Prairie Steward

Farming For Your Future Environment

The Newsletter of the Saskatchewan Soil Conservation Association — Fall Issue No. 67, 2015

Celebrating the International Year of Soils – A Year in the Life of a Soil Management Specialist

By Marla Riekman, Manitoba Agriculture, Food and Rural Development

The year 2015 has been declared the International Year of Soils by the Food and Agriculture Organization (FAO) of the United Nations. This designation has provided a great opportunity to promote the importance of soil as the base for agricultural production, but has been a little perplexing too, since for a soil management specialist like me, every year should be a celebration of soils!

In This Issue:

Click on article

To highlight the importance of soils, the FAO's website lists six key messages with regards to the International Year of Soils:

- Healthy soils are the basis for healthy food production.
- Soils are the foundation for vegetation which is cultivated or managed for feed, fibre, fuel and medicinal products.
- Soils support our planet's biodiversity and they host a quarter of the total.
- Soils help to combat and adapt to climate change by playing a key role in the carbon cycle.
- Soils store and filter water, improving our resilience to floods and droughts.
- Soil is a non-renewable resource; its preservation is essential for food security and our sustainable future.

http://www.fao.org/soils-2015/about/key-messages/en/

CONTINUED PAGE 6

2015 International Stewardship Symposium

By Tim Nerbas, PAg, SSCA Director

In July 2015 the Canadian Fertilizer Institute hosted the 2nd International Stewardship Symposium in Calgary. Delegates from around the world participated in the conference. The conference focused on the fact that agriculture needs to produce more with less: greater production on a smaller land base while invoking less environmental impact. In many parts of the world, such a solution would help improve the livelihoods of smallholder farmers.

The impact of climate change adds to the complexity of how we will feed an estimated 9.6 billion people by 2050. Climate Smart Agriculture (CSA) is an initiative of the Food and Agriculture Organization (FAO) of the United Nations (UN). Climate-smart agriculture promotes production systems that sustainably increase productivity, resilience (adaptation), reduces/removes GHGs (mitigation), and enhances achievement of national food security and UN's development goals (www.fao.org/climatechange/climatesmart/en).

Key Messages:

1. CSA must be a continuing process to achieve climate inclusive agricultural planning and implementation. It requires a strong commitment from policy makers in government and in the private sector, including farmers and scientists.

2. CSA faces many uncertainties and important and necessary knowledge is still lacking, in particular how to evaluate agricultural performance across different spatial scales and over a longer time period.

3. Continuous interaction among scientists, policy makers in CONTINUED PAGE 3

2015 International Stewardship Symposium…continued from page 2

government and the private sector, including farmers, is needed to ensure decision makers align with research.

4. The components and processes to frame or shape CSA are context specific.

5. Examples and concrete suggestions for activities are available and these provide a basis for learning and further steps.

6. It is important to create a relevant platform to exchange and organize best management practices.

CSA is not a single technology. It must be a suite of technologies and practices that leads to a better outcome than what is currently done (Kaushik Majumdar). Agriculture as a whole remains a significant emitter of greenhouse gases. However, Saskatchewan has made substantial improvements over the last 25 years. The Prairie Soil Carbon Balance (PSCB) project, a comprehensive, 14-year study of 137 Saskatchewan fields, has conclusively proven that farmers using no-till, direct seeding practices are contributing to the reduction of greenhouse gas (GHG) emissions through the sequestration of substantial amounts of organic carbon in their soils. The PSCB ran from 1996 to 2011 and results show that on average soil organic carbon (SOC) is increasing on Saskatchewan farmland under direct seeding at a rate of 0.23 Mg C/ha/yr or up to 0.38 ton CO_2 per acre per year (see www.ssca.ca for full research summary). That is equivalent to the removal of 8 million tons CO_2 every year by Saskatchewan's direct seeders.

The public has huge demands for agriculture. We are being asked to not only produce more with less, but also to do so using the best technologies and practices available in order to improve nutrient and water use per unit of production. The 4R program is a key component of sustainability. Nutrient use must be guided by the 4R's – use the right product, at the right rate, at the right time, and in the right place. As producers, we sometimes take two steps forward but one step back. It is important that sustainability be at the heart of everything we do. The use of direct seeding practices for seeding is well adopted, however the 4R's and diversified crop rotations have taken a backseat during the last decade and that is a step backwards.

Sustainable Agriculture is possible, but it has many hurdles to overcome. Consumers are demanding less environmental impact. In many parts of the world, soil degradation is still a real issue, as well as nutrient-leaching into ground water and river systems. Government policies need to align with the promotion of sustainable agriculture. In Africa, inadequate infrastructure and distribution systems are a significant barrier to improving farming practices and the "conventional" wisdom about soil management is often false.

Sustainable Agriculture is attainable, but we all must use all the tools in our toolbox. And governments will need to provide leadership and perhaps incentives to assist in achieving a sustainable food system.

As a wise African proverb states: "If you want to go fast, go alone, if you want to go far, go together." ▪

Click here to return to menu

Building Carbon to Improve Plants, Soils, and Air

By Brian McConkey and Darrel Cerkowniak, AAFC, Swift Current and Saskatoon

Healthy Plants = Healthy Soils

Farmers know that healthy soils make healthy plants. Australian soil scientist Dr. Christine Jones has rejigged that concept to healthy plants make healthy soils.

