

Heartland

November 2018

Soil & Crop News

Waterloo member releases book “The Soil Fixers”

FarmSmart 2019

Heartland Tier 2 grant

Don't miss upcoming county AGMs

+ **OMAFRA Crop Talk | OSCIA News | County Updates**

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Ontario



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Upcoming events

November 30: Wellington County SCIA AGM, Alma Bible Church. 9 a.m. to 3 p.m. Featuring speakers Jake Munro from OMAFRA, Kelly Daynard from Farm and Food Care Ontario, Greg Stewart from Maizex + more. Find out more at heartlandsoilcrop.org/events or by calling Linda 519-362-2094.

December 3: Waterloo AGM, Flordale Mennonite Church. 9:30 a.m. Guest speakers include Anne Loeffler from GRCA, Ian MacDonald from OMAFRA speaking on compaction, and Dylan Sher, producer of the motion picture "Before the Plate". More information at heartlandsoilcrop.org,

December 5: Huron AGM, Brussels Legion, 5:30 p.m. Hear from Mel Luymes talking about the drainage project at Huronview, Sarah-Louise Ruder speaking on "digital farming" and Rick Kootstra who will provide an update on his interseeding soybeans into wheat trial. More information at heartlandsoilcrop.org.

December 6: Forage Focus 2018, Stratford Rotary Complex. plus remote locations. \$40 includes lunch and conference proceedings. Keynote speaker Michael Hutjens, Professor Emeritus, ANSC Department of Animal Sciences. U of Illinois. Call to register by November 30. 1-877-892-8663.

January 3-4: Southwest Agricultural Conference, Ridgeway. See story on p. 5 for more information

January 17: Perth AGM, Stratford. SAVE THE DATE!

January 18: CropSmart, RIM Park, Waterloo

January 19: FarmSmart, University of Guelph. More information at farmsmartconference.com or see advertisement p. 6-7

February 5-6: OSCIA AGM, Kingston

Dave Brandt to speak in London

Thames Valley Region SCIA and Ontario Soil and Crop are proud to sponsor an intensive workshop session featuring Dave Brandt at the Ecological Farmers Annual Conference on December 4th at the Four Points Sheraton in London. Dave is a well-known producer from Ohio who has shared his cover crop experiences in Ontario many times. His session, "Multi-species cover crops and low-till strategies for field crops" will run from 9:30 am until 3:30.

"While in-season crops feed people and animals, off-season cover crops will feed the soil. Join Dave Brandt as he delves deep into multi-species cover crops as a way to increase soil fertility and crop yields, control weeds and limit soil erosion in the field. He will discuss how to determine what cover crop mix will work best for different farms and farm practices. He will also talk about his own no-till field crop practices that can increase organic matter, eliminate soil compaction and increase water filtration. You won't want to miss this day – your soil will thank you!"



EFAO members \$100/Non-members \$125 includes lunch

To Register: <https://conference.efao.ca/register/> Toll Free: 1-877-822-8606



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From the editor

As we move towards the end of 2018, we look forward to the start of "meeting season", an opportunity for farmers to gather with their friends and colleagues, share good food, a few laughs and learn a few things along the way. OSCIA, Heartland Region and #OntAg have a number of upcoming events that you don't want to miss — county AGMs, FarmSmart and SWAC, the OSCIA AGM to name but a few. We hope to see you there!

As always, if you have any information that you would like included in our quarterly print or monthly electronic newsletters, please let me know.

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Proudly serving the members of Huron, Perth, Waterloo and Wellington County Soil and Crop Improvement Associations

**Heartland Soil & Crop News is published 4 X a year
Watch for a monthly e-news in your email inbox!**

Visit our website for updates: heartlandsoilcrop.org

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For more information on membership or anything at all, please contact John Poel at 519 860 7639 or at president@heartlandsoilcrop.org.

A quarterly newsletter representing one of 11 Regional newsletters produced 4 times a year in conjunction with the Provincial Newsletter and OMAFRA Crop Talk.

Please return undeliverable mail to:

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OSCIA Provincial Director's Message

Stuart Wright, Heartland Provincial Director

As 2018 ends and 2019 is upon us the Ontario Soil and Crop Improvement Association is evolving as most vital organizations do. There are new things happening and ongoing activities gaining momentum that will strengthen the Association going forward thanks to work of the locals, regions, provincial executive and head office staff.

Among the new things in 2018 the initiation of the Canadian Agricultural Partnership complete with LEADS created some cost share opportunities for members and despite some complication with the recent government change many producers were able to improve their farms with best management practices. Hopefully the new year will bring a streamlining of the process to bring an even higher level of service to our members.

Also new was a restructuring of head office staff to better utilize opportunities to bring the program and Association areas into maximum effectiveness. In the past there was both a business manager and an environmental programs manager. Now there will be one program manager in the person of Angela Straathof who comes to OSCIA with an outstanding

resume and will bring great value to our group.

Last of the new and the exciting I would mention is our first OSCIA AGM in Kingston. Don't miss out on the action!

Of the ongoing activities first and foremost in the eyes of the provincial executive is the pursuit of strengthening the locals and regions as laid out in our Strategic Plan. After training sessions to build understanding of roles and responsibilities Association Development Advisor Brittany Roka has already begun the next phase that will focus on increasing membership in the coming years. Its an exciting challenge! OSCIA will strive to bring locals and regions full support.

I would like to congratulate Harold Rudy on an outstanding career with OSCIA, thank him for his guidance and friendship and encourage all to purchase his new book *The Soil Fixers*!



The Soil Fixers

Editor's note: Harold Rudy is a long-time member of Waterloo Region Soil & Crop.

The much-anticipated publication, *The Soil Fixers*, was celebrated with an official book launch with friends and colleagues of the Ontario Soil and Crop Improvement Association (OSCIA) assembling at the Cutten Fields in Guelph on Tuesday evening, November 13, 2018.

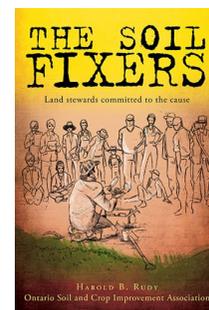
Reflecting on a 30-year career at OSCIA, book author Harold Rudy has captured key events, stories and highlights focused on many land stewardship activities over this time-period. The launch was complemented with fine food, musical entertainment and a special appearance by author and playwright, Dan Needles.

"Several history books of OSCIA have been published previously back to its origin in 1939, but *The Soil Fixers* is more than a history book. It is our stories, much of it related to our quest for improved soil management", says Rudy. "If you are interested to learn how farmers, along with government and industry partners, strive to

preserve soil as our most precious resource, and secure safe and nutritious food production for future generations, *The Soil Fixers* is a must read."

OSCIA's mission is to facilitate responsible economic management of soil, water, air and crops through development and communication of innovative farming practices. "Our members have been anxiously awaiting the publication of *The Soil Fixers*", says OSCIA president, Peter McLaren. "As a senior manager in the organization for more than three decades, Harold was very well connected to Ontario agriculture and has collected many experiences and observations as he travelled down the stewardship road."

The Soil Fixers can be purchased directly from the publisher, <https://books.friesenpress.com/store>.



