MANITOBA AGRONOMISTS CONFERENCE

UM | Faculty of Agricultural and Food Sciences

Wednesday, December 14, 2022

PLENARY SESSION – Room 172 Agriculture Building

8:25 **Welcome**

8:30 **Setting the Stage for the Plenary**

8:45 **Furthering 4R to Verify Sustainable Emissions Reduction**
Dr. Tom Bruulsema, Chief Scientist, Plant Nutrition Canada

9:25 **Research-Validated Strategies to Achieving 30%**
Dr. Mario Tenuta, Professor, Soil Science, University of Manitoba

9:55 **Coffee Break & Poster Session – Agriculture Building Atrium & Room 138**

10:25 **Soil Carbon Sequestration: Opportunities & Challenges**
Dr. Benjamin Ellert, Research Scientist, Agriculture and Agri-Food Canada

11:10 **Carbon Farming in the Northern Great Plains: Recent Research Findings**
Dr. Mark Liebig, Research Soil Scientist, USDA Agricultural Research Service

11:40 **Funding Change - The Prairie Watersheds Climate Program**
Mr. Dan Cox, Project Manager, Manitoba Association of Watersheds

11:50 **Canola 4R Advantage: Grower Incentives for Nitrogen Management**
Mr. Chris Manchur, Agronomy Specialist, Canola Council of Canada

12:00 **Lunch – Room 204 Marshall McLuhan Hall, University Centre**

CROP MANAGEMENT SESSION

1:00 **Crop Diseases – Old and New**

- **Crown Rust: A Perennial Concern in Oats**
  Dr. James Menzies, Research Scientist, Agriculture and Agri-Food Canada
- **Verticillium Stripe: What We Know and Don't Know**
  Justine Cornelsen, Agronomic and Regulatory Services Manager, BrettYoung Seeds
- **Aphanomyces Root Rot**
  Dr. Syama Chatterton, Research Scientist, Agriculture and Agri-Food Canada

1:45 **Unravelling the Challenges of Growing Canola: Emergence and Establishment in 2022**
Mr. Chris Manchur, Agronomy Specialist, Canola Council of Canada

2:30 **Coffee Break & Poster Session – Agriculture Building Atrium & Room 138**

3:00 **Keep Them Standing! Management Strategies to Minimize Lodging in Cereals**
Mr. Peter Johnson, Agronomist, Real Agriculture

3:45 **Agronomist Panel - Considerations When Planning Crop Rotation**
Mr. Jason Voogt, Owner Agronomist, Field 2 Field Agronomy
Ms. Elizabeth Karpinchick, Agronomist, Tone Ag Consulting Ltd.
Mr. Kory Van Damme, Owner Agronomist, Fortified Agronomy

4:30 **Reception – Agriculture Building Atrium**

Manitoba
Agriculture and Resource Development

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SOIL MANAGEMENT SESSION – Room 172 Agriculture Building

8:30 **Meeting Phosphorus Needs with Struvite**
Dr. Joanne Thiessen Martens, Assistant Professor, Soil Science, University of Manitoba

9:00 **Soil Acidification Trends and Solutions**
Mr. Ryan Buetow, Cropping Systems Specialist, North Dakota State University

9:30 **Nutrient Uptake Interactions in Wheat as a Function of Long-Term Rotation and Fertilization**
Dr. Miles Dyck, Professor, Sustainable Agriculture, Soil Physics, University of Alberta

10:00 **Coffee Break & Poster Session – Agriculture Building Atrium & Room 138**

10:30 **Tires, Traction and Minimizing Compaction**
Dr. Scott Shearer, Professor & Chair, Food, Agricultural and Biological Engineering, Ohio State University

11:15 **Biological Potential to Meet Crop Nutritional Needs**
Dr. Barney Geddes, Assistant Professor, Microbiological Sciences, North Dakota State University

12:00 **Lunch – Room 204 Marshall McLuhan Hall, University Centre**

PEST MANAGEMENT SESSION

1:00 **Cover Crops on the Prairies**
Dr. Yvonne Lawley, Professor, Plant Science, University of Manitoba

1:30 **Are Spot Sprays the Future for Pesticides?**
Dr. Tom Wolf, Owner, Agrimetrix Research & Training

2:00 **Outside the Box Weed Control**
Dr. Breanne Tidemann, Research Scientist, Agriculture and Agri-Food Canada

2:30 **Coffee Break – Agriculture Building Atrium**

3:00 **Using RNA Interference to Protect Crops Against Fungal Pathogens**
Dr. Mark Belmonte, Professor, Biological Sciences, University of Manitoba

3:30 **From an Orthopteran Overload to Sinister Sap-Suckers: Main Insect Concern in Crops in Manitoba in 2022**
Dr. John Gavloski, Entomologist, Manitoba Agriculture and Resource Development

4:15 **Closing Comments**

Thank you for joining us for the 2022 Manitoba Agronomists Conference!
Please scan the QR Code to complete the evaluation form.

Wednesday, December 14, 2022

8:45 Furthering 4R to Verify Sustainable Emissions Reduction

Tom Bruulsema, Chief Scientist, Plant Nutrition Canada tom.bruulsema@plantnutrition.ca

Fertilizer use has been a key factor in boosting crop yields worldwide, feeding a growing population, and relieving pressure for land use change. At the same time, the global use of nitrogen fertilizer is associated with greenhouse gas emissions of around 720 million tonnes of carbon dioxide equivalents each year. Crop producers and their advisers are under pressure to reduce those emissions, while continuing to increase crop yields and soil health. The principles of 4R Nutrient Stewardship have much to offer toward this goal. The scope for reducing emissions from fertilizer is large but may require dramatic and costly changes. In Canada a 30% reduction by 2030 was found possible only with unrealistically high rates of adoption of advanced 4R practices. Globally, a 70% reduction by 2050 could be achieved, again only with massive improvements in nitrogen use efficiency and 4R practice adoption. Farmers on their own do not have the resources to provide all the emission reductions possible. Farmers, industry, and government will need to work together to develop the monitoring, reporting, and verification needed to recognize and reward those adopting effective practices.

