Manitoba Agronomists Conference

ADAPTIVE CROP MANAGEMENT
Dealing with Agronomic Production & Market Risks

PROGRAM AND ABSTRACTS

December 12 & 13, 2018

Faculty of Agricultural and Food Sciences
University of Manitoba
# Morning Program

**Wednesday, December 12, 2018**  
**JRI Auditorium, Room 172 Agriculture Building**

Chair: Mr. John Heard

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<tr>
<th>Time</th>
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<tr>
<td>8:00</td>
<td>Registration</td>
<td>Foyer outside of Agriculture Auditorium, 172 Agriculture Bldg.</td>
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</table>
| 8:25  | Welcome to the Conference                                            | Dr. Karin Wittenberg, Dean  
Faculty of Agricultural & Food Sciences, University of Manitoba                  |
| 8:30  | Introduction                                                         | Mr. John Heard, Crop Nutrition Specialist, Manitoba Agriculture                |
| 8:35  | Keeping Manitoba's Canola Sustainable in a Risk-Filled World         | Ms. Delaney Ross Burtnack, Executive Director  
Manitoba Canola Growers Association                                                    |
| 9:15  | Getting Manitoba Wheat, Barley and Corn Growers Trade Ready in       | Ms. Pam de Rocquigny, General Manager  
Manitoba Wheat and Barley Growers Association &  
Manitoba Corn Growers Association                                                        |
| 9:55  | Coffee Break – Agriculture Atrium                                    |                                                                             |
|       | Poster Session – 138 Agriculture Bldg.                               |                                                                             |
| 10:35 | Adaptive Management Framework for Pulses and Soybean                 | Dr. Daryl Domitruk, Director of Research & Production  
Manitoba Pulse & Soybean Growers                                                        |
| 11:15 | Farmer Panel                                                         |                                                                             |
|       | **Moderator:** Ingrid Kristjanson, Farm Production Extension Specialist – Crops, Manitoba Agriculture |
|       | **Panel**                                                            | Mr. Günter Jochum, Blue Diamond Farms Ltd., St. Francis Xavier, MB  
Mr. Ron Krahn, Providence Farms, Rivers, MB  
Mr. Dean Toews, Toews Family Enterprises, MacGregor, MB |
| 12:00 | Lunch                                                                | University Centre, Rm 204 Marshall McLuhan Hall |
# Afternoon Program

**Wednesday, December 12, 2018**  
JRI Auditorium, Room 172 Agriculture Building

Chair: Ms. Marla Riekman

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<td>1:00</td>
<td><strong>Active and Passive Sensors for In-Season N Management</strong></td>
<td>Dr. Dave Franzen, Professor Soil Science &amp; Extension Soil Specialist, North Dakota State University</td>
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<td>1:45</td>
<td><strong>The Ins and Outs of Biological Crop Stimulants</strong></td>
<td>Dr. Carl Rosen, Professor &amp; Extension Soil Scientist Department of Soil, Water &amp; Climate, University of Minnesota</td>
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<td>2:30</td>
<td><strong>Coffee Break</strong> – Agriculture Atrium</td>
<td><strong>Poster Session</strong> – 138 Agriculture Bldg.</td>
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<td>3:10</td>
<td><strong>Development of an Adaptive Management Approach for Nutrient Management in New York</strong></td>
<td>Dr. Quirine Ketterings, Professor of Nutrient Management in Agricultural Systems, Cornell University</td>
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<td>3:55</td>
<td><strong>Bringing Crop Water Budget to the Forefront</strong></td>
<td>Dr. Timi Ojo, Provincial Meteorology Specialist, Manitoba Agriculture</td>
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<td>9</td>
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| 4:25   | **Agronomist Panel – Planning Ahead for Adaptation**                    | Mr. Brunel Sabourin, Owner, Antara Agronomy Services  
Ms. Taralea Simpson, Assistant Manager, Shur-Gro Farm Services Ltd. |                           | 10   |
| 4:40   | **Beer and Pretzel Reception** – Agriculture Atrium                     |                                                        |                           |      |
# Morning Program

**Thursday, December 13, 2018**  
**JRI Auditorium, Room 172 Agriculture Building**  
**Chair: Ms. Tammy Jones**

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| 8:30  | Introduction  
*Ms. Tammy Jones, Industry Development Specialist, Manitoba Agriculture* |      |
| 8:35  | **Precision Agriculture – Tools and Practical Uses**  
*Dr. Raj Khosla, Professor of Precision Agriculture, Colorado State University* | 11   |
| 9:35  | Regulatory Decisions on Pesticides:  
**A) The Process Leading to the Decision**  
*Ms. Pratisara Bajracharya, Pesticide – Minor Use and Regulatory Specialist, Manitoba Agriculture*  
**B) Adjusting to Product Removal: A Case Study of Flea Beetles in Canola**  
*Dr. John Gavloski, Entomologist, Manitoba Agriculture* | 12   |
| 10:15 | **Coffee Break**  
*Agriculture Atrium* |      |
| 10:45 | **Poster Session**  
*138 Agriculture Bldg.* |      |
| 10:45 | **Blackleg of canola in western Canada – What we know/don’t know?**  
*Dr. Gary Peng, Research Scientist, Agriculture and Agri-Food Canada* | 13   |
| 11:25 | **Soybean aphid management: New challenges posed by insecticide resistance**  
*Dr. Robert Koch, Associate Professor & Extension Entomologist, University of Minnesota* | 14   |
| 12:00 | **Lunch**  
*University Centre, Rm 204 Marshall McLuhan Hall* |      |
AFTERNOON PROGRAM

Thursday, December 13, 2018
JRI Auditorium, Room 172 Agriculture Building

Chair: Mr. Dane Froese

1:00  Maximizing Herbicide Activity and More
      Dr. Jeff Stachler, Agriculture and Natural Resources Extension
      Educator, The Ohio State University

1:40  Agronomist Panel
      Retail – Ms. Kim Brown-Livingston, Cargill
      Independent – Mr. Jason Voogt, Owner and Operator, Field 2 Field
      Agronomy Inc.