Conservation Corner

Editor's note: the following information was provided by Grand River Conservation Authority. If you live in another watershed, you can find contact information and details about tree planting programs for other conservation authorities by visiting www.conservationontario.ca

Trees can be critically important on the agricultural landscape. They stabilize and protect streambanks, protect soils and crops from the wind, and stabilize steep slopes. In the Heartland region, conservation authorities offer tree planting programs to support producers who wish to plant trees for soil and water conservation.

There's still time to order trees for spring 2019 from the Grand River Conservation Authority (GRCA) for spring planting. There are three ways to buy trees from the GRCA:

Landowners who have at least 2.5 acres of land and who are planting their own trees can order them between **October 2018 and March 1, 2019**. Trees will be available for pick up in the spring. Tree orders can be placed online by going to <https://www.grandriver.ca/en/our-watershed/Tree-planting.aspx>.

Landowners with at least five acres of land can get help with planting projects from GRCA. A Forestry Specialist will visit your property and help develop a custom planting plan for your property, identify

grants to offset costs, and arrange for the trees to be planted by contractors.. Grants are available through funding programs such as the Forests Ontario - 50 Million Tree Program and the Rural Water Quality Program (RWQP). Grant rates vary from county to county and for different types of projects.

The annual end-of-season GRCA tree sale usually takes place on the second Friday in May, from 8 a.m. to 12 p.m. All watershed residents are welcome to purchase trees at this event. Trees that will be available at the sale are based on cancelled orders and nursery stock overruns. This usually results in a wide variety of native trees and shrubs being available. Sizes range from small bare root and plug seedlings to potted trees and saplings.

Looking for fact sheets, videos and other information to help you plan your tree planting project and care for your trees? Check out the Landowner Resources page at www.grandriver.ca/en/our-watershed/Landowner-grants-and-resources.aspx

Contact the Grand River Conservation Authority at 519-621-2761 or 1-866-900-4722 for morning information on tree planting programs, or to book a visit with a forestry specialist. Or email our forestry specialists at ruralwater@grandriver.ca.

SouthWest Agricultural Conference

The Road Ahead

The 26th annual Southwest Agricultural Conference will return January 3 and 4, 2019 to get participants ready for "The Road Ahead". Speakers from across the globe will share the latest on topics from nutrient management to marketing, compaction to pest management, precision agriculture to maximizing yields and more! Complimenting an incredible lineup of speakers will be the traditional trade show and Taste Ontario reception.

"Another AMAZING program!" proclaims program co-chair, Peter Johnson. "SWAC continues to lead the way, with the latest information and updates making "The Road Ahead" in agriculture both smooth and EXCITING! Once again, a conference you simply cannot afford to miss."

Feature speakers include Dr. Brynn Winegard, an award-winning speaker and expert on the science of motivation, productivity and how the brain works, and an inspiring team from the Enactus World Champion "One Seed Project", bringing sustainable food security to more than 30,000 Zambian farm families! The full program can be found at www.southwestagconference.ca.

Registration is available until December 7th, 2018, online at www.southwestagconference.ca or by phone, fax or mail. *New for 2019* Friday January 4th only - Livestream access to 29 live and pre-recorded SWAC sessions. Registration is limited, and this conference fills up fast. See website for registration details. Don't miss your opportunity, register now!

For more information, contact: Conference co-chair: Albert Tenuta, OMAFRA, Box 400 Main St. E., Agronomy Building, Ridgetown Campus, Ridgetown, ON N0P 2C0. Ph: 519-674-1617 or Conference registration lead: Mary Margaret McDonald, Ag Business Centre, U of G, Ridgetown Campus, Ridgetown, ON N0P 2C0. Ph: 1-866-222-9682 Fax: 519-674-1512.



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**AGRICULTURAL
CONFERENCE**

Saturday, January 19, 2019

Rozanski Hall, University of Guelph, Guelph, ON



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CropSmart

**Featuring Ken Ferrie,
Heyworth, IL
Friday January 18, 2019**

**RIM Park, Manulife Financial
Sportsplex, 2001 University
Avenue East, Waterloo, ON**

Registration closes Jan. 14, 2019
PreRegistration Only
Limited Seating for 400

Ken Ferrie has worked as an independent agronomist for over 25 years. Ken is involved in an intensive test plot program where he works with his clients on side by side replicated tests on such things as tillage, herbicides, fertility and planters. Ken also oversees the test plots in the Farm Journal Test Plot Program and leads the curriculum for Farm Journal's Corn and Soybean College. All of this information is pulled together to help him develop a systems approach for his clients.



www.farmsmartconference.com

@FarmSmart19

1.877.424.1300



Keynote Speakers
John Phipps, Farm Journal
Dr. Robin White—Assistant
Professor Georgia Tech



Other Speakers (check website for a listing of all speakers)



Slugs and IPM—Healthier soil decreases troubles from menacing molluscs
John Tooker, PENN U



The US Best Practices for Optimizing Grain Crop Production Systems on Farm—Jason Webster, Precision Planting



A crop adviser’s perspective on managing for soil health and resilience
Lee Briese, Independent Crop Consultant, ND



Catching Up on the Farm Tax Changes Most Affecting Agriculture—Tim Bridge, Ward and Uptigrove



2019 – 2020 Grain Market Outlook and Strategies for Success— Steve Kell, Marketing, P & H



Next Steps for the Future of Corn and Soybean Management—Peter Johnson, Real Agriculture & **Greg Stewart**, Maizex



Advanced cover crop management—Steve Groff, Cover Crop Coaching, Holtwood, PA

Heartland Tier 2 Grant

Heartland SCIA Tier Two Project: Maximizing cereal rye cover crop management for multiple benefits

Cereal rye is relatively inexpensive, can be established late in the fall and is very winter hardy. Farmers have used it for years as a cover crop to protect against soil erosion. It helps build organic matter and recent Ontario research has shown that it can also play a role in weed suppression. Planting soybeans “green” into rye can maximize its benefits, but we don’t yet know the impact on crop yield.

In this project, Heartland Region cooperators are comparing soybeans planted after early-terminated rye and “plant green” rye vs. no rye. We’ll look at the effects on weeds, crop development, and yield. As well, several organic growers will compare no-till soybeans planted into roller-crimped rye to standard organic soybean production. This is a new practice that may allow for reduced tillage and time-saving in organic operations.

Cooperating Heartland farmers include: Brett, Jamie and Carl Israel (Drayton), Murray and Paul Brownridge (Erin), Stuart Wright (Kenilworth), Marcel Egli (Walton), and Jerry, Roger and Jeff Drudge (Wroxeter). There is also a plot at the Elora research station and three sites in the Eastern Valley region.

For more information on this project, contact Jake Munroe, Soil Fertility Specialist (Field Crops), OMAFRA.



Figure 1. Soybeans “planted green” into rye (right) next to soybeans planted into early-sprayed rye (left), St. George, June 26, 2018. Despite delayed growth, the “plant green” soybeans yielded the same in this Brant SCIA trial.



Figure 2. This cereal rye, seeded on September 24th at the Elora research station, is part of the Heartland SCIA Tier Two project.