Biography: Tom Bruulsema is Chief Scientist with Plant Nutrition Canada, supporting the nutrient stewardship programs of the fertilizer industry. He chairs the International Fertilizer Association's Scientific Panel on Responsible Plant Nutrition. Based in Guelph, Ontario, he served for 25 years with the International Plant Nutrition Institute and the Potash & Phosphate Institute. Dr. Bruulsema has been recognized as a Fellow of the American Society of Agronomy, the Soil Science Society of America, and the Canadian Society of Agronomy. He has agronomic research experience with the University of Minnesota (1994), and with the Mennonite Central Committee in Bangladesh (1986-1990).

9:25 Research-Validated Strategies to Achieving 30%

Dr. Mario Tenuta, Professor, Soil Science, University of Manitoba

Abstract not available.

Biography: Mario Tenuta is the NSERC/WGRF/Fertilizer Canada Senior Industrial Research Chair in 4R Nutrient Stewardship and Professor of Applied Soil Ecology at the University of Manitoba. His training includes a B.Sc. in Botany and Physical Geography, an M.Sc. in Soil Fertility, a Ph.D. in Plant Pathology, and Post-Doctoral research in Nematology. The 4R Industrial Research Chair Program is advancing research in 4R nitrogen management practices to give farmers and industry solutions to achieving nitrous oxide emission reductions as well as improved soil health and crop productivity.

10:25 ## Soil Carbon Sequestration: Opportunities & Challenges

Dr. Benjamin Ellert, Research Scientist, Agriculture and Agri-Food Canada

Soil carbon (C) storage in terrestrial ecosystems has been touted as a means to mitigate increasing atmospheric carbon dioxide at least since 1977 when the renowned physicist, Freeman Dyson, detailed the idea in the peer-reviewed literature. More recently, increased soil C often forms the basis for pursing improved "soil health" or "regenerative agriculture" or "integrated crop-livestock systems". When considering terrestrial C storage, the land area involved is critical, management intensity and feasibility of altering it also is important, and the durations of C accumulation also are crucial. Too often these aspects are neglected, and strategists consider only the rates of soil C accumulation. Agricultural land on the Canadian prairies is attractive as a repository of terrestrial C, because the area is relatively large and intensively managed. This presentation will review some of the practices that have been proposed to accumulate soil C, along with some of the estimates for rates, areas and durations. Approaches to measure temporal changes in soil C stocks will be presented, including details on sampling and analyses. Such measurements provide time-integrated assessments of landatmosphere exchange of carbon dioxide. Information on long-term changes in soil C will be reviewed, along with the vulnerability of soil C to decomposition, and interactions among the emissions of carbon dioxide and other greenhouse gases from agricultural systems.

Biography: Benjamin Ellert is a research scientist in biogeochemistry with the Agriculture & Agri-Food Canada Research & Development Centre at Lethbridge. He earned a Ph. D. in soil science, and has considerable experience in research on the cycling of carbon, nitrogen and other biogeochemicals in agroecosystems. He studies the land-atmosphere exchanges of greenhouse gases associated with biogeochemical cycling, applies isotopic techniques to trace element flows in the environment, and gleans insights from assorted long-term field experiments. Ellert's interest in agriculture stems from his early years on a small mixed farm in southern Alberta.

11:10 ## Carbon Farming in the Northern Great Plains: Recent Research Findings

Dr. Mark Liebig, Research Soil Scientist, USDA Agricultural Research Service, Mandan, ND
mark.liebig@usda.gov

Most agricultural soils in the northern Plains have the capacity to store more carbon. Increasing soil carbon can provide climate regulation benefits, and in doing so, may offer supplemental income for farmers and ranchers through ecosystem service markets. However, there is considerable uncertainty regarding the efficacy of agricultural management practices to achieve lasting climate regulation benefits, particularly in the northern Plains. This presentation will review research findings from the USDA-ARS Northern Great Plains Research Laboratory, where soil inventory and micrometeorological methods have been used to document management effects on soil carbon and greenhouse gas emissions in rainfed cropping, integrated, and pasture-based production systems. Broadly, findings suggest achieving climate regulation benefits is difficult under conventional management. Agronomic practices that preserve carbon already stored in soil while extending periods of photosynthesis are effective responses to climate change, both in mitigating its causes and adapting to its impacts.

Biography: Mark Liebig is a Research Soil Scientist with the USDA-ARS Northern Great Plains Research Laboratory near Mandan, North Dakota. For the past 23 years, Mark has contributed to research seeking develop soil, crop, and animal management practices for the Great Plains to overcome limitations to productivity while enhancing environmental quality. As a team member, Mark leads research to quantify management effects on soil properties and greenhouse gas emissions. As a supplement to core responsibilities, Mark develops decision aides and evaluation tools for producers, conservationists, and scientists, and regularly contributes to research networks within and outside USDA-ARS.

11:40 ## Funding Change - The Prairie Watersheds Climate Program

Mr. Dan Cox, Project Manager, Manitoba Association of Watersheds,
dan@manitobawatersheds.org

The Prairie Watersheds Climate Program (PWCP) provides up to $40 million in financial support, through the On-Farm Climate Action Fund (OFCAF), to producers in Manitoba and Saskatchewan to accelerate their adoption and implementation of on-farm beneficial management practices (BMPs) to reduce Greenhouse Gas (GHG) emissions, support production efficiency, sustainability, and resiliency on their farm operations. To assist producers with their adoption of new BMPs, the program offers producers resources to support BMP implementation and provide BMP design recommendations. The three streams of PWCP are improving nitrogen management, Increasing adoption of cover cropping, and expanding the adoption of rotational grazing.