2:00  Wheat Quality, Protein & Hitting the Right Market
      Mr. Jonathon Driedger, Senior Market Analyst, FarmLink Marketing
      Solutions

2:30  Coffee Break – Agriculture Atrium
      Poster Session – 138 Agriculture Bldg.

3:00  Clubroot & Biosecurity in Manitoba
      Dr. Bruce Gossen, Research Scientist, Agriculture and Agri-Food
      Canada

3:40  Agronomist Actions
      Ms. Wendy McDonald, Crops Input Manager, Parrish & Heimbecker

4:30  Official Closing
### CCA CREDITS

There are a total of **12** Certified Crop Adviser (CCA) continuing education units available.

**CCA Continuing Education Credits Offered:**

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<td>Integrated Pest Management</td>
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<td>Crop Management</td>
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<td>Soil and Water Management</td>
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**TOTAL POSSIBLE CREDITS** 12

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### CCSC CREDITS

A total of **12** Certified Crop Science Consultant (CCSC) continuing education units available.

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**TOTAL POSSIBLE CREDITS** 12

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Up to an additional 2 CEUs will be available through the self-study poster session, to all registrants. Successful completion of quiz questions will result in .5 CEU in each of the following: Nutrient Management, Integrated Pest Management, Crop Management and Soil & Water Management.

**Submission deadline:** December 30, 2018
Keeping Manitoba’s Canola Sustainable in a Risk-Filled World
Delaney Ross Burtnack, Manitoba Canola Growers Association, Winnipeg, MB
R3B 0T6 E-mail: delaney@canolagrowers.com

Managing production risk in an era of increased pressure and unpredictability is a challenge every grower faces in every crop. This topic will introduce a few of the risks facing growers in Manitoba, sharing some canola-specific examples that are of importance for agronomists to consider.

Biography
Delaney joined the Manitoba Canola Growers Association in 2017 as Executive Director, also leading the research and advocacy work for the association. Previously, Delaney led the Canadian Association of Agri-Retailers as President & CEO, and worked for years in the agricultural communications industry. She holds her Masters of Science in agronomy from the University of Manitoba.
Getting Manitoba Wheat, Barley and Corn Growers Trade Ready in a World Marketplace
Pam de Rocquigny, General Manager, Manitoba Wheat and Barley Growers Association & Manitoba Corn Growers Association, Carman, MB
R0G 0J0 E-mail: pam@mbwheatandbarley.ca

Growers in Manitoba face various risks throughout any given production year. Weather, loss of crop production tools, regulatory and market risks can result in producers assessing the resiliency of their operation and determining what tools are available to mitigate the impacts of those risks. Current risks impacting wheat, barley and corn growers will be discussed, and what role agronomists can play in helping producers create resilient systems in the face of risk.

Biography
Pam is the General Manager of the Manitoba Wheat and Barley Growers Association and the Manitoba Corn Growers Association. Headquartered in Carman, Manitoba both entities are not-for-profit organizations, each operated by their own farmer-elected board of directors. The MWBGA represents over 7000 farmers who grow spring wheat and barley, while the MCGA represents over 1100 corn growers. Both grower organizations are dedicated to advancing the spring wheat, barley and corn industries in Manitoba in the areas of research, market development and communication. Pam started as general manager in February of 2017. Prior to that, she worked with the provincial government for sixteen years in the Agriculture department.

Pam and her husband Norbert, along with their two boys, own and operate a purebred Simmental cow/calf operation near Haywood, Manitoba. For anyone that follows Pam on Twitter, you know her spare time is spent photographing the farm’s activities and showing cattle at various summer shows across Manitoba.
Adaptive Management Framework for Pulses and Soybean
Daryl Domitruk, Manitoba Pulse and Soybean Growers - Carman, MB
E-mail: daryl@manitobapulse.ca

Until the widespread adoption of soybeans in Manitoba, annual legumes had never exceeded six percent of the province's annual crop area. Increasing demand for peas for local processing plus projected growth in the global plant protein market will attract more acres into annual legume cultivation. Correspondingly, demand has increased for information on the agronomic risks, rewards and range of marketing options associated with annual legumes. However, when it comes to annual legumes in Manitoba significant uncertainty exists regarding the environmental effects on agronomically important processes; even essential processes such as symbiotic nitrogen fixation and protein biosynthesis are less understood in the Manitoba context compared to other regions. Adaptive management customized to the needs of agriculture may offer an efficient framework to develop, execute and extend experiments that solve some of the uncertainties faced by growers of pulse and soybean crops.