Figure 3. An organic no-till soybean field near St. Marys. Soybeans were no-till planted into roller-crimped cereal rye on May 30, 2018. Photo taken August 13, 2018. Tier Two cooperators will test this method of organic soybean production.

Editor’s note: The Heartland Tier 2 project is one of seven 3-year applied-research projects that have received funding across the province. Heartland is also a cooperator in the Thames Valley project “Roots Not Iron 2” and the Northumberland project “Making Relay Cropping Pay”. Results and information from the projects will be shared over the course of the next 3 years.



November 2018 Edition

OSCIA PROVINCIAL NEWSLETTER



As the year is getting close to an end, it also means for me that my year as president is coming to a close. Just four more months, three more regular monthly meetings plus the annual conference. And most important, only one more report to write, that being my annual report for

February's annual conference. But really, it seems like the term just got nicely started. Since the last newsletter there has been a few staff changes. First off, Amber Van De Peer is back from maternity leave and has jumped right back into the job of Executive Assistant. Nicole Hottot capably handled the duties for the 12 months Amber was away and has now secured a job elsewhere. The biggest change would be the addition of a new position of Program Director, filled by Angela Straathof from Renfrew county. Angela started on October 22nd and is fitting into the job quite nicely. We have just gone through another municipal election across the province. For me that means that starting in December I will once again be the mayor of our local township. I hope other parts of the province haven't experienced the turmoil of local councils as our area has in the past term. Some have had major turn over. Let's hope that the changes are for the better this time around.

Now, I get to talk about crops. A lot of the province has had quite good soybean yields, not for me, barely 20 bushels. But so far corn looks quite good. Just got started harvesting here, never before in October.

That brings us to annual meeting time. With an early harvest, more members should be able to get to their local meetings this year. As mentioned before the book that Harold Rudy wrote is now available to purchase at a reduced price for a limited time. This would be an excellent speaker's gift for annual meetings. By the time you read this we will have had the official book launch. We are all really looking forward to the evening of

November 13th, it will be an amazing culmination to Harold's career at OSCIA.

Last but not least is the annual conference in Kingston on February 5-6, 2019. This year we have a change in venue, and there are several changes in the format. From an earlier start and earlier end times to a change in the banquet format, I hope everyone likes the changes (agenda will be posted to our website shortly). Staff have been checking into Via Rail times that members from the west might find convenient instead of driving. Hoping to see everyone in Kingston in February.

So, with that I will sign off for now wishing everyone a safe and prosperous harvest.

Peter McLaren, OSCIA President

*A QUARTERLY NEWSLETTER ISSUED
ALONGSIDE 11 REGIONAL NEWSLETTERS AND
OMAFRA CROP TALK, TO UPDATE SOIL AND
CROP MEMBERS*

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- **OSCIA Annual Conference**

Ontario Soil and Crop Improvement Association

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Fax: (519) 826-4224*

Website: www.ontariosoilcrop.org

Tier One Grants – Waterloo SCIA Bus Trip

Waterloo SCIA organized a bus tour to Quebec from July 10th to 12th to learn and network with some innovative soil stewards. Below is a summary of our agenda:

Montreal and Saint Hyacinthe Quebec

Eric Kaiser – 2017 Soil Champion Winner. Eric has transformed 14 former Loyalist mixed settlement properties on heavy clay, into a large productive egg, field crop and strawberry business, now owned by his son, Max Kaiser.

Agrifusion – 6,000 Acre organic farm. Farming corn, soybeans, wheat and vegetables with production levels equal to conventional practices.

Danny Messier – Large cash crop operation running Guardian Strip till on controlled traffic RTK systems. Cover crops, yield mapping, fungicide and fertilizer trials. Danny is also a soybean seed grower.

Jocelyn Michon – over 20 years no-till experience growing corn, wheat and soybeans. Jocelyn has spoken at the Innovative Farmers conference, conferences in France, the 2017 Summit on Canadian Soil Health and has traveled to Ukraine as a consultant.

Including Special Guest speaker – Odette Menard, earthworm expert.

Mike Verdonk – 2,500 Acre corn, soybeans, wheat and canning crops. Mike grows cover crops and has tried no-till in heavy clay but has moved to strip till with a Soil Warrior.

We visited Eric and Max Kaiser's farm on Tuesday on our way to Quebec. Wednesday, we toured Agrifusion's Organic operation in the morning, had lunch with Jocelyn and Odette Menard, and finished the afternoon with a tour of Danny Messier's farm. Thursday, we visited Mike's farm and then travelled home.

What was Achieved?

Each stop offered different learnings, which really speaks to the diversity of the agenda. They all offered participants practical, applicable, hands-on teaching. Best of all, we got to go out and have a look at various crops and see the results for ourselves.

At Kaiser's we learned that one planter can do it all, and if you are going to practice No-till be PASSIONATE about it.

At Agrifusion, we learned that Organic crops can be as productive as conventional, but they require a lot of attention, tillage and detailed cropping strategy.

At Jocelyn's we learned, with a balanced soil and the right cover crops you can cut back on your Nitrogen inputs while maintaining yields.

Danny challenged the group to try things out for ourselves and do our own trials.

Finally, at Mike's farm we learned that adopting soil conservation practices doesn't mean that you must give up running expensive tillage equipment. We also learned, that banding fertility and getting phosphorus in the soil is the best place for it.

Each host was gracious, they didn't hide anything from the group and shared some of their greatest challenges as well.

We also had two separate opportunities to share during a group dinner with 2 of our hosts. I can't highlight how important those experiences are. When you sit down to eat you are physically nourished, while also taking time to get fed socially and emotionally. Sharing thoughts, practices, and reviewing each other's highlights of the tour. For those that are planning a bus trip in the future, I would highly encourage providing the opportunity for a group dinner.

Although each host offered a different approach, everyone (hosts and participants included) share the same goal, growing productive and profitable crops as sustainably as possible. We learned from those that are practicing soil stewardship first hand, and participants couldn't help but be inspired by the innovation and passion that each host shared with our group.

In closing, every farmer should take an opportunity to participate in a Bus Trip such as this, it is a great way to challenge your approach and broaden your network.

Report prepared by *Waterloo SCIA*

Call to Action!
Submit your Local SCIA's
Resolutions to the Provincial office
by January 11, 2019

Supporting Mental Health – Dealing with Stress

Whether it's in your personal life or at work, everyone experiences stress. To avoid the adverse long-term effects of stress on our physical, emotional, and mental health as well as our relationships, it's important to recognize the signs of stress and learn to manage it and a healthy way.

What is Stress?

According to the Canadian Mental Health Association, stress is a reaction to a situation, our body's response to a threat. It isn't about the situation itself. People usually feel stressed when the demands of a situation exceed the resources or the person's ability to handle the situation. However, there is a certain level of stress that can have a positive effect on your life. Small amounts of stress can help you rise to a challenge and meet your goals, leaving you feeling satisfied, proud, and accomplished.