Biography: Dan joined the Manitoba Association of Watersheds in 2020 as Project Manager. He brings 14+ years of project management experience in the renewable energy sector to the MAW project team. His educational background includes a Bachelor of Science from the University of Winnipeg and an advanced diploma in GIS from Red River College. His role within the organization is to over see all projects which MAW administers on behalf of the Watershed Districts in Manitoba.

11:50 Canola 4R Advantage: Grower Incentives for Nitrogen Management

Mr. Chris Manchur, Agronomy Specialist, Canola Council of Canada,
manchurc@canolacouncil.org

Growers across the prairies are excellent stewards of the land and engage in practices that both improve farm productivity and the environment. The principles of 4R Nutrient Stewardship (Right Place, Right Time, Right Rate, and Right Source) are key to improving fertilizer efficiency, and there are many best management practices (BMPs) that support this concept. Through the Canola 4R Advantage, growers in Manitoba, Saskatchewan, and Alberta can apply for funding to help pay for 4 BMPs related to nitrogen management. Soil testing, enhanced efficiency fertilizer, preferred application, and field zone mapping are all ways that growers can improve their bottom line, while engaging in 4R-documented practices that demonstrates their contributions towards reducing nitrous oxide emissions.

Biography: Chris joined the Canola Council of Canada in May 2022 as an Agronomy Specialist for the East Manitoba region and as the Sclerotinia and Research Lead for the Crop Production & Innovation Team. He received his Master's degree researching next-generation RNAi fungicides (2022) and his Bachelor of Science in Plant Biotechnology at the University of Manitoba (2020). Chris is currently involved in managing the Council's Canola Agronomic Research Program (CARP) and the 2023-2028 Sustainable Agricultural Partnership (SCAP) Canola AgriScience Cluster.

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1:00 **Crop Diseases – Old and New**

- **Crown Rust: A Perennial Concern in Oats**

  Dr. James Menzies, Research Scientist, Agriculture and Agri-Food Canada, Morden, Manitoba

Crown rust is caused by the fungus Puccinia coronata var. avenae f. sp. avenae (Urban & Marková), and is the most widespread and destructive disease of oats worldwide. The disease is economically significant in Quebec, Ontario, Manitoba and Saskatchewan. Yield losses can be up to 40% on average, but higher in individual fields. Quality of grain can also be affected. Disease development occurs optimally during periods of warm sunny days and mild nights, with good dew formation. The summer weather over the last few years has been hot and dry, which is not conducive to crown rust development. However, 2022 was a good year for crown rust, meaning the incidence and severity of crown rust was high. Recommended control practices for this disease include seeding early, use of resistant varieties and foliar fungicides. Seeding early can help avoid mounting losses caused by this disease because the pathogen spores are blown in from the USA each year in late June to early July. The earlier the crop matures, the more likely it will avoid the worst build up of the disease. Varieties with resistance to crown rust have been developed in Canada over many years and can be highly effective. The pathogen is highly genetically variable, however, which means that resistance genes may be overcome. Varieties that were considered resistant to crown rust when initially registered, may become less effective against the pathogen over time. A number of examples of resistance genes that have been overcome by genetic changes in the pathogen population are presented. Fungicides can also effectively control crown rust of oats, as we do see more fungicide applications to control crown rust. Users need to read and follow the labels and product information packages of registered fungicides for best results. Fungicide rotations should also be considered to prevent the development of pathogen tolerance or resistance to the fungicide.

Biography: Dr. James (Jim) Menzies attended the Universities of Winnipeg, Manitoba and Guelph, obtaining his Ph. D. from the latter. He started his professional career with Agriculture and Agri-Food Canada at Agassiz, B.C. in 1987, transferred to Winnipeg in 1995 and to Morden RDC in 2014. He has worked on diseases of greenhouse vegetables, the smut diseases of cereals, and currently focuses on ergot of wheat and crown rust of oats. His areas of research interest include genetics of host-pathogen interactions, pathogen population genetics, and the use of plant nutrients (in particular soluble silicon) in plant disease control.

- **Verticillium Stripe: What We Know and Don't Know**

  Justine Cornelsen, Agronomic and Regulatory Services Manager, BrettYoung Seeds

Canola infected with the fungal species Verticillium longisporum was discovered in Manitoba in 2014. Since then, this soil-borne pathogen has allowed the disease, verticillium stripe, to rob yield from canola growers in western Canada. Hot, dry summers have intensified the disease symptoms, making identification of this disease easier but losses more noticeable. Nearing 10 years since first discovered in Canada, what do we know about this plant disease now and what remains a mystery?

Biography: Justine Cornelsen is the Agronomic and Regulatory Services Manager with BrettYoung Seeds. She carries over 10 years of agricultural and environmental experience from previous positions

with the Canola Council of Canada, Agriculture & Agri-Food Canada, and Parks Canada. Justine graduated with a Bachelor of Science degree from Brandon University in 2014. In 2021, she completed her Master of Science degree at the University of Manitoba. Justine currently resides on an acreage near Virden, where she is surrounded by many, many horses.