Dr. Jones has made presentations throughout the world, including in Alberta and Saskatchewan this past summer, on soil health. She stresses the importance of plant carbon as the both the fuel and building block for building and maintaining a healthy, productive soil. A vigorous, continuous, and diverse plant community is the essential means to supply that carbon to the soil. For cropland, this entails a diverse range of crops including post-harvest cover crops and periodic perennial crops where feasible. She advocates using a Brix meter (a refractometer) to measure the amount of dissolved solids in plant juices as a means to monitor plant health. She states that managing to maximize plant health will also maximize soil health.

Although Dr. Jones has unsubstantiated optimism about the ability of soils to rapidly build organic matter and supply plant nutrients, her plant centred view of managing soils is nonetheless useful. Productive soils do not exist without a healthy soil microbial community and that community is fed by the photosynthesis of past and present plant growth on that soil. Maximizing plant growth then is essential to maximize the ability of microbes to provide numerous soil-health benefits to plants in terms of disease control, good soil structure, growth promoting substances, and micro- and macronutrients supply. However, there is no hard evidence supporting Dr. Jones' claim that free-living microbes in a healthy soil can fix the entire crop's nitrogen demand.

Healthy Soils = Healthy Air

The world's soil is a huge reservoir of carbon. It contains about 1000 times as much carbon as the annual amount added to the air from the global burning of fossil fuels. Therefore, even small changes in soil organic carbon (SOC) have an important effect on atmospheric carbon balance. Dr. Jones has noted that if Australia increased the SOC concentration by an easy one-half a percentage unit on just 2% of its agricultural land, it would sequester carbon sufficient to offset all of Australia's greenhouse gas emissions. The Government of France has proposed a world goal to increase SOC on agricultural land by 4 per mil (0.4%) per year. This amount of carbon sequestration would be sufficient to reduce net greenhouse gas emissions to levels that would prevent dangerous climate change (less than average 2^{o}C temperature increase by 2100) while also improving global food security. How would these targets translate for Canada?

Canada's agricultural land (cropland, hayland, pasture, and rangeland) has an average of 2.2% SOC amounting to 4.8 billion tonnes of SOC to a depth of 30cm. In 2013, Canada emitted 726 M tonnes of

CONTINUED PAGE 5

Building Carbon to Improve Plants, Soils, and Air…continued from page 2

carbon dioxide equivalent (CO_2 eq). An increase of one-half a percentage unit of SOC on 19% of agricultural land would offset one year of emissions. The French 4 per mil goal for all agricultural land in Canada would reduce Canada's net annual emissions by 70 million tonnes of CO_2 eq, reducing national emissions by 9.6%. For Saskatchewan, achieving the 4 per mil goal would offset 22 million tonnes of CO_2 eq, reducing provincial emissions by 29%.

How easy is it to achieve these C sequestration goals? Put simply, increasing SOC is not easy. It requires an increase in carbon inputs from plants compared to what had occurred in past and/or decreasing the decomposition of SOC back to carbon dioxide. Dr. Jones's advice of maintaining a vigorous, continuous, and diverse plant community certainly accomplishes this. First, it increases C input. Second, growing plants cool and dry the soil and this reduces decomposition. Third, continuous plant growth minimizes the loss of SOC from soil erosion.

Prairie Soil Carbon Balance Project

A major initiative of the Saskatchewan Soil Conservation Association is the Prairie Soil Carbon Balance project where the SOC change was monitored from 1996 to 2011 for about 100 fields converted to direct seeding throughout Saskatchewan. Fallow was reduced to near zero, the crop rotation was greatly diversified, and crops better managed for more vigorous growth. Soil disturbance is minimized so that the plant root-soil-microbe system functions as effectively as possible. These changes are a practical example of Dr. Jones' recipe to increase soil health. So this study provides a good estimate of achievable SOC sequestration. The results from the project are summarized in Figure 1.

