

(continued from previous page) variables have been developed and are on the market currently.

Just like any other advancement in technology, the machines are not the only things that will change with their adoption. Our systems will adapt and restructure as well. Shearer sees Farming as a Service (FaaS) being the way of the future, with producer ownership of equipment being less and less common. Sabanto Ag is an Illinois company already operating on a FaaS system. The company has a fleet of small autonomous tractors which run 30 to 40-hour shifts planting soybeans, and they do it more economically than most operations currently can. Sabanto Ag said "As a general rule, machinery costs for a planting operation are \$0.25/hp-hr – ours are down to \$0.07/hp-hr." In another example presented by Shearer; an Australian company that leases out autonomous sprayers said that their costs are around \$1.00/ac, compared to a typical \$7.00-\$10.00/ac custom rate. The producer sets the dates that they need their field work done between, and the company does the rest. Again, with smaller equipment, field conditions don't cause as much of a challenge.

There are many implications that come with the FaaS business model. Farm business retailers would switch from being suppliers to, as Sabanto Ag's owner puts it: being in the business of "seed installation". This could be true of fertilizer, chemical, seed, irrigation, manure and more. Rather than purchasing field inputs and keeping them on farm until use, farmers would simply contract their retailer to install the product on the field. There might be no ownership of product until it is in the soil.

Scott A. Shearer's presentation: *Ag Tech: Disruption or Distraction*, Jan 11th 2022.

As FaaS becomes more popular, equipment ownership by farmers would also decrease. Shearer asked; at what point does purchasing equipment become a risk for obsolescence? If the speed of change and adoption becomes too great, a purchased piece of equipment with a 25-year lifespan might not be practical for use in five years after purchase. Additionally, as technology

adoption happens there will be a point where farmers can no longer be economically competitive if they continue to use older equipment. If 'so-and-so' can plant, grow, and harvest their field for a fraction of the cost you do, and most of the country is now farming like 'so-and-so', you may have the choice to adopt their methods, or get out of the business.

On the flip-side of the coin, he sees the move to smaller autonomous equipment leading towards "scale neutrality" where a small farmer can use the same machine as a larger farmer, just with a different number running the fields.

So, what factors will influence whether these technological changes come about? The biggest one is access to rural broadband internet, as all autonomous machines need to collect, analyze, and share information. Not only is coverage an issue, but our upload and download capacity will need to increase dramatically as the amount of data being processed grows. Areas that have the internet services necessary for movement of that information will be the ones where new technology implementation is possible. Areas that don't, will be held back.

Whatever the speed of development, access, and adoption; it is clear there are big changes coming. We were very grateful to Scott Shearer for taking the time to present on Crops Day, and for sharing with us this big picture of a brand-new world.

ONFARM data dashboard launched at 2022 research forum

Written by: OSCIA provincial office

The Ontario Soil and Crop Improvement Association (OSCIA) launched an exciting new data visualization tool at its second annual ONFARM Research Forum on February 10, 2022. The virtual event introduced attendees to the On-Farm Applied Research and Monitoring (ONFARM) program and shared accomplishments from the program's second field season—including developing an interactive, user-friendly [Data Dashboard](https://www.osciaresearch.org/onfarm-applied-research/onfarm-data-dashboard/) (<https://www.osciaresearch.org/onfarm-applied-research/onfarm-data-dashboard/>).

The ONFARM program conducts extensive soil health analysis on 25 sites comparing Best Management Practices (BMPs) on working farms across southern Ontario. Researchers with the Soil Resource Group, a Guelph-based agricultural research and resource management consulting firm, collect soil health data at field sites each year. The result is (continues on next page)

(continued from previous page) a substantial data set reflective of a wide range in farming operations, soil types and climatic variability. While this gives researchers and farmers much to learn from, improving the accessibility of results is a challenge facing many agricultural research programs.

The dashboard, built using Microsoft Power BI, will serve as a public space for anyone to access ONFARM data and results relevant to their farm or interests. Users can explore well-known soil health measurements, such as organic matter levels alongside more novel indicators like Solvita CO₂-Burst and active carbon, or study correlations among them. Filters allow for comparison between ONFARM sites by operation type, tillage practices or landscape position. Additional information about each site, including the BMP(s) and crop rotation, can be found on the [interactive map \(https://www.osciaresearch.org/onfarm-applied-research/onfarm-interactive-map/\)](https://www.osciaresearch.org/onfarm-applied-research/onfarm-interactive-map/). Currently, the dashboard hosts baseline data collected in June 2020 before the BMP treatments were applied.

Organic Matter

Organic matter is a common soil property measured in agricultural soils, and for ONFARM, it is a useful benchmark to compare other more novel soil test indicators against. These plots show the baseline organic matter levels sorted by ONFARM region and soil type. Try using the options on the right to filter in and out different sites, operation types, tillage practices, or landscape positions to see how the organic matter distributions change. When either all or no boxes are selected for a filter, all of the data are shown in the visuals.