- ## Aphanomyces Root Rot

  Dr. Syama Chatterton, Research Scientist, Agriculture and Agri-Food Canada, Lethbridge, Alberta

Following several wet growing seasons on the Canadian Prairies, root rot severity in field pea and lentil exploded in 2012–2013, often associated with the oomycete pathogen Aphanomyces euteiches. Surveys from 2014–2022 revealed that A. euteiches was distributed across the Prairie region. Fusarium species such as F. avenaceum and F. redolens were also frequently isolated from diseased pea roots. Surveys showed that root rot is present in every pea and lentil field in the region, and that root rot incidence and severity increased in wet years and decreased in dry years. This presentation will delve into the current research on the main culprit, Aphanomyces euteiches, and the role its many accomplices (biotic and abiotic) play in driving disease in the field. The challenges and lessons learned from field trials tell the complicated story of this disease complex and ongoing field research into managing the disease will be presented.

Biography: Dr. Syama Chatterton joined Agriculture and Agri-food Canada at the Lethbridge Research Centre in July 2011 as the pulse and special crops pathologist. Her research focuses on management of root and foliar diseases of pulse crops, and molecular diagnostics and identification of soilborne pathogens. She was the first to identify that Aphanomyces root rot was present in Alberta, and has been on a challenging journey of discovery of this troublesome pathogen ever since. She is chasing the dream of developing a robust decision support system to reduce root risk for sustainable pulse production.

1:45 Unravelling the Challenges of Growing Canola: Emergence and Establishment in 2022

Mr. Chris Manchur, Agronomy Specialist, Canola Council of Canada, manchurc@canolacouncil.org

After a drought year in 2021 with well-below average canola yields, growers were faced with a completely opposite challenge to begin with in 2022. Record snowfalls, rains, and flooding set up the 2022 growing season with many challenges, ranging from leached nitrogen to high flea beetle pressure. In many cases where a combination of seeding challenges were present, growers were able to get a canola crop out of the ground and reach around average yields. We'll discuss how these issues impacted the canola crop through the months of May, June, and July, their implications for the rest of the year, and how we can set up growers for success using what we've learned through the challenges met in 2022.

Biography: Chris joined the Canola Council of Canada in May 2022 as an Agronomy Specialist for the East Manitoba region and as the Sclerotinia and Research Lead for the Crop Production & Innovation Team. He received his Master's degree researching next-generation RNAi fungicides (2022) and his Bachelor of Science in Plant Biotechnology at the University of Manitoba (2020). Chris is currently involved in managing the Council's Canola Agronomic Research Program (CARP) and the 2023-2028 Sustainable Agricultural Partnership (SCAP) Canola AgriScience Cluster.

3:00 Keep Them Standing! Management Strategies to Minimize Lodging in Cereals

Mr. Peter Johnson, Agronomist, Real Agriculture

Lodging management in cereal crops is a moving target. Although driven by environment, the occurrence of lodging is heavily dependent on agronomic management. When lodging occurs, yield loss of 1 bushel/acre/day until crop maturity is a common estimation of the yield loss that results from lodging. Lodging also greatly reduces harvest speed and efficiency, forcing much greater volumes of straw to be put through the combine, resulting in increased grain loss, slower travel speeds, and higher risk of damage from stones.

Physiology: Lodging can occur either as stem breakage, or from root lodging. While stem break generally has a greater impact, root lodging is more common. Either type interrupts the flow of nutrients upward in the plant, reducing water and nutrient availability to the leaves for photosynthesis and movement of photosynthate down to the roots for nutrient uptake and root growth. Nutrient transport concerns are not the only driver of yield loss however: the shading of leaves by lodged plants causes reduced photosynthesis and results in corresponding yield reductions.

Genetics: The first line of defense against lodging must always be genetics. Cereal species and varieties within species vary widely in their lodging susceptibility: ie oat is much more lodging prone than spring wheat. Excellent lodging data exists from provincial variety trials. In lodging prone fields or situations, chose a lodging resistant variety or more resistant crop species.

Planting date: Winter wheat planting date has a significant impact on plant height and resulting lodging risk. Earlier planting dates are taller and much more lodging prone, especially if seeding rates are kept

constant. Spring cereal planting dates show less impact on plant height and lodging risk, although some data shows a trend suggesting ultra-early seeding may reduce plant height and lodging risk slightly.

Seeding rate: High seeding rates increase lodging risk significantly in winter and even more so in spring wheat. Winter wheat seeding rates should be targeted to seeding dates to manage lodging risk, and spring wheat seeding rates should be kept low in lodging prone scenarios. Stem counts is another tool for determining lodging risk in winter wheat fields, but is of less value in spring wheat.

Nitrogen management: Nitrogen is the "big gun" in managing lodging risk. The more nitrogen that is applied, the higher the lodging risk. Split nitrogen applications, or inclusion of controlled release nitrogen products, are excellent management options to reduce lodging risk. Both management options have their accompanying risks: split nitrogen requires rainfall to make later applications available, and controlled release products can release either too early or too late in the development of the crop.

Plant growth regulators: Another excellent tool that growers can utilize are plant growth regulators (PGR's). PGR's shorten plants and strengthen stems to make plants more lodging resistant. As with all management options, PGR's have risks. Varieties differ in their sensitivity to PGR applications, and applications on sensitive varieties can reduce yields. Applications made under adverse weather conditions can increase plant shortening unacceptably, reducing grain and straw yield. However, in most cases, PGR's improve lodging resistance and increase yield in fields where lodging does occur. PGR's can increase root mass and improve crop uniformity. Growers that use PGR's often report increased combine efficiency (up to 1.6 Km/hr increase in forward speed) when PGR's are applied, even in the absence of lodging.

Summary: Lodging risk increases as grain yields increase, and growers increase inputs to support high yields. Lodging management options exist, with many tools in the management toolbox. Growers and agronomists that understand and utilize appropriate lodging management strategies will be able to prevent lodging, and harvest excellent yields of high quality grain.