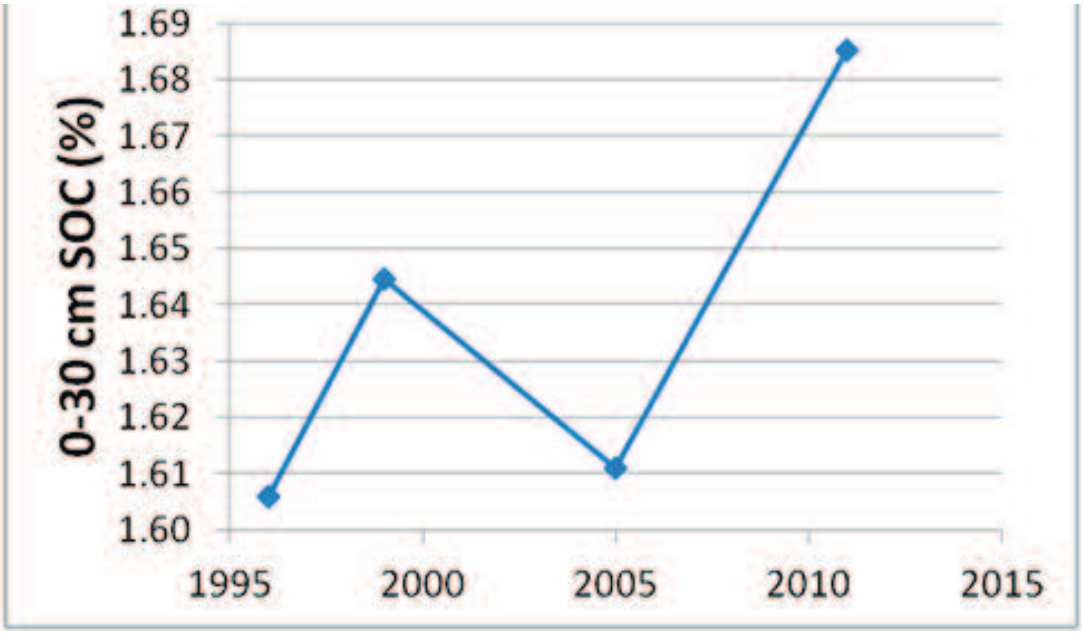


Figure 1. Average soil organic carbon (SOC) in upper 30 cm of soil in the Prairie Soil Carbon Balance Project (note, the apparent decrease in SOC from 1999 to 2005 was attributed to the effects of the 2001-2003 drought).

Over 15 years, average total SOC in the project increased by 0.08 percentage units. So it is completely unrealistic when Dr. Jones or others suggest that SOC can increase by one-half or more percentage units over periods of one decade or less. The average % increase in SOC from 1996 to 2011 was 0.33 (3.3 per mil). Therefore, the 4 per mil goal is challenging but is achievable under particular circumstances. These would be where the soil has been highly degraded in SOC but good plant growth, and thereby carbon input, on that degraded soil is attained. ▪

Click here to return to menu

Celebrating the International Year of Soils...continued from page 1

These messages are not new to the soil conservation-minded farmer; these are the underlying themes of zero tillage and min-till. Conserving the soil will increase the soils ability to hold water, maintain soil microbiology, sequester carbon, etc. These are the same concepts that underlay our extension messages - that we must promote proper soil management to minimize impacts of agriculture on the soil to preserve it for long-term use. So, as we near the end of 2015, I wish to take the opportunity to highlight some of the extension events where we've promoted the International Year of Soils and those key messages.

Soil Health Demonstrations

"Healthy soils are the basis for healthy food production" and a healthy soil is one that has good soil

Soil Crusting Demonstration – from left, poorly structured soils from two heavily tilled vegetable fields in Manitoba, a heavily soybean cropped Ontario soil, and a well structured Manitoba clay (with no crusting – on right).

Aggregate Stability Test – soil aggregates (pebble and smaller sized soil particles) from different tillage and rotation systems are placed on sieves and dunked into a water bath multiple times to see how well the aggregates withstand the impact of water. Poorly structured soil aggregates "melt" quickly and fall through the sieve (interesting fact: the forages in rotation make a bigger impact on aggregate stability than just zero tillage alone).

Soil Pit Discussion at a soybean field day near Isabella, Manitoba. Talking about root depth, soil compaction and soil salinity.

Soil Slake Test – soil clods from three different cropping practices (forage in rotation, organic grain (heavy tillage), conventional grain (fall-only tillage) to be placed into each cylinder to observe how clod stays together or collapse. Collapsing clods indicate weak soil susceptible to erosion.

Celebrating the International Year of Soils...continued from page 6

structure, is able to withstand the impact of wind/water erosion, doesn't seal off and form a crust, and generally allows for good root development and crop growth. We use number of demonstration activities (photos below) to show exactly what can happen to poorly managed, unhealthy soils vs. better managed, healthier soils. Some soils are more vulnerable to poor management than others and it is important to recognize the limitations of these soils for agricultural production – and manage them according to those limitations.

Nutrient Management Extension

A healthy soil has good supply of nutrients such as N, P, K and S; however, no soil has an endless supply so we need to strike a balance between crop removal and nutrient addition. A good nutrient management strategy is an important part of agricultural production and those nutrients can come from commercial fertilizer, livestock sources and N fixation by previous legume crops. MAFRD offers Soil Fertility Workshops during the winter months for farmers and agronomists – these two-day workshops go over the basics of soil fertility and interactions between the soil, plant and nutrients/fertilizers. We also made nutrient management "fun" by creating a 4R Nutrient Management Casino – the only casino where, if you play you cards right, everybody wins! Manitoba farmers are gamblers – each year laying down $600 – 750 Million in fertilizer in anticipation of increasing this "ante". The goal of this activity is to build a nutrient management plan that, when dealt a "wild card" such as extremes in weather,

Soil Fertility Workshop – presenting on the variability of sulphur in soils.

Horticulture Diagnostic School – discussing how to read a tissue test

Nutrient Management Casino dealers – John Heard (MAFRD), Marla Riekman, Don Flaten (University of Manitoba, Department of Soil Science)

CONTINUED PAGE 8

Celebrating the International Year of Soils...continued from page 7

lack of fertilizer availability, etc, is resilient enough to handle the new situation at hand. If not, 4R strategies of rate, source, placement and timing are used to make practical plan modifications.