How to Recognize Stress

- Physical signs may include headache, chest pain, muscle tension/pain, increase heart rate and blood pressure, fatigue/insomnia, digestive issues, and more;
- Mental signs may include decreased ability to think clearly or focus and increased forgetfulness, anxiety, restlessness, irritability, defensiveness, mood swings, hypersensitivity, anger, etc.;
- Other signs may include increased need to be in control, seeking perfection, or negative self-talk;
- You may experience low self-esteem, feel lonely or withdrawn, or feel like you just can't relax.

Managing Stress

- Getting to the root cause of your stress is the first step to managing it;
- Keep note of what causes you stress. Is it work, personal, financial, environmental, or internal stress?
- Relieving yourself of stress is important for your overall wellbeing.

Tips to help reduce and manage stress

- Reduce or eliminate alcohol, caffeine, and nicotine as these exacerbate stress;
- Get moving. Exercise is an excellent stress reliever;
- Eat a healthy, well-balanced diet;
- Talk to someone, a friend, family member or see a counsellor;
- Take a different perspective. A positive attitude can go a long way;

- Realize the things you can't control and try to accept them.

There are several resources to help you with stress. Visit the website for the Canadian Mental Health Association (<https://ontario.cmha.ca/mental-health/>) for more information.

Resources: Canadian Centre for Occupational Health and Safety and the Canadian Safety Council

Long-term effects of diverse cropping systems and no-till as best management practices to mitigate greenhouse gas emissions

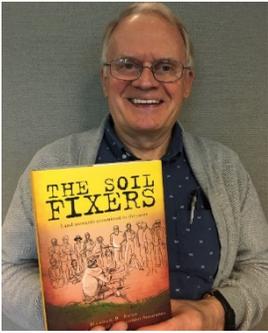
Soil health is known to be the basis of sustainable agriculture and important to mitigate nitrous oxide emissions, a potent greenhouse gas (N₂O). The adoption of diverse crop rotations with cover crops is described in the literature as an effective way of promoting a healthy soil. The rationale for this soil health amelioration relies on carbon inputs and use of diverse crops with different residue quality. In addition, the use of cover crops can protect nitrogen from losses, due to post-harvest nitrogen uptake. The adoption of no-till systems also has the potential to conserve the soil, resulting in lower mineralization rates of soil organic matter and affecting N₂O emissions.

Thus, the objective of the present research is to compare long-term diverse and non-diverse crop rotations, with or without tillage on soil nitrous oxide emissions. This ongoing research has been conducted following a factorial design, with two levels of tillage (i: no-till, and ii: conventional tillage), and two levels of crop rotation (i: corn-soybean rotation, and ii: corn-soybean-winter wheat with cover crop rotation). Measurements have been performed for the non-growing and growing seasons, in a long-term trial established in 1980 at the Elora Research Station, Ontario, by using steady-state chambers (manual and automatic chambers).

At the 2019 OSCIA Annual Conference, the initial findings associated with non-growing season N₂O emissions will be presented along with an overview of the research and future objectives.

Written by Pedro Ferrari Machado 2018 OSCIA Soil Health Scholarship winner

The Soil Fixers – Book Launch



Harold Rudy’s much anticipated book, *The Soil Fixers*, was launched November 13th at a celebratory gathering of friends and colleagues in Guelph. Readers of *The Soil Fixers* subtitled “Land Stewards Committed to the Cause”, will enjoy learning of the people and events, stories and highlights of many land stewardship activities over Harold’s 30-year career with OSCIA. As Harold was quoted, “This book is more than a history book, it is OSCIA’s stories related to the quest for improved soil management; how farmers, along with government and industry partners, strive to preserve soil as our most precious resource and secure safe and nutritious food production for future generations.”

For more information, see: thesoilfixers.com



Our diverse membership of over 4,000 has a significant presence in all agricultural areas of the province and across all major sectors.

Networking

Share your ideas and network with other progressive farmers in your area at:

- meetings
- bus tours
- twilight tours,
- demonstration days
- workshops
- annual meetings

Regional Newsletters

Highlight local activities and new technology, and are distributed quarterly to OSCIA members.

Discounts

Members enjoy discounted rates for various services, agricultural conferences & farm shows across the province.

- FREE brunch at Canada’s Outdoor Farm Show
- 10% off regular soil testing

Membership Benefits

Crop Trials

Participate in applied research trials and access new ideas and innovative technology that can improve your productivity and profitability. Also, align with OMAFRA Field Crop Specialists to gain valuable cropping information.

2019 OSCIA Annual Conference – Kingston, Ontario



Annual Conference

February 5 - 6 2019

Four Points by Sheraton, Kingston



OSCIA’s Annual Conference is moving East for the first time in many years and will be held in historic Kingston, Ontario.

Featuring Keynote Speakers:

Dr. Andria Jones-Bitton, University of Guelph – who will conduct a hands-on skills development session focusing on “*Mental Health in Canadian Farmers*”

Kevin Stewart, P.Ag. (hon) CAPS – will present “*The Forward Factor – Disruptive ideas that drive innovation*” to get us thinking about just how powerful the mind really is in determining human performance.

Pedro Ferrari Machado – OSCIA’s 2018 Soil Health Scholarship winner presenting initial findings

Dan Breen – OSCIA’s 2018 Soil Champion winner

Chris Martin – “*Innovation in Cover Crops and Export Hay Markets*”

Josh Cowan, Manager Research & Innovation, GFO – who will present on current research at Grain Farmers of Ontario.

Plus, numerous reports on applied research projects and membership engagement activities.

Check the website for Registration in December!



CROP TALK

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5. Sustainable Farmland Agreements
6. Spaces to Breathe and Grow
7. Crop Talk Evaluation Survey

Visit FieldCropNews.com for current field crop information through the season!

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Can Relay Cropping Work in Ontario?

Scott Banks, Cropping Systems Specialist, OMAFRA

This is the question that Mark Burnham near Coburg and several other growers across Ontario are trying to answer. It can be a challenge for many grain growers to justify the returns of winter wheat in a cash crop rotation, so these innovative growers are experimenting with different ways to continue growing wheat profitably.

Several growers are experimenting with relay cropping where soybeans are planted between rows of winter wheat in the spring with the goal to harvest two cash crops in the same year. The objective is to minimize the winter wheat yield loss, while establishing a soybean crop that will continue to grow after the winter wheat is harvested. The benefits of winter wheat-soybean relay cropping are 1) including winter wheat in rotation to provide a living soil cover through fall, winter and early spring 2) greater crop diversity that has shown to lead to greater soil health and 3) two crops in one year. The challenge is this: will soybeans inter-seeded into established winter wheat pay? That's the question Mark and other farmers are trying to answer with some on-farm trials this year.

In the fall of 2017, Mark planted winter wheat in three different row spacing configurations; 1) twin rows - 2 rows of wheat and 2 open rows (Figure 1), 2) winter wheat planted in 15 inch row spacing (Figure 2) and 3) three-7.5 inch rows of winter wheat with one open 7.5 inch row for soybeans to be planted in spring. The yield of winter wheat was compared to a solid (7.5 inch row spacing) winter wheat stand. Soybeans were planted on 30 inch row widths in the twin and 3:1 row stands, and in 15 inch row spacing between each wheat row in 15 inch row spacing. The wheat and soybeans were seeded at the same seeds per foot of row for all row configurations.