Biography: @WheatPete is the resident agronomist with Real Agriculture, where he posts a weekly podcast "Wheat Pete's Word". He is a regular on "Agronomy Monday" on RealAg radio, Sirius Satellite Radio 147. Peter spent 30 years as the Ontario Cereal Specialist, and loves to talk anything agriculture, especially wheat! He leads the Middlesex Soil and Crop Improvement Association's applied research program, is the Environmental Advocate for the Land Improvement Contractors of Ontario, and is a member of the Ontario Compaction Team. He was named as one of the Top 50 in Canadian Agriculture in 2021, and inducted in to the Middlesex County Agricultural Hall of Fame in 2022. Peter operates a small farm near Lucan, Ontario, where he constantly tries out new production ideas, and where the "rubber hits the road"! He is enthusiastic and passionate about agriculture, and loves to be challenged by growers. "Have at him"!!!

3:45 Agronomist Panel - Considerations When Planning Crop Rotation

- *Mr. Jason Voogt, Owner Agronomist, Field 2 Field Agronomy*
  Biography: Jason is the co-owner and Lead Agronomist of Field 2 Field Agronomy Inc. He has 27 years experience as an agronomist working for ag retail and industry. He has 8 staff including 4 full time agronomists and 4 summer scouts. Field 2 Field Agronomy Inc. offers full-service boots on the ground crop consulting services such as soil testing and fertilizer planning as well as intensive field scouting and SWAT MAP VR services in the central area of Manitoba, across a range of soils and special crops. He is currently the Vice Chair of the Prairie CCA program.

- *Ms. Elizabeth Karpinchick, Agronomist, Tone Ag Consulting Ltd.*
  Biography: Elizabeth Karpinchick P.Ag. CCA, of Tone Ag Consulting Ltd. works as a Consulting Agrologist with farmers across Manitoba. Elizabeth is the leader of the Tone Ag team that works together on nutrient management, soil testing, crop rotation planning, and on-farm trials. Elizabeth spends her summers crop scouting, working with farmers on crop protection recommendations, and damage claims. Elizabeth works collaboratively with the farmers in her care to come up with the best strategies for their farm today and improving for the future. Each farm presents their own unique circumstances and Elizabeth works closely with each farm to reach their goals. Any free time Elizabeth has is spent volunteering on non-profit committees, La Société D'agriculture St. Pierre, Manitoba Organic Alliance and St. Pierre en Boom.

- *Mr. Kory Van Damme, Owner Agronomist, Fortified Agronomy*
  Biography: Kory grew up in the Hamlet of Glenora, MB on a mixed hog/grain farm operation. He completed high school in Pilot Mound, MB in 2003 then went on to get his post-secondary education in Brandon, MB where he got his diploma in Agribusiness and GIS Environmental Technologies @ Assiniboine Community College which he graduated from in 2005 and 2006. Kory Started his career in Agriculture at Double Diamond Farm Supply in Pilot Mound, MB for the summers of 2004 and 2005, thanks to his dad David Van Damme for getting his foot in the door. In the fall of 2005 Kory had an opportunity to join Wade Barnes and Curtis MacKinnon in their new company (Farmers Edge) based out of Pilot Mound. Kory was with Farmers Edge right up till the spring of 2017 when he decided to start his own business Fortified Agronomy. Currently Fortified has two additional Full time Agronomists and usually 2-3 seasonal workers. Kory has his CCA, Tech. Ag and 4r Designations. Kory currently resides in the town of Glenora with his wife and three kids. Some of his favorite pass times are snowmobiling, ice fishing, hanging out with friends, camping, and spending time with his family.

Thursday, December 14, 2022

8:30

Meeting Phosphorus Needs with Struvite

Dr. Joanne Thiessen Martens, Assistant Professor, Soil Science, University of Manitoba, J.ThiessenMartens@umanitoba.ca

Struvite is a slow-release phosphorus (P) fertilizer that is derived from municipal wastewater and available commercially as the product Crystal Green. Struvite can be an effective P source for crops and may reduce the risk of seedling injury as well as P loss to the environment through runoff. But its low solubility in water means that struvite behaves differently in soil than common soluble fertilizers such as monoammonium phosphate. Factors such as soil pH, struvite granule size, and crop type can affect struvite solubility and crop response. The slow dissolution of struvite in soil also has implications for multi-year soil fertility planning and soil testing after struvite application. This presentation will highlight what is known about using struvite as a fertilizer as well as key agronomic questions that remain unanswered.

Biography: Joanne joined the Department of Soil Science at the University of Manitoba as an Assistant Professor of Soil Chemistry and Fertility in August 2022, after completing a PhD in the same department. Her research interests focus on nutrient flows in agroecosystems, especially phosphorus dynamics. Joanne previously worked in research, extension, and education related to organic and ecological farming systems in the Natural Systems Agriculture lab in the Department of Plant Science at U of Manitoba. She has worked with farmers, agronomists, extension personnel, and researchers across Manitoba and Canada, as well as internationally.