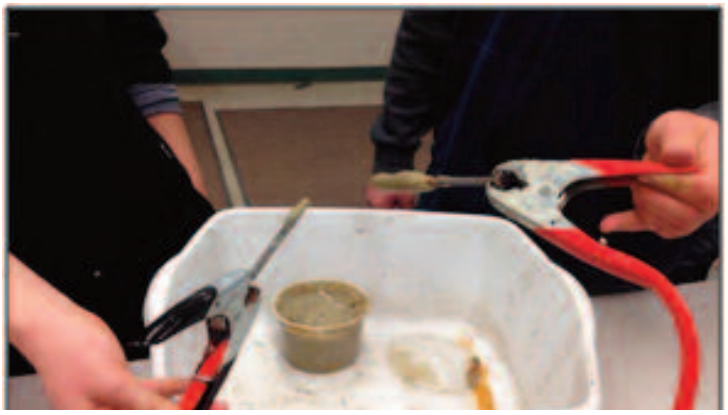
Student Education

The local high schools in the area around Carman, MB have created an event called the Agroecology Day which has given us an opportunity to educate on the importance of soils. Students learn about soil texture and structure and how they impact water movement and potential erodability of soil. We also discuss how nutrients move in the soil (how the charge of the soil will either attract or repel nutrients) and how nutrient loss might impact the environment.

Hunting for Manitoba's Provincial Soil

In 2010, Manitoba declared the Newdale Clay Loam as its provincial soil. This proclamation has turned into a special labour of love for members of the Manitoba Soil Science Society (MSSS). Not

Agroecology Day (April) – students learning to hand texture soil.



Get a charge out of soil! Using electrodes to show the net negative charge of soil clay and organic matter – commonly referred to as cation exchange capacity (CEC)

Boy scouts earn their Soil and Water Management Challenge Badge at spring camp by learning about soil texture/colour and making a mini monolith of the Newdale Clay Loam soil.

Newdale Clay Loam mini monolith

CONTINUED PAGE 9

Celebrating the International Year of Soils...continued from page 8

only has this meant "hunting" for the provincial soil in its native habitat in the northwest part of agro-Manitoba, but the soil has also been made into exclusive jewelry as a fundraiser for the MSSS. The Newdale soil, once sterilized, is laid out in its A, B and C horizon in rectangular metal findings and encased in resin to preserve it. These soil gems have even been used as speaker gifts for numerous events, including the World Congress on Conservation Agriculture hosted in Winnipeg in 2014, meaning that our humble provincial soil has gone "international", bringing new meaning for us to the International Year of Soils!

Collecting the Newdale Clay Loam from a farm north of Brandon, Manitoba.

Bagged our trophy soil! (with John Heard, MAFRD)

Candice Froese (student) on the Newdale soil jewelry assembly line.

We won the blue ribbon in the Carman Fair! (Note: this is just second place – obviously the judges didn't understand the significance of this entry!

Click here to return to menu

Duration of Agricultural Drainage Changes Soil Properties

By Robin Brown and Angela Bedard-Haughn
Department of Soil Science, University of Saskatchewan, Saskatoon, SK

Agricultural drainage is a hot topic for debate especially in the wetter northern and eastern portions of the province where flooding has been wreaking havoc in recent years. In Saskatchewan, agricultural activity is concentrated in the prairie pothole region where many small wetlands (i.e., sloughs) dot the surface of the landscape. These wetlands are

typically full in the spring and dry up throughout the summer. Wetlands provide many ecological services such as habitat for wildlife, sources of recreation, flood control, improving water quality, groundwater recharge and carbon storage. However, in certain areas of the province these wetlands are growing in size and staying wet throughout the growing season. Waterlogged soils can increase salinity, decrease soil structure, limit nutrient availability and create anoxic conditions that are unfavorable for

CONTINUED PAGE 11

Duration of Agricultural Drainage Changes Soil Properties...continued from page 10

plant growth. Agricultural drainage can help increase the amount of land available to farm, extend the growing season, reduce costs associated with manoeuvering equipment around wetlands and increase nutrient availability. Previous research in the province has focused on the water quality and flooding aspects of drainage. It is necessary to understand all sides of the drainage issue and meaningful to understand how drainage affects key soil fertility related properties in order to determine if drainage is a suitable management practice for long-term soil quality and to help develop management strategies that could help minimize negative impacts associated with drainage.

Since low-lying areas tend to have higher nutrient and organic matter concentrations than the surrounding uplands, drainage may create some of the best agricultural land. Our study aimed to determine how drainage affects soil properties over time and if these