Biography
Daryl is the Director of Research and Production with Manitoba Pulse and Soybean Growers. Daryl has 30 years experience in research, extension, policy development and administration pertaining to crop and livestock production, agro-ecosystem management, renewable energy and food-health issues. Daryl holds a Ph.D. in Crop Science from University of Saskatchewan. He obtained his B.S.A. and M.Sc. at University of Manitoba.
Farmer Panel
Moderator:
Ms. Ingrid Kristjanson, Farm Production Extension Specialist – Crops
Manitoba Agriculture

Panel:
Mr. Günter Jochum, Blue Diamond Farms Ltd., St. Francis Xavier, Manitoba
Mr. Ron Krahn, Providence Farms, Rivers, Manitoba
Mr. Dean Toews, Toews Family Enterprises, MacGregor, Manitoba

Biographies

Ingrid Kristjanson is a Farm Production Extension Specialist – Crops, with the Primary Agriculture Branch of Manitoba Agriculture. She joined Manitoba Agriculture, Food and Rural Initiatives as Ag Rep in Morris, in 2002. She recently made the move to the Teulon office, covering the Interlake area. She previously worked with Cargill AgHorizons as consulting agronomist, and with Simplot Soilbuilders as sales agronomist. She holds a Bachelor of Science in Agriculture from the University of Manitoba, is a member of the Manitoba Institute of Agrologists and is a Certified Crop Adviser.

Günter Jochum operates the family business, Blue Diamond Farms Ltd. in St. Francois Xavier with his wife Crystal and their four daughters. His family has been farming in Canada since 1980 when they moved from Germany. While studying Agriculture at the University of Manitoba Günter took interest in grain marketing and took a leadership role on the family farm marketing their crops. Over the years, the farm has engaged in various enterprises including hogs, U-pick strawberries, and special crops such as sunflowers, peas and perennial rye grass. Günter’s passion is for grain farming and at Blue Diamond Farms, he is currently focusing his energy on producing cereals and oilseeds. Günter is keen to engage in activities that strengthen the agriculture industry to ensure the sustainability of farming for future generations. Each year Blue Diamond Farms participate in Manitoba Open Farm Day. They have also hosted the University of Manitoba’s faculty of agriculture, providing students with the opportunity to tour a grain operation. Günter has recently taken an active role on the board of the Western Canadian Wheat Growers Association as a voice for Western Canadian farmers. However, he maintains he does not like politics. Günter has developed a strong presence advocating for agriculture on social media and you can follow him at @gmjochum on twitter.
Ron Krahn is co-owner of Providence Farms at Rivers, Manitoba with his brother, Robert and their families. They grow wheat, canola, peas, soybeans, sunflowers and are dabbling in corn on their Newdale clay loam soil. His dad Abe started experimenting with zero-till in the 80’s and transitioned to a zero-till/min till system in the late 90’s. Farm management, agronomy and marketing are the aspects of farming that Ron enjoys the most. Ron is a director with the Manitoba Canola Growers Association and enjoys leading the Canadian FoodGrains Bank growing project in the Rivers/Oak River area. Providence Farms enjoys trying new technology, crops and practices that hopefully can improve the farm for the next generation who is already showing some interest in joining the family farm.

Dean Toews – I am married 22 years to Roxie and we have 4 kids ages 5 to 15. We are the 3rd generation on this farm. I farm with my dad (age 66) and 2 younger brothers, Devin and Darren and their families at Macgregor, Manitoba. We grow mostly row crops like corn, edible beans, soybeans and some years we grow sunflowers and wheat. We custom harvest approximately 7000 acres above our own 3800 for a few neighbours. In spring, we often do some custom planting and strip tilling as well. We also have a small manufacturing business called Triple Star Mfg., where we build steering kits for PTO driven grain augers and sell scale equipment for grain carts and any on-farm weighing applications. I am serving my 4th year as a director on the Manitoba Corn Growers Association and for 8 years I have been working with a local grow project for Canadian Foodgrains Bank.
Active and Passive Sensors for In-Season N Management
David Franzen, Dept. of Soil Science, Extension, North Dakota State University
Dept. 7180, PO Box 6050, Fargo, ND, USA 58108  david.franzen@ndsu.edu

Many farmers/ag-consultants believe that active and passive sensors detect crop N status. They can, but not directly. This presentation explores the world of both types of sensors, explains their various best uses to date, status of the science, their practical value to people on the land, and how best to utilize them to help direct in-season N application. Passive sensors have problems with atmospheric conditions, particularly clouds and haze, and drone passive sensors may have a limitation due to the time it takes to cover large areas and multiple fields. Active-sensors, particularly active optical sensors, have been extensively researched and are useful in a variety of crops. However, algorithms for their use must have a growth stage normalization component and an N-nonlimiting area for a cultivar-specific, soil-specific foundation. Algorithms are also meaningful in the region of their development, unless combined with local data. Crop height sensors may also be useful, are rarely used commercially, but these will also be covered.

Biography
Dave Franzen is Professor Soil Science and Extension Soil Specialist at North Dakota State University. He earned his BS and MS degrees in Forestry and Soil Science from the University of Illinois in 1975 and 1976 respectively.

He worked for about 18 years as agronomist and manager of a chain of fertilizer/ag-supply retail locations headquartered about 20 miles north of Champaign, Illinois. He was able to work the last 4 years of his industry career while earning his PhD in Soil Science from University of Illinois. In 1994, after earning his degree, he accepted a position at North Dakota State University as Extension Soil Specialist. His research continued his PhD work on soil sampling to support site-specific fertilizer application, resulting in the zone sampling strategy now adopted by most of the region. His work during the past 10 years has focused on revision of nutrient recommendations to complement the new precision nutrient application management system. At the same time, he used active-sensor technology to relate reflectance data to yield, which is the basis for in-season N application using active-sensors or remote sensing imagery. The work has resulted in algorithms to help direct in-season corn N application. Work to replicate the results of the corn study is on-going in sunflower, spring wheat/durum and sugarbeet projects.
Biological crop stimulants or “biostimulants” are compounds and/or microorganisms applied to plants with the intent of increasing marketable yield by enhancing one or more of the following: growth, quality, nutrient uptake, and tolerance to disease or abiotic stress. Numerous commercial products have been manufactured and sold under many trade names with various claims about their efficacy, often based on testimonials. Even though there is no legal definition for biostimulants, sale of these products is among the fastest growing sectors of the agricultural industry. This talk will explore the various classes of biostimulants being used, their possible mode of action, and when available, their effects on yield based on replicated research trials.