9:00 ## Soil Acidification Trends and Solutions

Mr. Ryan Buetow, Cropping Systems Specialist, North Dakota State University

Crop yields are decreasing due to acidic soils. No-till practices paired with heavy nitrogen (N) use have lowered the surface soil pH on many acres of the Northern Great Plains. Acid soil where the pH drops below 5.5 has an impact on nutrient availability, soil microbial activity, stunted roots from aluminum (Al) toxicity and other plant/soil interactions. These areas can be improved from surface liming; however, liming can be costly. For many producers facing this issue, especially those working rented land, there is a search for alternative options to reduce yield loss on acidic ground. Research has been conducted in western North Dakota on surface liming and on adaptive management strategies for mitigating the symptoms of aluminum toxicity and soil acidity including cultivar selection, in-furrow fertilizer application, and seed treatments. Variety selection showed a significant difference in yield with a 182 kg/ha and 1204 kg/ha increase in the aluminum toxicity tolerant variety compared to the susceptible variety. Calcium based fertilizers in-furrow did not have an impact on yield. Across wheat varieties a yield bump of 101 kg/ha in 2021 and 625 kg/ha in 2022 was shown from seed placed P (0-45-0) applied at high rates (67 kg P2O5/ha). The data suggests use of tolerant wheat varieties along with in-furrow P fertilizer can be used to alleviate symptoms of an acid soil. Ideally producers should be applying tons of lime to bring the pH above 5.5 because the variety and fertilizer may fix the yield loss but does not fix issues with pesticide breakdown and carryover, soil microbiological activity, and nutrient tie-up; all issues caused by acid soil.

Biography: Buetow attended North Dakota State University, where he pursued an undergraduate degree in Crop and Weed Science and a master's degree in Plant Sciences. He is currently finishing up a PhD while working full time for NDSU Extension. He started working at the Dickinson Research Extension Center in June of 2015. He was raised near Cologne, MN, surrounded by corn, soybean, and alfalfa production and is currently enjoying the crop diversity of southwestern North Dakota. Buetow works with a wide range of cropping systems and is currently focusing much of his time on Aluminum toxicity and acidic soils.

9:30 Nutrient Uptake Interactions in Wheat as a Function of Long-Term Rotation and Fertilization

Miles Dyck, PhD, PAg. Professor of Soil Science, Department of Renewable Resources, 442 Earth Sciences BLDG University of Alberta. Edmonton, AB T6G 2E3. mdyck@ualberta.ca

Over the last 20-30 years, Increased intensification, and diversification of crop rotations on the Northern Great Plains has increased nutrient removal from cropping systems, affecting soil nutrient cycling, soil C and nutrient balances. Effective management of soil nutrient stocks to meet crop demand is one key to realizing yield potentials given growing season conditions. Because short-term changes in soil nutrient stocks are incremental, the effects of crop rotation and fertilization on crop yields and nutrient uptake are best quantified through long-term observations. Several long-term agroecological experiments (LTAEs) in western Canada have databases with these long-term observations. One example, the University of Alberta Breton Classical Plots, established in 1929, consist of two crop rotations of varying diversity and intensity: 1) wheat-fallow (WF); and 2) five-year, cereal-forage. Superimposed on these rotations are 8 fertility treatments, including a check (control), manure, balanced (NPKS) and nutrient exclusion treatments. Soil total C, N, P, K and S levels were measured on soil samples (0-15 cm) collected from both rotations in 2018. Wheat yields and above-ground N, P, K and S uptake for the 2010-2021 growing seasons from both rotations were compared. The 12-year average yield and crop recovery of N, P, K and S differed between the two crop rotations and fertilization treatments. For example, in the 5-yr rotation, yields and crop N recovery response to P, K and S fertilization was significantly greater than in the WF rotation. Other interactions between crop N, P, K and S recovery and fertilization history were apparent. These results suggest monitoring soil nutrient stocks and harvest removals to inform longer term nutrientmanagement plans could prove effective. Current technologies make this feasible at the field scale.

Biography: Miles Dyck is a professor of soil science in the Department of Renewable Resources, Faculty of Agriculture, Life and Environmental Sciences at the University of Alberta. While growing up on a farm near Swift Current, Saskatchewan, Dr. Dyck developed an intense curiosity about the origin of the soils landscapes around his home that was further developed through his university studies at the University of Saskatchewan (BSc in Environmental Earth Sciences; MSc in Soil Science) and the University of Alberta (PhD in Soil Physics).

Dr. Dyck's primary research focus is the effect of long-term agricultural management practices on soil processes and properties, and transport of mass and energy in soil. As principle and co-investigator, Dr. Dyck has secured research funding from federal (NSERC – Discovery, Strategic, Strategic Networks, CREATE; AAFC; IDRC), provincial (ACIDF, AB Wheat Commission, Results-Driven Agricultural Research (RDAR)) and industrial sources (Fertilizer Canada, Shell, Koch Agronomic Services). Dr. Dyck has authored/co-authored over 70 peer-reviewed publications.

With respect to agricultural management impacts on soil processes and properties, Dr. Dyck's research at the Breton Plots has generated interest in the agricultural community as demonstrated by extensions publications in Top Crop Manager (March, 2018), Country Guide (September, 2017 & 2018) and Better Crops (April, 2016). In 2015, past and present Breton Plots researchers were recognized with an ASTech (Alberta Science and Technology Leadership Foundation) Award for Innovation in Agricultural Science, awarded to the Breton Plots Long-term Agroecological Research Site Management Team (chaired by Dr. Dyck).

Since joining the University of Alberta in 2008, Dr. Dyck has taught courses in soil physics, sustainable agriculture, cropping systems and soil formation. He has supervised/co-supervised 17 MSc students, 3 PhD students, 3 post-doctoral fellows, 2 technicians and 5 undergraduate students. Currently, Dr. Dyck is co-supervising 4 MSc students, 3 PhD students, 2 post-doctoral fellows and 1 technician.

10:30 Tires, Traction and Minimizing Compaction

Dr. Scott Shearer, Professor & Chair, Food, Agricultural and Biological Engineering, Ohio State University

Abstract not available.

