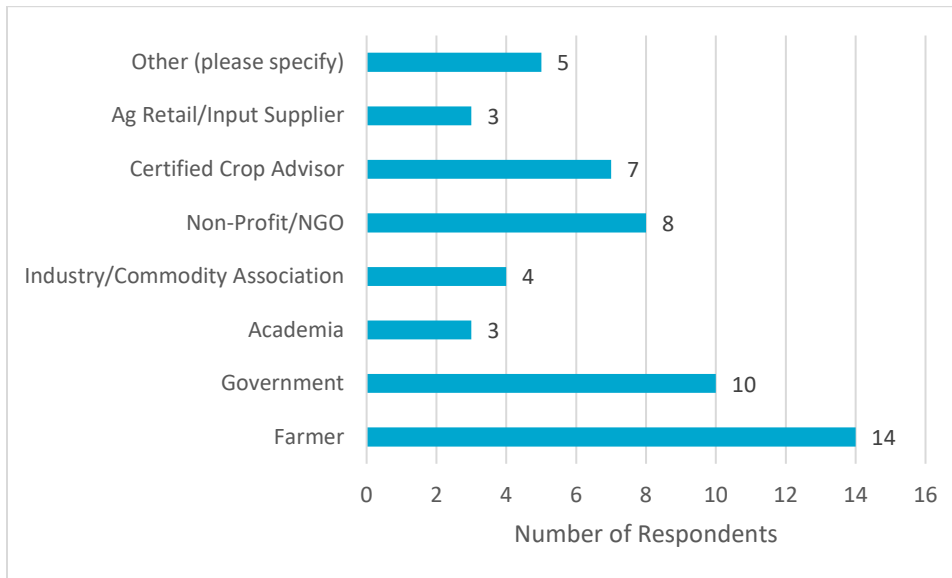


Figure 11. Primary profession of survey respondents (n=49)

Most respondents strongly agreed with the following statements:

- The format was an effective way to share ONFARM project information (60%)
- The presenters were knowledgeable about the subject matter and content (78%)
- The presenters delivered content in an effective and engaging manner (53%)
- The information was presented in a clear and logical way (49%)

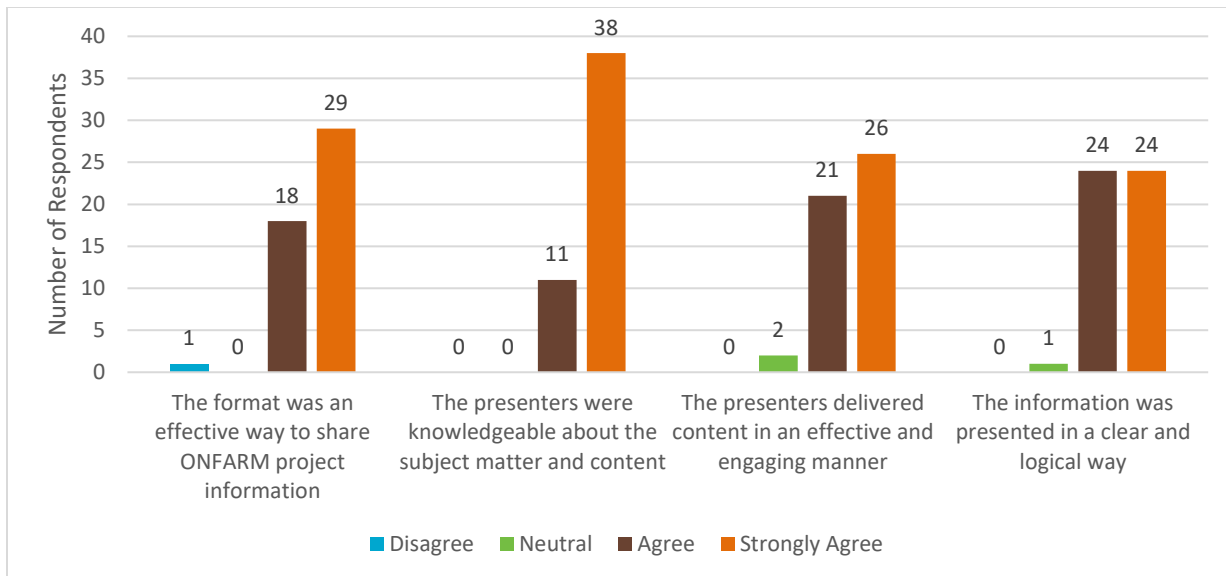


Figure 12. Respondents' level of agreement with four statements about the Forum (n=49). No one strongly disagreed with any of the statements.

Most survey respondents intend to apply what they learned through the Forum to their farms or their research programs or advisory services; 39% said they would apply their new knowledge within six months, while another 12% said they would apply this knowledge within six months to one year. Another 37% of respondents said this question did not apply to their personal circumstances.