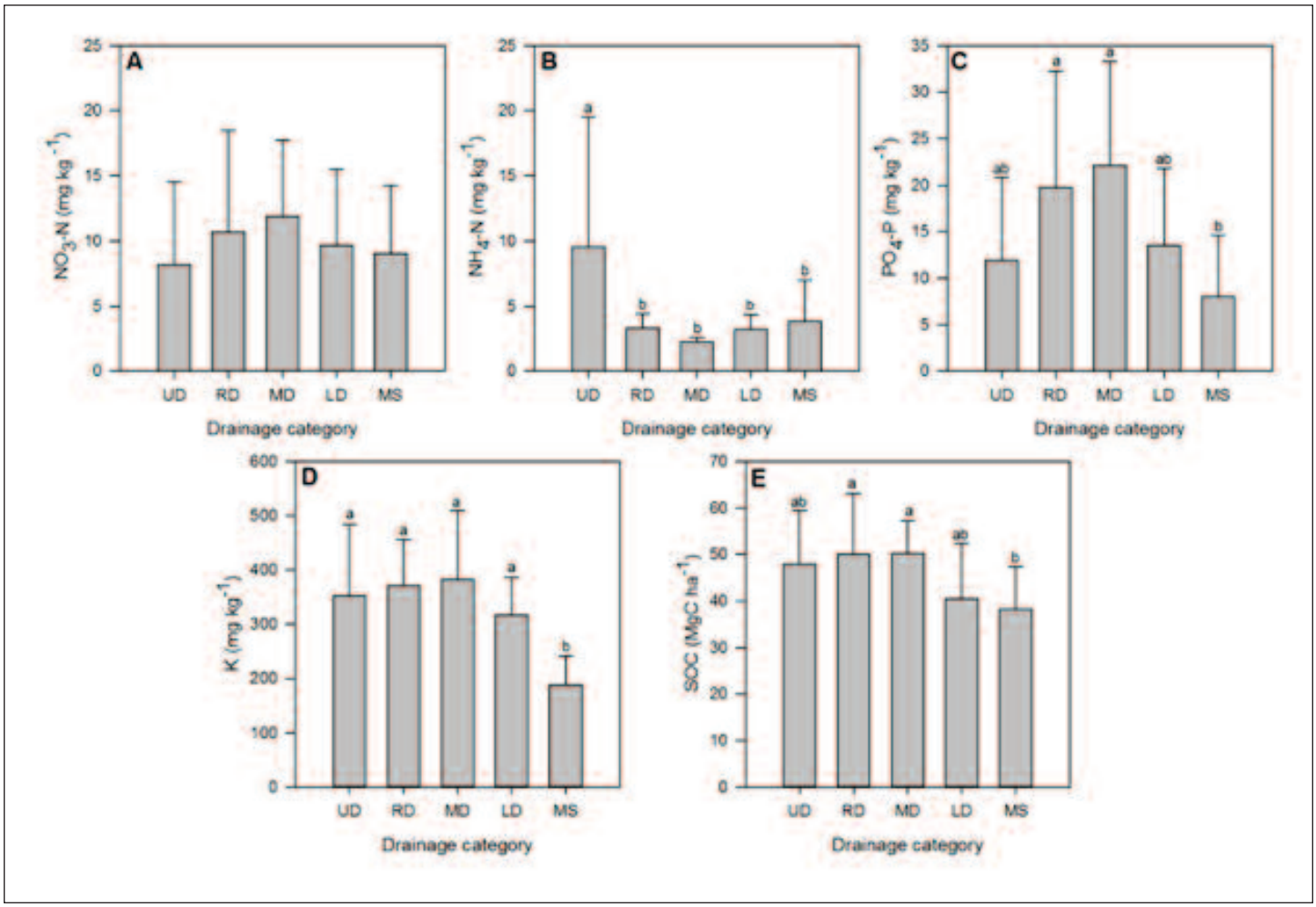


Figure 1. Available macronutrients and SOC in the surface soil (0-15cm) of drained soils and midslope pairs. Error bars represent the standard deviation. Lowercase letters above bars represent significant differences according to Tukey HSD test ($P<0.05$).

changes cause the drained soils to become more similar to the typically farmed midslope/upslope soil. In the fall of 2014 we sampled soil from 42 wetlands that have been drained anywhere from 0 to 50 years and 42 corresponding

CONTINUED PAGE 12

Duration of Agricultural Drainage Changes Soil Properties…continued from page 11

midslopes in the Smith Creek Watershed in southeast Saskatchewan. This area has been extensively drained over the past 50 years with more drainage projects in the works. The sites were grouped into five categories based on duration of drainage: undrained (UD), recently drained (RD), medium drained (MD), longest drained (LD) and midslope (MS). Soil properties measured include bulk density, structure, available N, P and K, mineralization, nitrification, sorption of P and quantity and quality of carbon.

Drainage was found to change surface soil properties (0-15 cm). Bulk density increased, with the LD soils becoming more similar to the MS. There was an increase in proportion of macroaggregates that offer protection of soil organic matter (SOM) and improve porosity resulting in improved structure. However, there was a decrease in the proportion of microaggregates that hold more recalcitrant forms of C. This could be problematic in terms of long-term carbon storage. Available NO_3, (Figure 1:A) PO_4 (Figure 1:C) and K (Figure 1: D) increased or remained consistent with initial drainage but appear to decline in LD soils becoming more similar to the MS (Figure 1). Potential nitrification followed a similar trend, which helps explain why we saw greater proportions of NO_3 compared to NH_4 (Figure 1:B) in drained soils. Phosphorus sorption was fairly high in all of the soils, which is likely due to high calcium and clay contents. The RD and MD soils had higher measured P desorption, indicating they have greater potential to lose P. Similar to nutrients, SOC (Figure 1:E) remained consistent in the RD and MD soils but decreased in the LD soils (Figure 1).