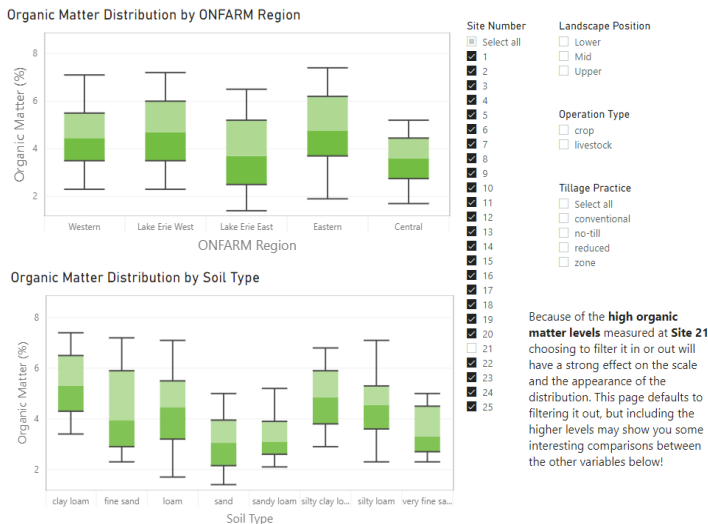


Figure 1 – Data Dashboard showing baseline organic matter levels by region and soil type measured at ONFARM soil health BMP sites.

The dashboard complements a key objective of the ONFARM program—supporting peer-to-peer learning by helping farmers compare what they observe in their own fields to results from farms with similar management practices or soil characteristics. The dashboard will simplify navigation of current and future ONFARM findings and help farmers take full advantage of ONFARM research to inform decision-making.

“ONFARM has such a wealth of data and sharing it

publicly on this approachable dashboard enables everyone to put it under their own lens, be that as a farmer or a researcher or a supporter of the practices studied,” shared Angela Straathof, OSCIA Program Director and chair of ONFARM’s Technical Working Group. “We look forward to hearing people’s interpretations and questions that come out of their ONFARM data explorations.”

Using this tool, ONFARM hopes to inform a stronger understanding of BMPs and their effects on soil health and water quality on Ontario agricultural lands. This is just the first iteration of the dashboard, and OSCIA looks forward to exploring other applications of this tool for the ONFARM program and beyond.

Solvita CO₂-Burst

Solvita CO₂-Burst, commonly referenced just as Solvita, is a soil test measuring the CO₂ released when a dried soil sample is rewetted. As the CO₂ is generated by microbial respiration, this test is classified as a biological indicator. The quantity of CO₂ released indicates the activity and potential size of the microbial community in the soil.

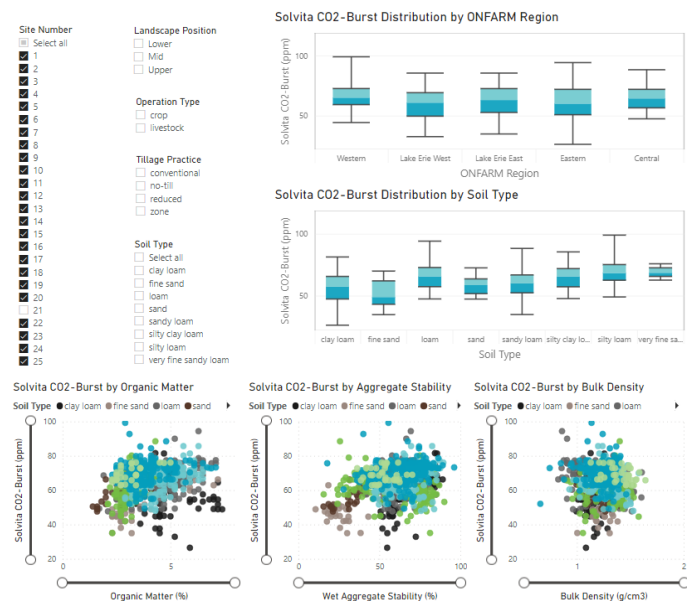


Figure 2 – Data Dashboard showing the distribution of Solvita CO₂-Burst data, and its relationships with other soil health parameters.

Explore the dashboard today at: <https://www.osciaresearch.org/onfarm-applied-research/onfarm-data-dashboard/>. For regular updates on the program, including technical reports, visit the [ONFARM](https://www.onfarm.org/) website and follow [@OntarioSoilCrop](https://twitter.com/OntarioSoilCrop) on Twitter.

The ONFARM program is a four-year, applied research initiative delivered by OSCIA on behalf of the Ontario Ministry of Agriculture, Food and Rural Affairs to support soil health and water quality research across farms in Ontario. This program is funded by the Canadian Agricultural Partnership, a five-year federal-provincial-territorial initiative.

For more information about ONFARM, please contact: ONFARM@ontariosoilcrop.org.