**Biography**

Carl Rosen is a Professor and Extension Soil Scientist in the Department of Soil, Water, & Climate at the University of Minnesota and currently serves as Department Head. He received his MS degree in horticulture from Penn State University and a Ph.D. degree in Soil Science from UC Davis. Since 1983, his research and extension programs in Minnesota have focused on optimizing nutrient management for a variety of crops with particular emphasis on irrigated cropping systems. He has authored or coauthored numerous publications and extension bulletins on the subjects of nutrient management, soil fertility, plant nutrition, and beneficial use of by-products for crop production.

Dr. Quirine M. Ketterings, Professor of Nutrient Management, Nutrient Management Spear Program (NMSP), Department of Animal Science, 323 Morrison Hall, Cornell University, Ithaca, NY, 14853. Email: qmk2@cornell.edu

In New York, environmental regulations require the use of land grant university (Cornell University) guidelines for nutrient applications for farms that are classified as Concentrated Animal Feeding Operations (CAFO) because of size, and for farms that get state financial support or are in sensitive watersheds. The Nutrient Management Spear Program (NMSP) of the College of Agriculture and Life Sciences has responsibilities for development of such guidelines.

Through the implementation of an On-Farm Research Partnership, the NMSP aims to keep the nutrient management guidelines updated. Underlying principle is that limiting yields due to nutrient shortage and excess nutrient application beyond what crops can use are both undesirable. Knowing a soil’s yield potential is essential for fine-tuning of nutrient guidelines over time, especially for nitrogen (N). Since 2000, planners have been allowed to substitute corn field yields for those in the Cornell University soil yield potential database so long as the farm had at least three years of yield data to back up the higher yield potential.

In 2013, government and university nutrient management specialists framed an adaptive management process. The goal of adaptive management is to create guidance for and incentivize on-farm evaluation of practices that improve nutrient management over multiple crop seasons, in recognition of year to year and location to location differences in crop response to nitrogen. Here, we present the process of stakeholder-based development of a statewide approach to enhance nutrient management decision making that includes on-farm experimentation, research and extension partnerships, technology use, and advisory committees that include farmers and farm advisors as well as governmental and regulatory agencies.

Biography

Quirine Ketterings is a Professor of Nutrient Management in Agricultural Systems at Cornell University. Dr. Ketterings initiated and leads the Cornell Nutrient Management Spear Program (NMSP; http://nmsp.cals.cornell.edu), the applied research and extension program in nutrient management of field crops of the College of Agricultural and Life Sciences. Quirine’s research focuses on improving the understanding of nutrient release and risk for runoff and leaching losses from inorganic and organic amendments as affected by soil type, hydrology, time, rate and method of application, and the use of specific soil and fertilizer amendments. Her teaching and extension programs aim to improve grower and agricultural industry awareness of crop nutrient needs, crop quality, management of organic amendments, environmentally sound nutrient management practices, and overall soil fertility management in New York State, and provide methods and tools to integrate and apply accumulated knowledge about crop nutrient guidelines to optimize crop yield while minimizing risk to the environment.
Bringing Crop Water Budget to the Forefront
Dr. Timi Ojo, Manitoba Agriculture – Soil and Ag Weather Surveillance, Winnipeg MB, Canada

Crop production planning involves budgeting for costs such as seed and treatment, fertilizer, herbicide and fuel. However, budgeting for water use, though considered, is not always in the forefront of crop management decisions. The combined amount of water available to plants from soil moisture reserve from previous fall and growing season precipitation in Manitoba does not often meet crop water requirement. The recent expansion of long season crops such as soybean and grain corn in Manitoba since 2009 coincides with the dominant “wet cycle” characterized by high groundwater table with above normal precipitation during many of the growing seasons. Many areas of agro-Manitoba experienced lower than normal precipitation during the 2017 and 2018 growing seasons with some areas receiving less than 60% of the historical average precipitation for the area. The dry weather brought crop water use; water budgeting and crop selection based on water availability to the forefront of crop management decisions. This presentation will discuss fall soil moisture levels and growing season precipitation as well as crop water budgeting for long and short season crops, impact of groundwater levels and soil moisture monitoring efforts in agro-Manitoba.

Biography
Timi got his MSc (2012) and PhD (2017) from the department of Soil Science at the University of Manitoba where he conducted research on weather impacts on agriculture. He focused on soil moisture sensor calibration, measurement, modeling and remote sensing. Timi has been working with the Province of Manitoba as the Provincial Agriculture Meteorology Specialist since 2015 and he oversees the Manitoba Agriculture Weather Program which has a network of 109 weather stations across agro-Manitoba.
Biographies

Mr. Brunel Sabourin, Owner, Antara Agronomy Services
Brunel Sabourin is an independent agronomist with 25 years experience serving producers in the Red River Valley of Manitoba. As an owner of Antara Agronomy Services, along with his wife Jennifer, Brunel provides agronomy consulting services and facilitates on-farm research for their clients. Prior to Antara, Brunel worked as a sales agronomist for several local input retailers and consulting companies, never straying too far from the family grain farm in St Jean-Baptiste, Manitoba.