Many of these measured changes are likely a result of a shift to more dominantly aerobic conditions, changes in quantity and quality of soil organic carbon (SOC) and other coinciding management practices. Aerobic conditions increase biological activity resulting in increased aggregation and improved soil structure. Furthermore, aerobic conditions can increase mineralization of both N and P, increase nitrification, and decrease gaseous N losses associated with denitrification. In addition to these changes in nutrient cycling, fertilizer application is likely contributing to the apparent increase in initial nutrient availability following drainage. The increased biological activity – combined with increased tillage – can lead to greater decomposition of SOC with time. Tillage can also contribute to availability of K due to weathering. As for bulk density, lower bulk densities are usually associated with greater OM and the increase in these soils could be due to the loss of SOC, as well as compaction associated with the use of heavy equipment on these wet, clayey soils. These processes and management practices can explain why we see increases in nutrients initially following drainage. A decrease in available SOC for microorganisms as well as crop uptake followed by removal may explain the nutrient decreases in both LD and MS soils.

Drainage does improve growing conditions and nutrient availability for agricultural production. These improvements vary across wetlands that have been drained for different durations of time. Improvements appear to be greatest in soils drained from 7 to 34 years, but appear to decrease beyond

CONTINUED PAGE 14

Soil Health 2020

By Jim Tokarchuk, SCCC Executive Director, and Tim Nerbas, PAg, SCCC and SSCA Director

The Soil Conservation Council of Canada (SCCC), established in 1987, has a successful history as the national face and voice of soil conservation in Canada. In our 28 year history the SCCC has developed a strong relationship with farmers and farm organizations, wildlife organizations, governments, agri-business and many other stakeholders on the agricultural landscape. Through these relationships we have delivered numerous programs and services that have supported soil health and conservation in Canada. The SCCC will continue to partner and work with stakeholders on the agricultural landscape to advocate for and take actions on soil conservation and health in Canada. We invite you to visit www.soilcc.ca to look at some of the specific achievements and programs of the SCCC over the years, and the ongoing activities we now support.

In order to maintain a healthy organization that provides value to all its stakeholders, the SCCC continues to evolve what we do and how we do it. As a foundation for our future success we must be clear with our partners and supporters on what we can achieve together. Specific challenges and priorities will change with time and conditions, but we feel the constant anchor points for the SCCC are:

- Helping all Canadians, including farmers, consumers, industry, conservation groups and all levels of government recognize their shared interest in and commitment to safe guarding soil health and conservation;
- Increasing crop production through promoting sustainable production systems and best management practices that sustain the health of Canada's soil resource;
- Maintaining a science based approach to soil conservation and health;
- Promoting the sustainable intensification of agricultural production on existing farmland to avoid agricultural development of natural areas; and
- Promoting biodiversity in all forms on the agricultural landscape.

Going forward, the SCCC's key will be to focus on bringing leadership to understand the national and regional challenges and issues of soil conservation and health across the country and represent them to decision makers in government and industry. Conversely, the SCCC can provide leadership to our partners and stakeholders in disseminating solutions (information and technology) to agricultural producers and others who make land management decisions on the agricultural landscape.

Soil Health 2020 is new initiative championed by the SCCC to help us meet the future needs of soil health and conservation in Canada. We see this as an emerging framework that can harness our collective interests, commitments and resources of stakeholders on the agricultural landscape. Soil Health 2020 will be an evolving platform that will help us all to agree on what we must address to sustain soil health in Canada, how our joint actions can be applied to those priorities in an integrated and coordinated fashion, and a place

CONTINUED PAGE 14

Soil Health 2020…continued from page 11

where we shape our actions to respond to the challenges of the future. It can be the meeting place for science, awareness and action for soil health in Canada.

In the coming months SCCC will be reaching out to seek your help, input and commitment to the ongoing development of Soil Health 2020. To help get us all started, three "Pillars of Progress" are proposed. They are:

Leadership for a new generation – Progress through partnerships

Growing knowledge- Building awareness and connecting communities

Innovative solutions – Capturing opportunities to drive a better future

The Soil Conservation Council of Canada invites you to think about how and where you can contribute to Soil Health 2020 as a national initiative to promote soil health and conservation on the Canadian agricultural landscape.

To learn more about the SCCC and Soil Health 2020, visit www.soilcc.ca for new information. ■

SOIL CONSERVATION COUNCIL OF CANADA
CONSEIL CANADIEN DE CONSERVATION DES SOLS
The face and voice of soil conservation in Canada
Le visage et la voix de la conservation des sols au Canada

Click here to return to menu

Duration of Agricultural Drainage Changes Soil Properties…continued from page 12

that, becoming more similar to cultivated midslope positions. Other agricultural practices that are used following drainage affect how these soil properties change over time. Therefore, long-term soil quality depends on the management practices that are used with drainage. These results provide us with valuable data that could be used to help plan suitable management strategies to address agricultural drainage concerns within this region. Additionally the differences in properties across drained wetlands and midslopes may be a potential avenue to explore precision agriculture that could improve nutrient use efficiency and reduce nutrient losses to the environment.