It is well known that there is competition between crops or between plant species. Consequently, we have to wonder: just how much impact is there on the winter wheat yield? How much of an impact is there on the soybean yield? Table 1 shows that in Mark's plots the wheat yield was reduced by 5 -16% depending on the different spacing of the wheat with interseeded soybeans in the 2018 winter wheat crop. It is possible that increasing the plant population to compensate for the wider row spacing may minimize the wheat yield reduction.

The soybeans have not been harvested at this point to report yields. Based on current market price for winter wheat and soybeans, it would take a yield of about 33 bushel of soybeans per acre to break even in this trial.



Figure 1. 2018 Twin row winter wheat-soybean relay cropping, Mark Burnham, 18 September 2018.



Figure 2. 15 inch Winter wheat-soybean relay cropping, Mark Burnham, 18 September 2018.

Table 1. 2018 Winter wheat yield in relay cropping with soybeans, Mark Burnham

| Winter Wheat Spacing | Yields (bu/ac) | % Yield of Solid Winter Wheat |
|---|----------------|-------------------------------|
| Check 7.5" Solid Wheat/no soybeans | 108 | |
| Triple wheat rows and 1 blank for beans | 101 | 94% |
| Twin row wheat | 92 | 85% |
| 15 inch rows | 93 | 86% |

Table 2. Break even budget for relay soybeans in twin row wheat

| | |
|---|---------|
| Yield (bu/ac) | 32.80 |
| Average price (\$ per bushel) | \$11.38 |
| Gross Return | \$373 |
| Total all Inputs | \$275 |
| Net Margin/acre | \$98 |
| Lost Wheat Yield (16 bu@ \$6.16 per bushel) | -\$99 |
| Net Return/Acre | \$0 |

There are many challenges to managing two crops together in one season:

- Weed control – it is extremely important to avoid competition with the seedling soybeans and for moisture. Some growers have had good success with a one pass fall application pre-emerge in the winter wheat crop, but generally weed pressure is higher in wider rows of winter wheat.
- Plant competition – in 2018, July was a very dry month, which was stressful on the soybeans competing with the wheat for moisture.
- Stand population – winter wheat is known to tiller well, but increasing the in-row plant population may compensate for the reduced wheat yield. In this year, the winter wheat was seeded at the same rates of seeds per row in each relay cropping configuration.
- Soybean populations – more work needs to be done to look at optimum plant populations for soybeans as it pertains to relay cropping.
- Harvesting winter wheat – shields are required to prevent the cutter-bar from cutting the soybeans and the combine tires need to align with the wheat rows to avoid trampling the soybeans (Figure 3). It is also important to adequately spread straw and chaff so that the remaining soybeans are not smothered.

There is still a lot to be learned. Mark is coordinating a relay cropping project funded through the Ontario Soil & Crop Improvement Association's Tier II grants. Other growers involved in this project include Reuben DeJong, Travis Greydanus, Mike Strang and Rick Kootstra. They are looking for other growers interested in experimenting with relay-cropping. Thank you to Mark and other growers for sharing your results and experiences with relay cropping



Figure 3. Combine trampling of the soybeans, Mark Burnham 18 September 2018.

Is there a Safe Rate of In-Furrow Fertilizer for Soybeans?

Horst Bohner, Soybean Specialist, OMAFRA

Some crops respond well to seed placed fertilizer. Applying phosphorus to wheat in-furrow has become standard practice for many growers. The amount of fertilizer that can be applied safely depends on the crop species, the type of fertilizer, the rate, soil type and soil moisture. Complete crop failures are possible if the seed or seedling is “burned” with excess fertilizer. Is there a safe rate of dry fertilizer phosphorus (P) and potassium (K) that can be applied in furrow for soybeans?

What Causes Fertilizer Burn?

There are two ways in which commercial fertilizer may cause injury. The first is salt injury and the second is ammonia toxicity. Essentially all commercial fertilizers contain salt. As they dissolve, the salt concentration in the soil solution increases. Salt injury occurs when the amount of salt close to the seed is greater than the salt that naturally occurs in the cells of the seed. The difference in osmotic pressure causes water to move out of the seed into the soil solution, which dries out the seed. If there is significant desiccation the seed or even young plant will die. The seed or roots of damaged plants may look dark grey or black. The term fertilizer burn comes from this blackened appearance.

The amount of moisture in the soil will greatly influence the amount of fertilizer burn. This is why knolls may be more impacted than lower areas where moisture conditions are higher. If the soil is wet the dissolved fertilizer salts in the soil will become diluted and move away from the seed reducing the osmotic pressure and the amount of injury. Sandy soils that dry out quickly, especially in a dry spring, show the greatest amount of injury.

Fertilizer Salt Index

Salt index is a measure of the salt concentration that a fertilizer causes in the soil solution. It is calculated by comparing the increase of osmotic potential that a fertilizer produces compared to the increase in osmotic potential of sodium nitrate when added to water. The salt index of sodium nitrate is defined as 100. The salt index of a mixed fertilizer that contains N, P, and K is calculated by adding up the value from each of the components. Nitrogen, potassium, and sulphate-sulphur fertilizers have higher values than phosphorus fertilizer.

It is important to know that salt index values do not predict the amount of injury that will occur to a crop in a specific field. They just provide a relative value of one product compared to another. The salt index of some fertilizers are shown in Table 1. The amount of fertilizer that can be applied safely depends on the crop species, the type of fertilizer, the fertilizer rate, soil type and soil moisture. For example, wheat is moderately tolerant to high salt conditions, and corn has some tolerance, while soybeans are very sensitive.

Table 1. Salt Index of Selected Fertilizers

| Fertilizer Product | Salt Index |
|--|------------|
| Potassium chloride, 60% K ₂ O (0-0-60) | 116 |
| Ammonium nitrate, 34% N | 104 |
| Sodium nitrate, 16.5% N | 100 |
| Ammonium thiosulphate, 12% N, 26% S | 90 |
| Ammonium sulphate, 21% N, 24% S | 69 |
| Urea, 46% N | 75 |
| 32% N (44% ammonium nitrate, 35% urea) | 71 |
| Potassium thiosulphate, 25% K ₂ O, 17% S | 68 |
| 28% N (39% ammonium nitrate, 31% urea) | 63 |
| K-Mag | 43 |
| Monoammonium phosphate: 11% N, 52% P ₂ O ₅ | 27 |
| MicroEssentials SZ | 23 |

Fertilizers that produce free ammonia such as urea will also increase stress placed on the seedling, which can increase injury. Ammonia toxicity occurs as urea breaks down to ammonia. High concentrations of ammonia near germinating seed is toxic and impairs water and nutrient uptake. Free ammonia in the soil is increased with high soil pH, low CEC, and under dry conditions. When soil moisture is high, hydrogen from water will attach to ammonia to convert it to ammonium, which reduces the potential of ammonia injury.

Is there a Safe Rate for Soybeans?

Since the amount of soil moisture is important in predicting the extent of fertilizer burn, establishing a “safe” rate for a sensitive crop such as soybeans is very difficult. It’s certainly not as simple as just picking a fertilizer with a relatively low salt index. One rainfall can make the difference between no damage and a significant stand reduction.