Ms. Taralea Simpson, Assistant Manager, Shur-Gro Farm Services Ltd.
Taralea Simpson lives and works in Portage la Prairie, MB where she was born and raised. For the past 26 years she has worked as an agronomist and assistant manager with Shur-Gro Farm Services. An Agriculture Degree from University of Manitoba led her to pursue a career in Agriculture, as well as operating a 50 cow/calf beef operation and most recently Farm Away, a family farm stay ; bed and breakfast just outside of Portage. Taralea works with a variety of growers from small grain farmers to large mixed farms including potato, veggies, beef and dairy. Taralea is a member of MIA and spends time looking after several manure management plans along with crop planning and scouting throughout the year for growers in the Portage and surrounding area. Advocating for Agriculture is high on her list of priorities as she helps as a volunteer with Ag in the classroom, visits the local high schools to speak and has been a local 4-H leader for many years.
**Precision Agriculture – Tools and Practical Uses**
Raj Khosla, Professor of Precision Agriculture, Department of Soil & Crop Sciences, Colorado State University, Fort Collins, CO, USA Email: Raj.Khosla@Colostate.Edu

The field of precision agriculture has witnessed development of numerous techniques, tools, and technologies in the last about three decades. The key principle in deploying any precision techniques requires understanding of variability – both, spatial and temporal. This presentation will provide an understanding and quantification of concept of variability, how to measure and manage changes across landscape using precision tools.

**Biography**
Dr. Khosla is a Robert Gardner Award Professor of Precision Agriculture at Colorado State University. His main research focus has been on management of in-field soil and crop variability using geo-spatial technologies for precision management of crop-inputs. He has generated many discoveries in precision agriculture, most widely recognized among them is the innovative technique of quantifying variability of spatially diverse soils using satellite based remote-sensing to create management zones. Most recently, he was recognized with the Werner L. Nelson Award for Diagnosis of Yield-Limiting Factors by American Society of Agronomy. Previously, in 2015, he was recognized as the “Precision Ag Educator of the Year”, a national honor bestowed by the agricultural industry and in 2012, he was named the Jefferson Science Fellow by the National Academy of Sciences. Previously, he has served two 2-yr terms on NASA’s US “Presidential Advisory Board on Positioning, Navigation and Timing”.

He is a Fellow of the American Society of Agronomy; Soil Science Society of America; Soil and Water Conservation Society; and Honorary Life Fellow of International Society of Precision Agriculture.

He is the Founder and Founding-President of the International Society of Precision Agriculture.
Pesticides are regulated under Federal and Provincial legislations in Canada. All pesticide products in Canada are registered under Federal Pest Control Products Act (PCPA). As mandated by the PCPA, all registered pesticide products are re-evaluated for human health and environmental concerns in a fifteen year cycle or as special reviews. The re-evaluation process will be discussed using the most recent re-evaluation decisions as examples. The process to contribute to PMRA’s pesticide re-evaluations will also be highlighted.

Insecticides registered to manage flea beetles in canola have changed over the years, as regulators strive to enable effective control while also providing safety for humans and non-target organisms. Foliar insecticide and seed treatments options have changed over the years, and granular insecticides are no longer used. The risks and benefits of some historical and current chemistries for flea beetle management will be discussed, as well as potential future flea beetle management scenarios.

Biographies

Pratisara Bajracharya – I am a pathologist by training. I have a M.Sc. Degree in Plant Pathology and Genetics from University of Manitoba. I have a B.Sc. Degree in Microbiology from North Dakota State University. I started my career working with various field crops and their diseases. In my current position as a Pesticide- Minor Use and Regulatory Specialist, I have multiple roles. Sometimes I put my Minor Use hat on and seek new pesticide registrations as requested by Manitoba growers and other times I switch hat and become a regulator. I administer Manitoba Ag’s pesticide licensing program and license all commercial pesticide users and sellers. I also work closely with Pest Management Regulatory Agency (PMRA) on pesticide related issues. When I have some spare time, I love to travel, listen to country music and try new recipes.

John Gavloski is an entomologist with Manitoba Agriculture in Carman. He conducts monitoring programs for some of Manitoba’s major insect pests and provides information on insects and insect management to farmers, agronomists and those working in the agriculture industry. John does numerous presentations and information updates for agronomists and farmers, and co-produces a weekly Manitoba Insect and Disease Update during the spring and summer. He has worked for Manitoba Agriculture since 1997.
Blackleg of canola in western Canada – What we know/don’t know?
Gary Peng, Saskatoon Research and Development Centre, Agriculture and Agri-Food Canada, 107 Science Pl. Saskatoon, SK S7N 0X2

In many canola growing areas on the prairies, blackleg has increased noticeably in recent years. While most canola cultivars are labelled as resistant to the disease, only the resistance (R) genes \textit{Rlm1} and \textit{Rlm3} are found commonly in them. Field monitoring has shown that the corresponding avirulent genes \textit{AvrLm1} and \textit{AvrLm3} are generally at low levels, and this would indicate that these \textit{R} genes are no longer effective against the current pathogen population. At the same time, \textit{AvrLm4}, \textit{AvrLm6} and \textit{AvrLm7} are relatively abundant, suggesting the opportunity to use additional \textit{R} genes for blackleg management. Most canola cultivars also showed a moderate level of resistance to blackleg relative to “Westar” (susceptible); pathogen hyphae spread more slowly from infected cotyledons to the stem and the infection also develops more slowly in stem. This indicates quantitative resistance (QR) with these cultivars. Due to a relative short growing season, early infection may be the key to severe blackleg in western Canada. We also need to better understand the impact of seedling injuries by insect pests, such as flea beetles and root maggots on blackleg; the insect feeding create wounds on young leaves or roots, which may favor blackleg infection. Seed treatment may be cost-effective if early infection is critical to blackleg impact.