Acknowledgements

We are extremely grateful for funding provided by Saskatchewan Ministry of Agriculture Development Fund, NSERC Discovery Grant, and the University of Saskatchewan. Special thanks to the Water Security Agency, Assiniboine Watershed Stewardship Association and the landowners who helped us locate and provide access to our study sites. ■

Click here to return to menu

Conservation Agriculture 2016

TRANSITIONING TO SUSTAINABILITY

The 28th Annual Conference of the
Saskatchewan Soil Conservation Association
Monday, January 11, 2016
Hall A – Prairieland Park – Saskatoon

8:00 am	**Registration Opens**
8:45 am	**Welcome and Opening Remarks**

Soil Session

9:00 am	***Keynote Speaker:*** **Succession to Soil Development to Ecological Intensification: Going Where No Grains Have Gone Before!** Tim Crews, PhD, Director of Research at The Land Institute, Salina, Kansas, USA
10:15 am	**The Role of Cover Crops in a Sustainable Farm** Garry Richards, Richards Family Farm and Livestock Ltd., Bangor, SK
10:45 am	**Refreshment and Networking Break**
11:00 am	**Soil Fertility Benefits of Short-Rotation Forages** Dr. Jeff Schoenau, Department of Soil Science, U of S
11:30 am	**Nurturing Soil Microbial Partners for Healthy Agro-Ecosystems** Dr. Bobbi Helgason, Agriculture and Agri-Food Canada, Saskatoon
12:00 pm	**Luncheon**

Weeds and Conservation Session

1:00 pm	**Managing Weed Seed Production: The Next Revolution in Weed Control** Eric Johnson, PAg, Department of Plant Sciences, U of S
1:30 pm	**Non-Herbicidal Weed Control** Dr. Steve Shirtliffe, Department of Plant Sciences, U of S
2:00 pm	**Managing Wheat to Make the Most of a Tough Growing Season: Lessons From 2015** Sheri Strydhorst, PhD, Ministry of Agriculture & Forestry, Barrhead, AB
2:30 pm	**Refreshment and Networking Break**
2:45 pm	**Wetlands in Agro-Ecosystems: A Mixed Blessing** Dr. Angela Bedard-Haughn, Department of Soil Science, U of S
3:15 pm	**The Returns to Conservation Tillage Research and the Dearth of Funding** Dr. Richard Gray, Department of Bioresource Policy, Business and Economics, U of S
3:45 pm	**Wrap-up**
4:00 pm	**SSCA AGM**

Click here to return to menu

CCSCs: Approved for 5.0 CEUs	CCAs: Approved for 5.0 CEUs
CM: 4.5 IPM: 0.5	NM: 2.0 CM: 1.5 PM: 1.0 SW: 0.5

For more information, please phone 306.371.4213 or email info@ssca.ca

2016 Speaker Biographies and Topics

Keynote Speaker: Tim Crews, PhD, Director of Research and Ecologist at The Land Institute in Salina, Kansas, USA

As Director, Tim helps administer collaborations between researchers at The Land Institute and universities and research institutes in over 10 countries, including Canada. His own research focuses on carbon, nitrogen, and phosphorus economies of perennial grain intercrops, especially grain-legume bicultures. Before joining the staff of The Land Institute, Tim was a professor at Prescott College in N. Arizona where he founded and directed an agroecology program. He has been a resident visiting scientist at CSIRO Plant Industry in Australia and Rothamsted Research in the UK. His PhD was in Ecology and Evolutionary Biology from Cornell University.

"Succession Soil Development Ecological Intensification: Going Where No Grains Have Gone Before!": Many of the greatest challenges in agriculture - soil erosion, soil nutrient and carbon retention, weed competition, heavy crop losses to pests - are logical, predictable outcomes of a low diversity food producing ecosystem arrested in a highly disturbed, early successional state. Studies suggest that the development and establishment of diverse perennial grain crops will facilitate soil and ecosystem development in ways that have been unattainable under annual cropping regimes. With improved soil organic matter quality and quantity as a primary driver, a mid-successional agroecosystem is predicted to maintain a different and potentially more beneficial soil micro biome, while also achieving greater water and nutrient uptake efficiencies.

Garry Richards, Richards Family Farm and Livestock Ltd., Bangor, SK

Garry, his wife Lynn, and their three children Rebekah, Evan, and Caroline have a mixed grain and cattle farm near Bangor, southeast of Melville. Garry and Lynn came back to Garry's family's farm in 2000. At that time Garry was a pharmacist, Lynn was a nurse, and it was their goal in the first few years to determine whether or not the farm would be viable without long-term subsidies from off-farm income. The farm was a straight grain operation in 2000, but beef cattle were added in 2002. In 2003 Garry and Lynn took a Holistic Management course and their first child, Rebekah, was born. In 2009 they started growing cover crop cocktails in an effort to become more sustainable. They strive to integrate the cattle and grain enterprises on their farm to achieve

CONTINUED PAGE 17

2016 Speaker Biographies and Topics...continued from page 16

healthy land, healthy people, and healthy profits.

"The Role of Cover Crops in a Sustainable Farm": An introduction to cover crop cocktails; what they are and what they do; why we grow cover crop cocktails on our farm; how we have used cover crop cocktails on our farm and the results we have seen; practical examples of how cover crop cocktails can be used on your farm.

Dr. Jeff Schoenau, PAg, Professor and SMA Chair, Department of Soil Science, University of Saskatchewan, Saskatoon

Dr. Jeff Schoenau is a professor of soil fertility and professional agrologist at the U of S. He also holds the Saskatchewan Ministry of Agriculture Soil Nutrient Management Chair in the College of Agriculture and Bioresources. Jeff was born in Saskatchewan and completed his undergraduate and graduate degrees at the U of S. His research, teaching and extension activities deal with soil fertility and fertilizer management, conservation and nutrient dynamics. He also owns and operates a grain farm with his wife Lynne near Central Butte in south-central Saskatchewan.