A trial was established in 2018 for the Southwest Diagnostic Days at Ridgeway College which demonstrated fertilizer burn in soybeans. Three products were applied in-furrow with different salt index values. Four planting dates were chosen to establish different soil moisture levels. The results demonstrated the difficulty of establishing safe rates for soybeans. The amount of soil moisture this spring continued to decline from the first planting date for each subsequent planting date. The planting dates were April 23rd, May 7th, May 23rd, and June 11th. The three fertilizers used were urea (salt index of 75), ammonium sulphate (salt index of 88), and a 50/50 mix of MESZ/K-Mag (salt index of 33).



Figure 1. April 23rd planting with MESZ/K-Mag – No plant stand reduction

Figure 1 shows that during the April 23rd planting date MESZ/K-Mag did not reduce plant stands significantly. Fertilizer was placed in-furrow. However, ammonium sulphate reduced stands by about 30% and urea with the highest salt index reduced stands by over 70% (see Figure 2). From this comparison it could be argued that a salt index of 33 or lower is safe for soybeans. However, by the May 23rd planting date even the MESZ/K-Mag with a relatively low salt index caused a large plant stand reduction. By the June 11th planting date over 70% of the plants were destroyed when using the MESZ/K-Mag mixture (see Figure 3). The urea completely decimated the stand for this planting date.

This relatively simple demonstration showed how planting date (soil moisture) can make the difference between a safe rate and a complete crop failure.

So, back to the original question: is there a safe rate for in-furrow dry fertilizer for soybeans?

The quick answer is yes, but safe rates across all soil types and moisture levels are not useful because the numbers are extremely low. Therefore, OMAFRA recommends no dry fertilizer be placed with soybean seed. This is mostly because soybeans are one of the most sensitive crops to fertilizer burn and because there is little evidence that soybean yields improve with seed placed dry fertilizer compared to broadcast applications. Although some Ontario experiments have shown that 25 lbs/ac of actual phosphate in the form of MAP is safe in 15" rows, yield gains from those trials were disappointing. Manitoba Agriculture suggests that 10 lbs/ac of actual phosphate in the form of MAP is safe with soybean seed in 6 or 7" rows when adequate soil moisture was present. Stand reductions can still occur with these low rates of MAP but losses will be relatively small.



Figure 2. April 23rd planting with urea – 70% reduction in plant stand



Figure 3. June 11 planting with MESZ/K-Mag – 70% reduction in plant stand

Be Safe on the Road! Know the Load!

Ian McDonald with contributions from Jacqui Empson-Laporte, James Dyck, Alex Barrie and Terrance Sauve, OMAFRA

As farmers struggle to complete harvest, there is pressure to quickly get the crop out of the field and into storage. However the crop won't matter much if your harvest practices mean you or someone else does not make it home! Nothing hurts a farm business more than a serious injury or worse yet, a fatality.

Let's start with the picture below. Four gravity wagons strung together to be filled and towed down the road to the farm. Maybe these empty wagons were brought to the field as a single unit but will be disconnected so that only one or possibly two full wagons are connected for the ride home. But, there are lots of cases where farmers take these risky chances and try and pull this entire load home.



Figure 1. Really! What's wrong with this picture? Seen on the back roads of Ontario, Thanksgiving Monday 2018.

start-up or jam on the brakes in an emergency. AT MINIMUM, for this load, a 1.5-inch, grade 8 pin should be used at the tractor (shear strength of 122,000 lbs) if it will even fit the running gear of these 400 bu wagons. And that is for certified graded pins! A home-built pin? Don't even think about it!

The stress on that pin at the tractor depends on the weight of the load, the speed of transport, the stress of the braking force applied, and the amount of contact of the pin to the tongue and drawbar. The wagon hooked to the tractor has the weight distributed over two thin (the tongue hitch) and one thick (the tractor drawbar) contact points. The wagons behind have 3 thin contact points, two on the tongue of the following wagon, and a hitch plate on the forward wagon. Yes, they tow less weight but the thin steel of the towed trailers hitch plate has greater chance of breaking or twisting under load.

What about safety chains? The chain at the tractor must be of a grade/capacity to carry the entire load. The chains put on wagons by the manufacturer are rated for the capacity of a single wagon (maybe two wagons if you're lucky). Have you upgraded your chains so that each wagon in the train has a chain sized for the capacity of that wagon and the wagons attached to it? Likely not! But we shouldn't have to ask this question because no one in their right mind should be thinking of pulling such a load, RIGHT? If the hitch or pin breaks on any one of the wagons, will that loose wagon(s) follow straight being towed by only the chain, or is it going to jackknife?

The vast majority of wagons do not have brakes. Bigger wagons may be equipped with surge brakes. But you have no control with surge brakes until the weight comes forward during braking. You have no way to engage the wagon brakes to start braking the load to correct potential jackknifing or start to stop the entire load. There is a high potential that the wagons will jackknife as they all surge forward during panic braking. Think also about not having enough tractor power to pull the load. If you run out of power for this load going uphill and stall, it is highly unlikely that the tractor brakes will be able to hold the load. The whole thing will slide backwards and jackknife with potentially devastating consequences.

Wagon manufacturers have commented that the only brakes they support are the hydraulic brakes hooked to the tractor system, or even better those hooked to a receptacle in newer tractors that connect the wagon brakes to the tractor brake pedals, enabling them to be set to engage when the operator initiates braking. Many people opt against the brakes because of cost on the assumption that their big tractor can control the load. THINK AGAIN!

What is a safe towing speed? If you come to the field empty at full road speed, is that the same speed you should be pulling a full load at? Obviously not, but what is your practice? Consult your equipment's Owner's Manual for information on safe travel speeds and weight limits.

Have you thought about what is involved here? Let's do the math using soybeans (because I can't do the darn math with wet corn):

- 4 gravity wagons and running gear - ~3000 lbs each empty = 12,000 lbs
- 400 bu per wagon @ 16% moisture and 60lbs/bu - 24,000 lbs each = 96,000lbs
- Total towed weight: 12,000 + 96,000 = 108,000 lbs (49 tonnes)

One single 1" diameter (or maybe 1-1/8" if we're lucky) draw pin at the tractor carrying all the weight behind it with 3 more draw pins (one on each wagon) carrying progressively lower loads. How strong is that pin? Just like bolts, hitch pins have grades. A 1" diameter grade 5 pin will shear under a load of 38,500 lbs - meaning if you were to hang 38,500 lbs from the pin, it would break. When towing, you aren't carrying the entire weight on the pin, but it's still a good gauge for the load limit. Consider the added stress on the pins when you jerk the load on

Owner's manuals also include safe towing limits for tractors and other power units. In general, the towed implement weight should not exceed 1.5x the weight of the tractor. For the example above and using a 200hp tractor to pull that load, if the tractor weighs around 26,000 lbs its maximum towed weight should not exceed 39,000 lbs. That means this load would be almost 3x its suggested towed weight limit.

The tire choice and inflation pressure can also impact load dynamics under speed. Again, consult your Owner's Manual or a professional on what is safe for the load and configuration.



Figure 2. What can happen when you don't think about safety in your daily farming practices.