Biography
Gary received his Ph.D. in Plant Pathology from University of Guelph in 1992, and is currently a Research Scientist at AAFC Saskatoon working primarily on clubroot and blackleg diseases of canola, including plant-pathogen interaction, host resistance and disease management. He has led many multi-disciplinary research projects over the years, received several research and achievement awards. He has authored or co-authored over 100 peer-reviewed scientific papers.
Soybean aphid management: New challenges posed by insecticide resistance
Robert Koch, Associate Professor & Extension Entomologist, University of Minnesota, St. Paul, MN, 55108  Email: koch0125@umn.edu

Soybean aphid is a significant pest of northern soybean production. Management of this pest since its initial detection in North America in 2000 has relied primarily on use of foliar insecticides, especially pyrethroids and organophosphates. In 2015, populations of soybean aphid were detected with resistance to pyrethroids. Since then, documentation of insecticide resistance and/or reports of failures of pyrethroids to control soybean aphid have occurred in Minnesota, South Dakota, Iowa, North Dakota and Manitoba. Growers, consultants and applicators should rethink how this pest is managed. Apply insecticides for soybean aphid only when necessary, which means fields must be scouted and the economic threshold (250 aphids per plant) should be used. If fields need to be treated, apply the insecticide correctly to make sure good coverage is provided and full effective rates remain on the crop. Scout fields 4-5 days after application to ensure the product provided the level of control expected. If fields need to be retreated, alternate to a different insecticide group for the follow-up application. There are few insecticide groups available for management of soybean aphid. The agricultural community must work together to preserve the effectiveness of and continued access to these products for protection of soybean and other crops from pests.

Biography
Dr. Bob Koch is an Associate Professor and Extension Entomologist at the University of Minnesota. His research and extension responsibilities focus on applied ecology and integrated pest management of insects associated with soybean. Currently, his research program focuses on IPM for the soybean aphid and brown marmorated stink bug. Dr. Koch received a Ph.D. in entomology from the University of Minnesota and Bachelor's degree in biology from St. John's University. Prior to this position at the University of Minnesota, he worked for six years with the Minnesota Department of Agriculture.
Maximizing Herbicide Activity and More
Jeff Stachler, The Ohio State University, Wapakoneta, OH 45895 E-mail: stachler.1@osu.edu

The utilization of Roundup Ready crops caused many to forget about the basics of applying herbicides. Now that other herbicides are necessary to control weeds, the principles of maximizing herbicide activity have become critical. Some of the principles include using the correct herbicide, using the full rate, applying to small weeds, using the correct adjuvant at the correct rate, applying at the correct time of day, applying during good growing conditions, and using the correct spray volume. Waterhemp is a pigweed species that continues to spread throughout the United States and may be in Manitoba. This weed will cause an increase in herbicide costs to manage it, so stopping it from becoming established is critical.

Biography
I grew up on a diversified crop and livestock farm in west central Ohio. I have a B.S. and Ph.D degree from The Ohio State University in Agronomy and Weed Science, respectively. I have a M.S. degree from Michigan State University in Weed Science. I worked at The Ohio State University as a Weed Science Program Specialist from 1995 to 2008. I worked as the Extension Weed Specialist for Sugarbeet for North Dakota State University and the University of Minnesota from 2008 to 2013. I currently work as The Ohio State University Agriculture and Natural Resources Extension Educator in Auglaize County, Ohio.
Agronomist Panel
Retail - Ms. Kim Brown-Livingston, Market Development Agronomist, Cargill
Independent - Mr. Jason Voogt, Owner and Operator, Field 2 Field Agronomy Inc.

Biographies

Kim was raised on a mixed farm near Rivers, in southwest Manitoba. She went to U of M for first an Agronomy Degree and then did an MSc in Soil Science jointly with U of M and AAFC in Brandon. She stayed at AAFC as a Research Associate then went to Carman with Manitoba Agriculture first as a Weed Specialist and later as a Farm Production Advisor. After a move with her family to the beautiful Parkland she has been working in industry and is enjoying her time with Cargill as a Market Development Agronomist in Swan River and Yorkton.

Jason Voogt - I have worked in the Agriculture Retail Industry for the past 23 years. Sales Agronomist for an Independent Retail in Carman for 5 years. 13 years with Cargill based out of the Elm Creek Location involved in agronomy at the location level and as Agronomy Manager Sales and agronomy support with Bud McKnight Seeds Ltd. in the Carman area for a short time as well as a short tenure with Richardson Pioneer as Regional Agronomist.

Started my own independent Crop Consulting company called Field 2 Field Agronomy Inc. in January of 2016 based out of Carman, Manitoba. Professional Agrologist status with the Manitoba Institute of Agrologists as well as a Certified Crop Advisor with the American Society of Agronomy.

Committee and chairing responsibilities for the Manitoba Agronomists Conference, Manitoba Soil Science Society, Manitoba Soil Advisory Council and currently Manitoba Provincial Rep. for the Prairie Certified Crop Advisor Board.
Wheat Quality, Protein & Hitting the Right Market
Mr. Jonathon Driedger, Senior Market Analyst, FarmLink Marketing Solutions, 110-93 Lombard Ave., Winnipeg, MB R3B 3B1 Email: jonathon.driedger@farmlinksolutions.ca

All crops’ values are affected by quality. However, in many cases the crop is fairly homogeneous if a base grade is achieved. Wheat is different. Aside from the obvious differences between different classes of wheat, the value can change significantly across grade and protein levels within an individual class of wheat. This makes the marketing of wheat more complicated than for most other crops. Understanding the dynamics that drive the relative value of the different factors affecting wheat quality can help growers make better selling decisions.