Biography: Scott Shearer received his Ph.D. in agricultural engineering from The Ohio State University (OSU) in 1986. Currently, he serves as Professor and Chair of Food, Agricultural and Biological Engineering at OSU. Highlights of his research career include development of methodologies and controls for metering and spatial applying crop production inputs, modeling of agricultural field machinery systems, autonomous multi-vehicle field production systems and strategies for deployment of UAVs in agriculture. He has lead research supported by over $15M in grants, authored more than 200 technical publications, and has made numerous invited presentations at international conferences, professional meetings and farmer forums. Dr. Shearer is a Fellow of the American Society of Agricultural and Biological Engineers.

11:15 Biological Potential to Meet Crop Nutritional Needs

Dr. Barney Geddes, Assistant Professor, Microbiological Sciences, North Dakota State University

The plant microbiome is crucial for plant health. Members of the plant microbiome have the potential to provide protection from diseases, tolerance to abiotic stresses like drought as well as enhanced nutrient acquisition. These emergent properties of the plant microbiota are receiving increased attention for their ability to boost crop yields as alternatives to more expensive or environmentally harmful chemical options. This is particularly evident in their potential to provide nitrogen as a replacement for chemical nitrogen fertilizers, the application of which is increasingly expensive and may even become regulated in future years. Microbes have already been deployed in agriculture for decades, with the most famous example being the rhizobia which are able to provide nitrogen to legume plants in specialized organs called root nodules. More recently, nitrogen-fixing microbes that do not form such a symbiosis have been commercialized and proposed as inoculants for diverse crop species. In this talk I will discuss the "state-of-the-art" for both rhizobium inoculation as well as new products that may deliver nitrogen to cereal crops. I will frame this discussion in the context of a number of research directions we have taken in this area with the long-term aim of maximizing biological potential to meet crop nutritional needs.

Biography: Having grown up on a small farm Dr. Barney Geddes is passionate about making discoveries that can be harnessed to improve resilience and productivity in agriculture. Dr. Geddes completed a PhD studying the rhizobium-legume symbiosis in the lab of Dr. Ivan Oresnik at the University of Manitoba in Canada before joining the lab of Dr. Philip Poole at the University of Oxford in the UK as a post doctoral researcher to explore the engineering of nitrogen-fixing cereal crops. In a second post doctoral position with Turlough Finan at McMaster University in Canada he began work to elucidate a "minimal symbiotic genome". In 2020 Dr. Geddes started his research group at North Dakota State University in the Department of Microbiological Sciences. At NDSU his research group uses a blend of bacterial genetics, microbial ecology and synthetic genomics to investigate ways to maximize microbe's contribution to agriculture.

Thursday, December 15, 2022

1:00 Cover Crops on the Prairies

Dr. Yvonne Lawley, Professor, Dept. of Plant Science, University of Manitoba, Winnipeg, MB R3T 2N2 yvonne.lawley@umanitoba.ca

Cover crops are grown to cover the soil at times when the soil would otherwise be left bare. They are planted primarily to provide soil health and other agronomic benefits and are not harvested as a cash crop; however, some cover crops are grazed as annual forage. Cover crops have become an established part of conventional agriculture in North America. In Manitoba, cover crops are being grown by early adopters. This presentation will highlight what was learned about the current practices, goals, and challenges of 281 early adopters that responded to the Prairie Cover Crops survey and grew over 100,000 acres of cover crops across Manitoba, Saskatchewan, and Alberta in 2020. Insights from the survey will be connected to current on-farm and small plot research underway that is focused on how to adapt the practice of growing cover crops to prairie conditions.

Biography: Dr. Yvonne Lawley is an assistant professor in the Plant Science Department at the University of Manitoba. Her area of research is agronomy and cropping systems. Dr. Lawley's research has focused on several crops including soybeans, corn, and wheat and a range of management practices from residue management, strip tillage, to cover crops. Her research involves both small plot and on-farm field scale agronomy research. Dr. Lawley enjoys communicating the results of her research to a wide range of audiences including farmers, agronomists, scientist, and especially in the classrooms where she teaches at the University of Manitoba.

1:30 Are Spot Sprays the Future for Pesticides?

Dr. Tom Wolf, Owner, Agrimetrix Research & Training

A spot spray is similar to any other site-specific technology in its underlying principles: one applies the product only where needed, and only in the quantity needed. The basic hardware for spot sprays includes just four components. First, spot sprayers have individual nozzle shutoffs that can be turned on in milliseconds. Second, they have a sensor that can determine the characteristics of the area in front of it. Third, it requires an algorithm that can convert the sensed area into a decision. Fourth, a computer needs to process the information before the nozzle passes the target. The recent development of convolutional neural networks has greatly accelerated the accuracy of green-on-green spot sprays. Ultimately, spot sprays will prolong the utility of pesticides in agriculture by making multiple effective modes of action affordable. But they can also reduce overall residue levels if pre-harvest weed control or desiccation can be targeted to just the green or weedy patches, or fungicides can be limited to areas of vigorous crop growth. Spot sprays are commercially used in Manitoba since 2020 and initial results are promising.

Biography: Tom Wolf is a spray application specialist, based in Saskatoon. He grew up on a farm in Manitoba and studied agriculture at the University of Manitoba (BSA, M.Sc.) and the Ohio State University (Ph.D.). Tom has over 30 years research experience in spray technology, including work on spray drift, coverage, efficacy, sprayer cleanout, waste disposal and risk assessment. With Jason Deveau, Tom hosts and writes for the world's number one sprayer website, Sprayers101.com. He is a past president and Fellow of the Canadian Weed Science Society and has been named Distinguished Agrologist with the Saskatchewan Institute of Agrology.