When we asked some equipment people what would be needed in a tractor to stop this load under emergency conditions, they all essentially said nothing would do, because the wagons would more than likely jackknife and the results would be catastrophic. They said they would refuse to connect to this load with any tractor.

Another common site during the season is the Slow Moving Vehicle sign (SMV). The purpose of a SMV sign is to make the public realize there is a slow moving vehicle ahead. It is important to consider slow moving vehicle signs in the psychology of their use. The purpose of the sign is to get people to associate seeing them with a vehicle moving slower than normal traffic on the road ahead of them. By using SMV signs on gates, camping trailers, driveways and other uses, the public can be desensitized to what they are facing. Add in the fact that they are often approaching at

approximately 100 km/hr while the farm equipment is travelling 40 km/hr, and it's important that the awareness is instantaneous. Give them and yourself that awareness and reaction time by displaying and using SMV signs correctly!



Figure 3. The purpose of SMV signs is to make the public realize there is a slow moving vehicle ahead, not to mark the gate or lane entrance.

We need to build more thoughts of safety into our farming routines. We get complacent because it hasn't happened to us and think that it likely never will. Talk to someone who has experienced a tragedy and you will find that they once felt the same way. Replacing a faded slow moving sign, replacing a broken light, or taking the time for two safe trips instead of one seems like a small preventative action compared to the potential consequences.

Thinking and acting safely should be routine and instinctive. It takes "muscle memory" to make actions and thinking instinctive. Think, train and act safely for yourself and those around you. The goal should always be that you and those you come in contact with each day (including the people in the cars that pass you on the road), get home safely that night to enjoy their lives and their families.

Managing Glyphosate Resistant Canada Fleabane with Cover Crops and Tillage

Mike Cowbrough, Weed Management Specialist- Field Crops, OMAFRA

My colleague Dr. Clarence Swanton (University of Guelph) used to say that based on research he did in the 1980's, one should not expect to control weeds with cover crops. Their utility was in preventing soil erosion and improving soil health but not in significantly reducing weed populations. However, Dr. Swanton has had to re-think his long held position on cover crops and weed control given recent observations from on-farm research trials where fall seeded cereal rye has reduced glyphosate resistant Canada fleabane populations.

University of Guelph graduate student Ted Vanhie, under the supervision of both Swanton and Dr. François Tardif are looking at an integrated approach to the control of glyphosate resistant Canada fleabane using tillage, herbicides and fall seeded cereal rye. The concept being that seeding fall rye ahead of soybeans could significantly reduce populations of this weed and improve herbicide control. Below are observations Mr. Vanhie has made during the spring of 2018.

- Fall tillage followed by planting cereal rye resulted in the best control of glyphosate resistant Canada fleabane in the absence of herbicides. (Figure 1)
- Although glyphosate resistant Canada fleabane was still found in no-till fall seeded cereal rye, there were fewer and smaller plants compared to where no cereal rye was established and no fall tillage operation performed. (Figure 2 and 3).
- Control of Canada fleabane with herbicides was improved in no-till plots where cereal rye was established (Figure 4 – preliminary data from Ted Vanhie)
- Cereal rye at 50-60 lbs/acre provides little ground cover and shading. It is speculated that there is allelopathy inhibiting recruitment of glyphosate resistant Canada fleabane (Figure 5). Further experiments will test this hypothesis.



Figure 1. An overhead look at the level of control that cereal rye has provided when it was seeded the previous fall (mid-November) at 60 lbs/acre (left) compared to no cereal rye planted (right).



Figure 2. Height of glyphosate resistant Canada fleabane within fall seeded cereal rye.



Figure 3. Height of glyphosate resistant Canada fleabane in the absence of fall seeded cereal rye.



Figure 5. The recruitment of glyphosate resistant Canada fleabane appeared to stop within 10-15 cm of the outside row of cereal rye, prompting the speculation that differences in weed populations amongst treatments may be due to allelopathy.

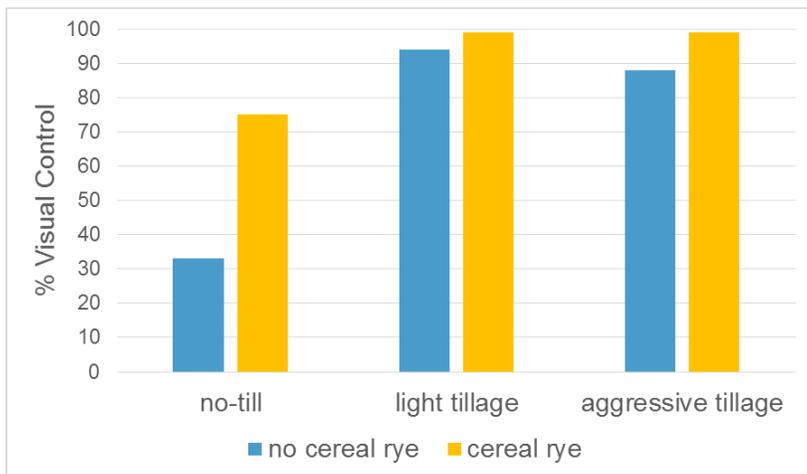


Figure 4. Visual control of Canada fleabane with Eragon LQ (59 mL/ac) + Merge adjuvant (400 mL/ac) applied in three different tillage systems (no till, light tillage, aggressive tillage) and in the presence or absence of a fall seeded cereal rye cover crop (60 lbs/ac).
Source: Preliminary data from Mr. Ted Vanhie's graduate thesis project.

Sustainable Farmland Agreements

Adam Hayes, Soil Management Specialist – Field Crops, OMAFRA

As the harvest season winds down many farmers begin to think about talking to their non-farming land owners about farming the land next year. Non-farming land owners are also preparing for discussions with a familiar grower or with a new one. According to the Farm and Food Care Ontario website over 35% of 4 million acres of farmland is currently on the rental market. How that land is managed can have a big impact on the environment.

Farmers approaching new landowners or those with an existing relationship need to make sure they are communicating in a way that the person is comfortable with. That could be a visit or a phone call or it may be electronic. You may also have to do some educating depending on the level of knowledge of farming or of more progressive practices. Showing the landowner the good soil management practices you use can go a long way to convincing them that you care about the land and want to work with them to improve the property in question. Some growers have put together a presentation illustrating what they do to maintain or improve their soil health. Working towards a multi-year agreement makes it easier for the farmer to take the steps to improve the land. Doing extra things the person needs done can be a way to help build trust.

A recent article from the Natural Resources Conservation Service (NRCS) in the United States titled “Five Questions Non-Operator Landowners Should Ask Their Farmers about Soil Health” features Barry Fisher an Indiana Farmer and soil health specialist with NRCS. In the article Barry suggests non-operator landowners ask their farming partners these five questions:

- Do you build organic matter in the soil?
- Do you test the soil at least once every four years?
- Do you use no-till practices?
- Do you plant cover crops?
- What can we do together to improve soil health on my land?

In the article Fisher states that farmers can build the productive capacity and resiliency of their landowner’s soil but as it is a long term proposition landowners should consider multi-year leases to provide more security for the farmer. He concludes by saying, “Improving soil health can provide long-term, stable dividends for you, your family, and your farming partner.”