Biography
Jonathon Driedger is a Senior Market Analyst with FarmLink Marketing Solutions, where he has worked for the past 10 years. Prior to joining FarmLink he worked as an economist for the Winnipeg Commodity Exchange and as a Commodity Risk Management consultant with a major U.S.-based futures brokerage firm. Jon attended the University of Manitoba where he obtained a BSc in Agribusiness and an MSc in Agricultural Economics. Recently, Jonathon has been a returning guest on BNN, providing context to Canadian Agricultural commodity markets. Jon grew up in Grunthal, Manitoba, where he still resides with his wife and three daughters.
Managing clubroot in Manitoba, 2018
Bruce D. Gossen, Saskatoon Research and Development Centre, AAFC, Saskatoon SK
S7N 0X2  E-mail: bruce.gossen@canada.ca

Clubroot on canola has continued to spread rapidly in western Canada in recent years, to infest more than 2500 confirmed fields. In 2018, it was identified in numerous sites in Saskatchewan and was also found at high levels in fields in Manitoba. Also, available commercial sources of clubroot resistance are already breaking down in Alberta. The pathogen moves primarily in the infested dirt on farm equipment, but also on wind and in water. The latest recommendation on what to do if (when) it first shows up on your farm include use of resistant cultivars, treatment with lime, grassing small infested patches, changes in cropping rotation, and possibly even adding a new field exit. The good news is that there are options available to stop the disease from spreading quickly from a small patch to the entire farm.

Biography
Dr. Gossen graduated with a Ph.D. in Plant Pathology from the University of Saskatchewan in 1985. Since then, he has been employed as a research scientist with Agriculture & Agri-Food Canada at Saskatoon SK, specializing in management of diseases of field crops. Over the course of his career, he has worked on diseases of forages and turf, cereals, pulse crops, canola and even vegetables. He has published more than 170 papers in refereed journal, plus hundreds of other articles and presentations. He has had a leadership role in many organizations, including a term as President of the Canadian Phytopathological Society, and has received numerous awards for his work, including two Golden Harvest Awards from AAFC and the Award for Outstanding Research from the Canadian Phytopathological Society. He currently leads studies on clubroot of canola and on root rot of field pea with colleagues across Canada and the USA, and continues to be active in supervision of graduate students and mentoring post-doctoral fellows.
Agronomist Actions

Ms. Wendy McDonald, Crops Input Manager, Parrish & Heimbecker
POSTER ABSTRACTS

1. Digging into Research
   Author: Bruce Barker, Haywire Creative, www.CanadianAgronomist.ca, Bragg Creek, AB T0L 0K0  Email: bruce@canadianagronomist.ca

   Author: Vikram Bisht, Crop Industry Branch, Manitoba Agriculture, 65, 3rd Avenue NE, Carman, Manitoba. R0G 0J0.

3. Soybean response to potassium fertility and fertilizer in Manitoba
   Authors: Megan Bourns, Dept. of Soil Science, University of Manitoba, Winnipeg, MB R3T 2N2, Don Flaten, Dept. of Soil Science, University of Manitoba, Winnipeg, MB R3T 2N2, John Heard, MB Agriculture, Carman, MB R0G 0J0, Greg Bartley, MPSG, Carman, MB R0G 0J0

4. Optimizing the Penman-Monteith Equation to Improve Estimates of Evapotranspiration over Canola (Brassica napus) in Manitoba
   Authors: Tony Britton¹ ², Aaron Glenn², Sanjayan Satchithanantham², Clayton Jackson², Brian Amiro¹, Henry Wilson²
   ¹Department of Soil Science, University of Manitoba, Winnipeg, MB R3T 2N2
   ²Agriculture and Agri-Food Canada, Brandon Research and Development Centre, Brandon, MB R7C 1A1

5. Effect of tillage method, plant population and soil moisture conditions on canola yield
   Author: Curtis Cavers, Agriculture and Agri-Food Canada, Portage la Prairie, MB R1N 3V6

6. Indicators of nitrogen sufficiency for spring wheat grain protein
   Author: John Heard, Manitoba Agriculture, Carman MB R0G 0J0

7. Fertilizer Management Practice for Manitoba Corn
   Author: John H, Manitoba Agriculture, Carman MB R0G 0J0
8. **Survival of three stored-product insects at cold temperatures:** Understanding the effect of acclimation on survival of different life stages  
**Authors:** Lavanya Ganesan¹ and Paul Fields², Department of Entomology, University of Manitoba, Winnipeg, MB R3T 2N2¹, Agriculture and Agri-Food Canada, Winnipeg, MB².

9. **Planted canola: population, singulation, and spacing – preliminary results**  
**Author:** Dane Froese, Primary Agriculture Branch, Manitoba Agriculture, Carman, MB

10. **Manitoba: Weeds to Watch For**  
**Author:** Tammy Jones¹ and Robert H. Gulden²; ¹Manitoba Agriculture, Carman, MB R0G 0J0 Email: Tammy.Jones2@gov.mb.ca ²Dept of Plant Science. University of Manitoba, Winnipeg, MB

11. **MCGA On-Farm Trials: Assessing the Effects of Nitrogen Application Timing and Rate in Corn**  
**Authors:** Ron Tone P. Ag CCA, Jordan Karpinchick CCA, Liz Karpinchick Tech. Ag CCA Tone Ag Consulting Ltd., St. Pierre-Jolys, MB

12. **Agronomic management to reduce lodging risk for spring wheat in western Canada**  
**Authors:** A. Mangin¹, Y. Lawley¹, A. Brûlé-Babel¹, D. Flaten² and J.J. Wiersma³. ¹Dept. Plant Science, University of Manitoba ²Dept. Soil Science, University of Manitoba; ³Dept. Agronomy and Plant Genetics, University of Minnesota.