2:00 Outside the Box Weed Control

Dr. Breanne Tidemann, Research Scientist, Agriculture and Agri-Food Canada

Weeds are a significant pest in agriculture, responsible for significant yield losses, but also providing hosts for insects and diseases. The primary method of weed control in Canadian agriculture is herbicide application. Herbicide resistance, and consumer pressures, has necessitated interest, research and development in alternative methods to weed control. Every weed control strategy has its own pros and cons. Some alternative strategies that we will discuss will include precision tillage, weed pulling, electrical weeding, harvest weed seed control methods, robots, and lasers. Some of these strategies are already commercialized for row and broadacre crops, others are still in development.

Biography: Dr. Breanne Tidemann is a research scientist with Agriculture and Agri-Food Canada in Lacombe. She completed all of her degrees at the University of Alberta, and holds a B.Sc in Biological Sciences, and an M.Sc. and a Ph.D. in Plant Sciences with projects focussed on weed science and weed management. Breanne started with AAFC in 2016 as a Weed Scientist/ Field Agronomist. Her research program in Lacombe focuses on management of herbicide resistant weeds, integrated weed management strategies, weed biology, and alternative methods of weed control. She lives in Blackfalds, AB with her husband and their two sons.

3:00 ## Using RNA Interference to Protect Crops Against Fungal Pathogens

Dr. Mark Belmonte, Professor, Biological Sciences, University of Manitoba
(Mark F Belmonte*, Nicholas Wytinck, Philip L Walker, Steve Whyard University of Manitoba, Department of Biological Sciences, 50 Sifton Road, Winnipeg, Manitoba, Canada
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Sclerotina sclerotiorum, the causal agent of white mold, infects over 600 species of plants worldwide. Sclerotinia is a persistent problem for global food production that has traditionally been managed using broad-spectrum fungicides. However, current fungicide strategies have proven less effective and crop rotations fail due to the promiscuous host range of Sclerotinia and the formation of durable resting structures known as sclerotia. Thus, there is an immediate need to manage Sclerotinia using novel species-specific control methods. Our strategy exploits the inherent cellular defense process known as RNA interference (RNAi). Upon encountering a double stranded RNA (dsRNA) molecule, the cell processes the dsRNA specifically targeting transcripts with sequence homology. Using a re-designed bioinformatics approach, we identified *Sclerotinia*-specific target genes. RNAi knockdown was confirmed using quantitative real-time PCR on RNA isolated from fungal liquid cultures. dsRNA molecules were screened for growth inhibition on the plant using a system representative of field conditions that showed up to 85% reduction in lesion spread. We then generated transgenic canola over-expressing good quality dsRNA and showed a more profound and prolonged tolerance to the fungus. Finally, I will provide insight into the uptake mechanisms and utility of next generation molecular fungicides and their applicability to control pathogens.

Biography: Dr. Mark Belmonte is a Professor of Biological Sciences at the University of Manitoba. Mark received his BSc (2001) and MSc (2003) from the University of Calgary before moving to Winnipeg where he obtained his PhD in Plant Science in 2008. After a brief postdoctoral fellowship at UC Davis, Mark moved back to Winnipeg to start his own lab in the Faculty of Science where he is a full professor. Dr. Belmonte's group uses cutting edge next generation molecular tools to improve crop production and protection in some of Canada's most important agricultural crops. Mark has published his work over 60 times, been the recipient of numerous awards including CBC's Top 40 under 40, the Canadian Society of Plant Biologists Research Excellence Award and has been recognized for his outstanding contributions to research, teaching and outreach by the Winnipeg Foundation and the University of Manitoba. Mark is devoted to promoting science education and research at outreach events across Canada and takes pride in training the next generation of young scientists.

3:30 From an Orthopteran Overload to Sinister Sap-Suckers: Main Insect Concern in Crops in Manitoba in 2022

Dr. John Gavloski, Entomologist, Manitoba Agriculture and Resource Development, Carman, MB, R0G OJO John.Gavloski@gov.mb.ca

Seeding was quite late in many areas this year, mainly because of excessive rainfall, and overland spring flooding in some areas. This resulted in some crops remaining in susceptible stages to some insect pests later in the season than normal.

Flea beetles (*Phyllotreta* spp.) in canola and **grasshoppers**, in many crops, were once again major insect concerns in 2022. There were reports of reseeding of canola because of injury from flea beetles, and numerous reports of multiple applications of foliar insecticides.

Aphids were controlled in many fields of small grains from late-July through mid-August. Because of the later seeding in many fields, small grains remained in the susceptible stages (prior to soft dough) later than in many years. Aphid levels were also high in peas in many fields. Soybean aphids got to economic levels and control was needed in some fields in August.

Armyworm (*Mythimna unipuncta*) levels were high and controlled in some fields of small grains in late-July and early-August. In some instances, armyworms were more abundant in the lodged areas of fields. Some feeding from armyworms was also noted on forage grasses. **Lygus bugs** were a concern in canola in many regions in August and early-September. **Cutworms** were a problem in some crops early in the season.

Scouting and management tips for these and some other insects will also be discussed.

Annual summaries of insect pests in crops in Manitoba are posted at:
http://www.gov.mb.ca/agriculture/crops/insects/index.html

Biography: John is an entomologist with Manitoba Agriculture based out of Carman. He conducts monitoring programs for some of the more common insect pests of crops, and provides information on insects, both beneficial and potential pests, to farmers, agronomists and those working in agriculture. John does numerous presentations and information updates for agronomists and farmers, and co-produces a weekly Manitoba Crop Pest Update during the spring and summer. He has worked for Manitoba Agriculture since 1997. John has a bachelor's degree in environmental biology and a M. Sc. in entomology from the University of Guelph, and completed his Ph.D. in the department of entomology at the University of Manitoba. Aside from entomology, John also enjoys cycling and observing almost any type of wildlife.