The Farm and Food Care Ontario website has a significant number of resources to help with the development of farmland agreements. There is a brochure outlining farmer and landowner experiences, information for farmers and land renters, and for landowners and landlords. There is also a land lease agreement discussion checklist and a sample farm lease agreement. Check them out at <http://www.farmfoodcareon.org/farming-and-the-environment/soil-3/> and start working towards better long term economic returns while improving the health of our soils.

Spaces to Breathe and Grow

Sebastian Belliard, Soil Management Specialist, OMAFRA

We are all aware of the imperative to minimize compaction, but with crop quality on the line, tough choices have to be made on the trade-off between the grain quality and potential income from this year’s crop, and future yield and cost of production due to compaction losses or increased tillage passes.

There have been plenty of good tips published recently on minimizing compaction at harvest, so they won’t be re-hashed here. The [University of Wisconsin](#) and [University of Minnesota](#) extension services both have recent articles from climates similar to ours. Give them a look as you weigh your options.

Tillage might be necessary to fill in some ruts, and in cases of severe subsoil compaction the use of a subsoiler may be warranted. (Make sure to check the [Guide to Successful Subsoiling](#) before you start.) But what if you’re tired of burning diesel with deep shanks, or if you’re on a path or committed to no-till or minimal tillage?

The key to addressing compaction (AFTER avoidance!) is to restore and maintain critical soil functions. Compaction costs us because it reduces aeration, infiltration rate, plant-available water, and root access to soil resources, to mention only the direct impacts on crop performance. What do these have in common? They are the results of macropores in the soil, which are the most reduced by compaction. Macropores are the large “drainage” pores in soil, but they are so much more. Many could actually be called “biopores”, since they are created by biology – roots and worms, mostly. This article will examine how we can address compaction in the subsoil using cover crops and crop rotation.

You might have guessed by now that the primary way various “pre-crops” can limit the effect of subsoil compaction on cash crops is by restoring macropores and the functions they provide. Generally, crops with deep, thick taproots are the most capable of penetrating dense soil, and they leave the biggest (>2mm) biopores behind.

Most brassicas fit this description, including oilseed and forage radishes, as well as rapeseed - all common cover crops. For more strongly or more deeply compacted soils, however, it may take several years for a significant amount of root penetration to occur. Alfalfa is the best and most well-known crop for this, though some other tap-rooted forage species can also be used, such as sweet clover. Deep root penetration can also induce small cracks in the soil that function as macropores through their drying action. For root biopores and their benefits to persist longer than a few years, however, they must be stabilized by deep-burrowing earthworms, who will coat the walls with glues and organic matter¹.



Figure 1. Roots following existing biopores marked by arrows.

uptake with increasing numbers of biopores⁶. Having access to deep soil moisture can be critical in a dry growing season. One might assume that deep roots would contribute less to crop growth if most of the nutrients are in the topsoil, but research has shown that as long as part of the root system receives water, other parts can continue to extend into dry soil⁷ (assuming non-limiting penetration resistance) and so could be ready to absorb those topsoil nutrients when better conditions return.



Figure 2. Roots of forage radish. Credit: Natalie Lounsbury, notillveggies.org

Macropores improve root growth and exploration, particularly in denser soil. Roots of corn, soybeans, and wheat have been shown to actively grow towards large pores formed by previous roots or worms, likely attracted by higher oxygen levels. One study on corn following alfalfa found 41% of corn roots growing in previous alfalfa root channels in a clay loam², while another observed that over 90% of wheat roots below 40cm were growing in biopores or cracks in a dense clay soil³. Many other studies have found similar results, but one put it this way for soybeans: “if a taproot failed to encounter a burrow at [30-45cm], that root tip died”⁴. In soils where there is a dense subsoil layer over less-dense soil, there is evidence that roots will follow macropores through this layer and then re-enter the bulk subsoil to access resources⁵.

One of the most crucial resources to plant growth is water. Here, macropores serve multiple functions, increasing infiltration, drainage, and root access to moist subsoil. While macropores that are intact to the surface improve drainage, even those that are disturbed by tillage and only start in the subsoil can reduce ponding over the subsoil and increase drainage through compacted layers.

With respect to plant access to water, the taproots of forage radish and rapeseed increased the least limiting water range (LLWR) – a measure of plant-available water that incorporates the limitations of adequate aeration on the wet end, and penetration resistance on the dry end. Used as cover crops, these species increased the LLWR of compacted soils, and also increased the critical bulk density at which least LLWR reached zero. In an Australian study, wheat grown after alfalfa extracted more water from below 70cm than wheat after clover, and other studies have shown similar improvements in wheat water

performance due to biopores are variable – depending on soil type, climate, and the specific crops grown – their benefits often become apparent in difficult years like the one we’ve had in 2018. While two to three years of alfalfa is probably the best way to re-establish vertical porosity in soils, many growers don’t see forages making sense in their operations, or can’t find someone who can and is willing to temporarily swap fields. If that is your case, try to find someone near you who has had success with forage radish or similar cover crops, and make a plan to incorporate them in your rotation or cover crop mixes in the future.

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Crop Talk Evaluation Survey

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- Learn about current farm business management practices and resources
- Prioritize your farm business goals
- Develop an action plan to improve your profitability and success

ENVIRONMENTAL FARM PLAN WORKSHOP (EFP)

Improve the sustainability of your farm business

- Identify potential environmental risks
- Learn about legislation and Best Management Practices
- Develop an action plan

BIOSECURITY WORKSHOP

Protect your animal and plant health

- Understand the benefits of an on-farm biosecurity program
- Identify current practices that could be putting your farm at risk
- Work with a vet or certified crop advisor to enhance biosecurity protocols on your farm

| Town | Day 1 | Day 2 |
|------|-------|-------|
|------|-------|-------|

GYFP Workshop Schedule

For information, contact a workshop leader

| | | |
|--------------|---------|---------|
| Mount Forest | Dec. 4 | Dec. 11 |
| Brodhagen | Dec. 5 | Dec. 12 |
| Orangeville | Dec. 6 | Dec. 13 |
| Clinton | Jan. 17 | Jan. 24 |
| Orangeville | Feb. 1 | Feb. 8 |
| Listowel | Feb. 12 | Feb. 19 |
| Mount Forest | Mar. 13 | Mar. 20 |

EFP Workshop Schedule

For information, contact a workshop leader. Upcoming 1 day renewal EFP workshops will be posted on the website as they are available. Call 519-955-3139 for details.

| | | |
|-------------|---------|---------|
| Mitchell | Dec. 3 | Dec. 10 |
| Orangeville | Dec. 4 | Dec. 11 |
| Wingham | Dec. 10 | Dec. 17 |
| Elora | Jan. 10 | Jan. 17 |
| Markdale | Jan. 15 | Jan. 22 |
| Formosa | Feb. 6 | Feb. 13 |
| Alliston | Mar. 1 | Mar. 8 |
| Linwood | Mar. 19 | Mar. 26 |

Biosecurity Workshop Schedule

For information, call 519-955-3139.

Register online at www.ontariosoilcrop.org

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