"Soil Fertility Benefits of Short-Rotation Forages": Including forages such as alfalfa or clover in rotation with annual crops provides benefits including enhanced nitrogen availability and phosphorus cycling. This presentation examines these effects, covering a recent study at four sites in Saskatchewan in which the effects of having two years of alfalfa or red clover in rotation with annual crops on the forms and availability of soil phosphorus and nitrogen, and effects on following annual crops, was evaluated.

Dr. Bobbi Helgason, Agriculture and Agri-Food Canada Research Scientist, Saskatoon

Dr. Helgason is a soil microbiologist with Agriculture and Agri-Food Canada in Saskatoon. With the goals of promoting efficient nutrient cycling, improved crop growth and sustainable soil management, her research focuses on soil-plant-microbial interactions and how these relationships are affected by agricultural management practices. Bobbi is also a visiting scholar and adjunct professor in the Department of Soil Science at the University of Saskatchewan.

"Nurturing Soil Microbial Partners for Healthy Agroecosystems": The roles of microbial abundance and community structure in productive and sustainable agricultural systems. For example, how different management practices affect the size and composition of soil microbial communities and why that matters for nutrient cycling and crop growth.

CONTINUED PAGE 18

2016 Speaker Biographies and Topics…continued from page 17

Eric Johnson, PAg, Research Assistant, Department of Plant Sciences, University of Saskatchewan, Saskatoon

Eric received both his undergraduate degrees in Agriculture at the U of S. He has over 30 years of research and technology transfer experience, working as a Weed Biologist and Officer-In-Charge for Agriculture and Agri-Food Canada in Scott, as well as an Extension/Soils and Crops Agrologist for the Ministry of Agriculture. Eric joined the U of S in 2015 where he now works for the Weed Research Program.

"Managing Weed Seed Production: The Next Revolution in Weed Control": Herbicide resistance is a growing problem worldwide with over 450 cases of resistance reported. Canada has 61 reported cases of weed and herbicide resistant combinations. The lack of new herbicide modes of action means that alternative methods of controlling weeds are necessary. In Australia, there has been a lot of research on managing weed seed production through techniques such as crop topping and weed seed destruction. Initial research results and the potential for these practices in western Canada will be presented.

Steve Shirtliffe, PhD, Professor, Department of Plant Sciences, College of Agriculture and Bioresources, University of Saskatchewan, Saskatoon

Steve was raised on a grain and oilseed farm in Manitoba. After completing a BSc in agronomy, he farmed with his family for five years before returning to the U of M where he received his PhD in 1999. As a professor at the U of S, Steve is involved with teaching, research and extension in the areas of weed control and agronomy. Past and current research projects have focused on the control of volunteer canola, oat and pulse agronomy, non-herbicidal weed control and agronomic applications of UAVs.

"Non-herbicidal Weed Control": Using physical weed control to control weeds, even in no-till agriculture!

Dr. Richard Gray, Professor, Department of Bioresource Policy, Business and Economics, University of Saskatchewan, Saskatoon

Richard's research has examined many aspects of agricultural policy including marketing and grain transportation; in the last few years he has examined agricultural research and innovation systems. He led the *Canadian Agricultural Innovation Research Network* from 2003 – 2013 and has regularly worked with farm organisations and government on innovation policy. Richard remains actively engaged in the fam-

CONTINUED PAGE 19

ily farm at Indian Head.

"The Returns to Conservation Tillage Research and the Dearth of Funding": In a recently completed study we found that investing in zero tillage research contributed to a fundamental transformation of cropping systems in western Canada creating substantial environmental and economic benefits. The extremely large benefit cost ratios merit greater investment in similar long run research. However, the lack of property rights, the diversity of the research, and the public nature of many benefits, will limit private investment in similar research. Innovative models are required to prioritize and fund similar future research investment.

Sheri Strydhorst, PhD, Ministry of Agriculture and Forestry, Crop Research and Extension Division, Barrhead, Alberta, and Adjunct Professor, University of Alberta (Photo credit: Jennifer Blair)

Sheri joined Alberta Agriculture in 2013 and is conducting agronomic research on cereal crops and plant growth regulators. Prior to this, she was the executive director of the Alberta Pulse Growers Commission. Sheri and her family have a grain farm in the Neerlandia area.

"Managing Wheat to Make the Most of a Tough Growing Season: Lessons From 2015": 2015 was a tough growing season - a cool spring, dry growing conditions, insects, heat and early fall frosts. While not all areas faced these problems, everyone faced some challenges. With data from five locations, we will take a look at the successes and failures of agronomic practices on many different wheat classes and cultivars.

Angela Bedard-Haughn, PhD, Associate Professor, Department of Soil Science, University of Saskatchewan, Saskatoon

Angela Bedard-Haughn was born and raised in the black soil zone, on a farm a few miles north of St. Brieux, SK. She completed her BSc in Physical Geography and her MSc in Soil Science at the U of S before heading south to University of California at Davis for her PhD. She returned to Saskatchewan in 2004 and joined the Soil Science faculty in 2006.

"Wetlands in Agro-ecosystems: A Mixed Blessing": Wetlands are ubiquitous in prairie agro-ecosystems, providing fertile land but also presenting great management challenges. This presentation will discuss some of the unique characteristics of wetland soils, including ecosystem services provided by wetlands, and explore management opportunities to maximize their potential benefit.

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