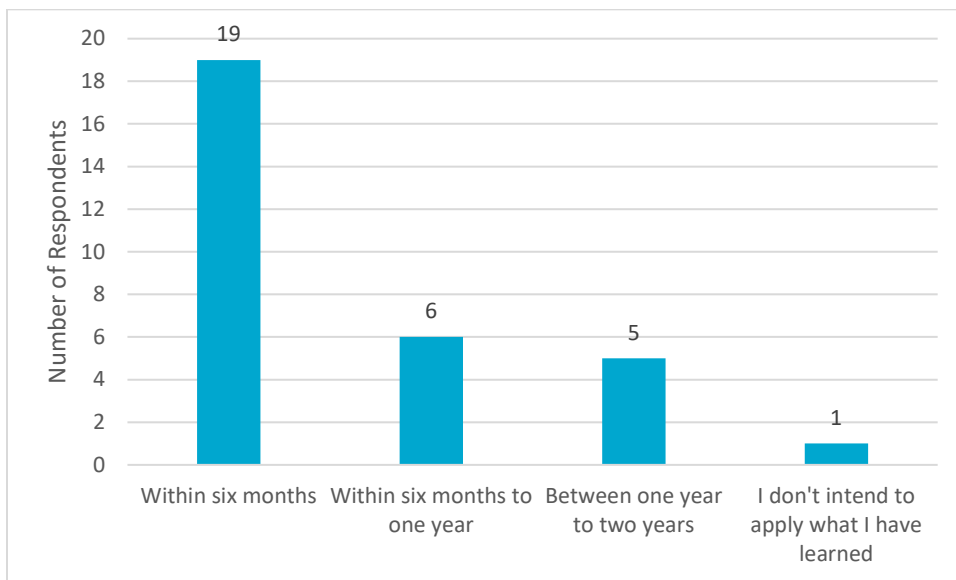


Figure 13. Whether respondents intend to apply what they learned during the Forum. (n=49; 18 responded N/A)

After attending this event, almost a third of respondents intend to implement a new or revised practice on their farms or in their research programs or advisory services. Another 55% of respondents said this question did not apply to their personal circumstances.

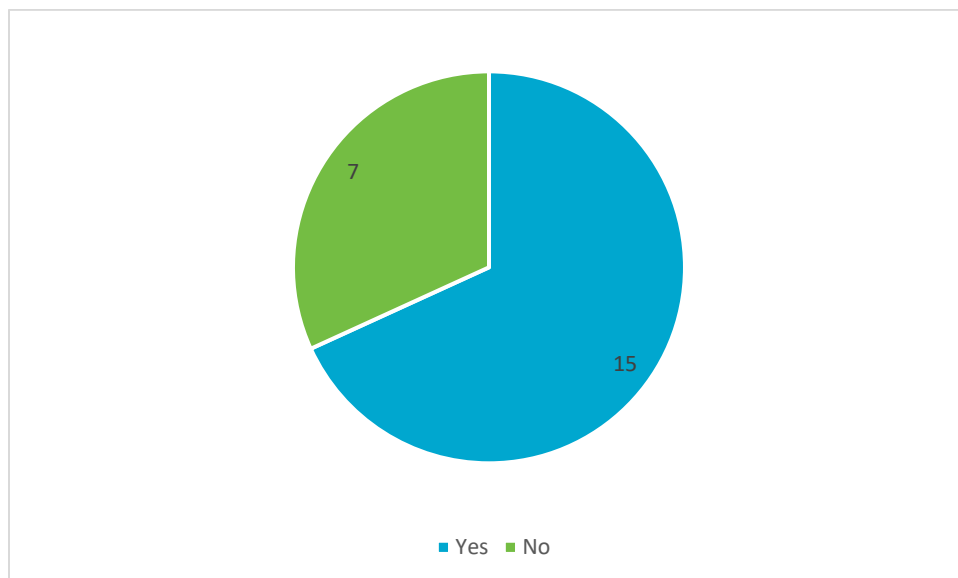


Figure 14. Whether respondents intend to implement a new or revised practice on their farms or in their research programs or advisory services. (n=49; 27 responded N/A)

Those individuals who answered yes (n=14) to the above question provided further insights on their plans:

- I'll be looking for opportunities to train my main equipment operators on the value on-farm research brings to our operators
- Reduce tillage, plant green
- Already doing these practices – awaiting results of trial end results
- Ongoing
- The program tended to reinforce what we already know.
- I will consider these agronomy practices to help farmers gain healthy soil, using your dashboard
- Info shared informs how BMPs are adopted at the farm level
- Will look at soil carbon influences on herbicide effectiveness
- Help to explain soil biology to our clients
- Revised cover crop & tillage practices, improved tile drainage, vegetation buffer zones at field catch basin locations
- I plan to share the ONFARM data posted on the website
- Am already incorporating most of the concepts today
- Communicate, communicate, communicate
- We will continue to think of ways to get on farm data to those who are harder to reach.

Respondents rated their knowledge, before and after the Forum, of the benefits of on-farm research and/or BMPs for soil health and water quality. The average rating before the Forum was 7.8/10, while the average rating after the Forum was 8.6/10. Thus, the Forum enabled participants to increase their knowledge of the subject matter.

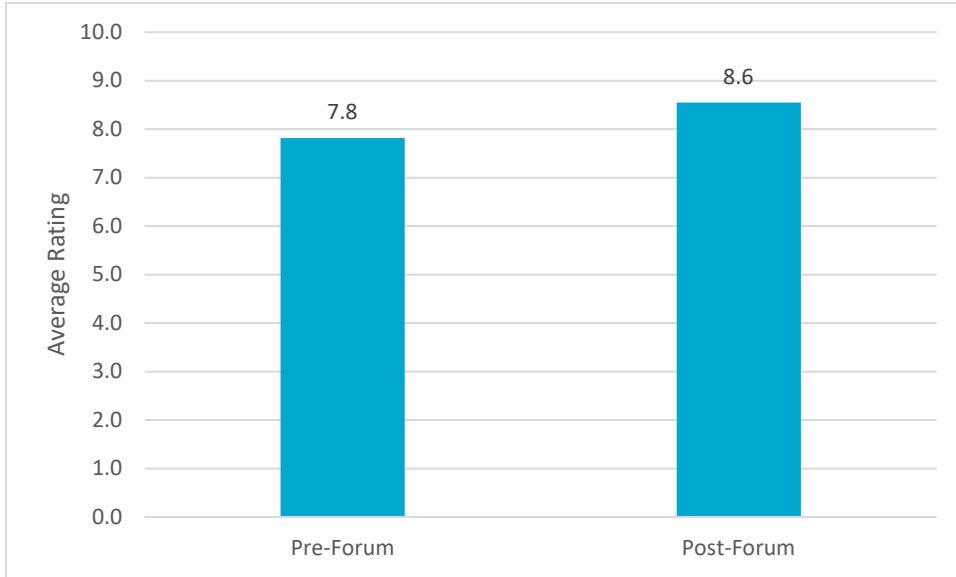


Figure 15. Respondents' average weighting of pre- and post-Forum knowledge of the benefits of on-farm research and/or best management practices for soil health and water quality (n=49)

All respondents were very satisfied (73%) or satisfied (27%) with the Forum. No respondents were neutral, dissatisfied, or very dissatisfied.

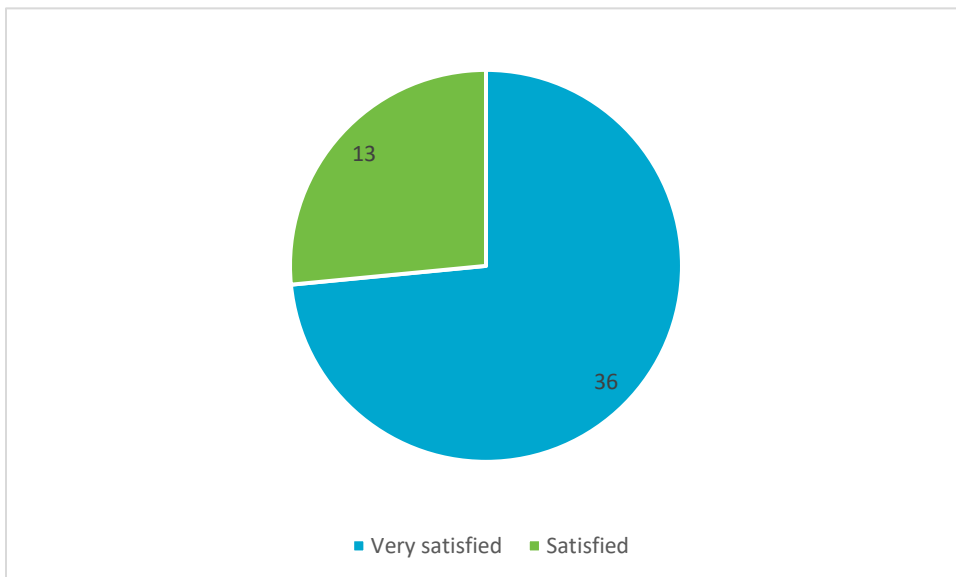


Figure 16. Respondents' satisfaction with the Forum (n=49)