13. **Effects of preceding residue management practices on soybean production systems:** Soil temperature and crop establishment  
**Authors:** Aaron Glenn¹, Ramona Mohr¹, Craig Linde², and James Frey³. ¹Agriculture and Agri-Food Canada, Brandon Research and Development Centre, Brandon, MB R7A 5Y3; ²Canada-Manitoba Crop Diversification Centre, Carberry, MB, R0K 0H0; ³Parkland Crop Diversification Centre, Roblin, MB, R0L 1P0.
14. Effects of preceding residue management practices on soybean production systems: Yield and quality

Authors: Ramona Mohr¹, Aaron Glenn¹, Craig Linde², and James Frey³. ¹Agriculture and Agri-Food Canada, Brandon Research and Development Centre, Brandon, MB R7A 5Y3; ²Canada-Manitoba Crop Diversification Centre, Carberry, MB, R0K 0H0; ³Parkland Crop Diversification Centre, Roblin, MB, R0L 1P0

15. Soybean Phenology in Manitoba

Author: Nathaniel Ort, Department of Plant Science, University of Manitoba, Winnipeg, MB, R3T 2N2

16. Corn hybrid response to in-furrow starter fertilizer

Author: Dickson Tran, Dept. of Soil Science, University of Manitoba, Winnipeg, MB, R3T 2N2
Currently, a gap exists between research scientists’ journal publications and final research reports and extension agronomists. Research published in scientific journals often sits on the shelf or on publisher websites as abstracts. Most agronomists do not have the time to search for articles or have access to the journals. Publishers are not reaching out to extension agronomists.

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Update on Manitoba horticultural crops disease and insect pests in 2018.
Vikram Bisht. Crop Industry Branch, Manitoba Agriculture, 65, 3rd Avenue NE, Carman, Manitoba. R0G 0J0.

Potato and horticultural crops are high value and high input crops with significant disease and insect pest risks. The 2018 cropping season in Manitoba had normal spring planting, starting around 3rd week in April and finished by mid-May. The mid season was generally dry and extended warm period; but finished with raining close to harvest time, followed with freezing temperatures. The weather conditions were not favourable and resulted in lower than normal levels of foliar diseases; and no late blight was reported on potato or tomato. Verticillium wilt and black dot diseases were more extensive. Colorado potato beetles appeared to be increasing in numbers even after seed treatments and foliar insecticide application was needed in many regions. Aphid numbers in traps were significantly lower than normal, reducing risk of mosaic diseases in seed potato. European corn borer injury incidence was noticeable in only a few fields, and did not warrant insecticide application. Aster leafhopper (ALH) numbers in traps were also low on potato and carrots, resulting in lower ALH transmitted diseases. Disease and insect incidence in vegetable crops was also similarly low. Onion downy mildew was reported in only one field; thrips on onion were not common. Cauliflower blackrot disease was not an issue in 2018. On strawberry and raspberry Botrytis grey mold was found at low levels; most harvesting was finished a week earlier than normal due to high temperatures near harvest time. Verticillium wilt/stripe was recorded in many crucifer vegetables in infested trial plots. End of the potato season was marked by significant frost damage to the crop, resulting in >5000 acres not harvested and many bring in frost damaged potatoes in storage. A few root vegetable crop acres were also left unharvested due to frost damage.
Soybean Response to Potassium Fertility and Fertilizer in Manitoba  
Megan Bourns¹, Don Flaten¹, John Heard² and Greg Bartley³  
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²Manitoba Agriculture  
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Soybean acres now occupy more than 25% of Manitoba’s annual cropland. This large expansion in acres, coupled with soybean’s high potassium removal rates in the grain at harvest (1.1 – 1.4 lb K₂O/bu) likely explain the increase in potassium deficiency symptoms in recent years. Despite high potassium removal rates, there has been little comprehensive potassium fertility research for soybean production in the province to date.

To address the growing potassium fertility concerns for soybean production in Manitoba, intensively managed small plot trials and field scale on-farm trials were established in 2017 and 2018. The frequency of soybean yield response to added potassium fertilizer and the effectiveness of different potassium fertilizer rate and placement combinations to increase seed yield (30 or 60 lb K₂O/ac sidebanded, and 30, 60 or 120 lb K₂O/ac broadcast and incorporated) were investigated.

Results suggest the traditional ammonium acetate extraction to determine exchangeable potassium may not be an adequate predictor of soybean yield response to added potassium fertilizer in Manitoba. There were no significant yield responses to potassium fertilizer addition in the 2017 or 2018 small plot trials, regardless of rate/placement combination, and despite low background soil test potassium levels (49 – 117 ppm). In 2017, four of fourteen on-farm trials (52 – 235 ppm soil test potassium) showed statistically significant yield responses to potassium fertilizer. However, the yield responses were not as predicted by ammonium acetate levels. Additional measurements include investigation of ammonium acetate potassium levels from moist and dry soil samples, Plant Root Simulator® (PRS) probe potassium supply rates, differences in potassium concentration of the soybean tissue midseason, potassium concentration and oil/protein content of the seed at harvest.
Optimizing the Penman-Monteith Equation to Improve Estimates of Canola (*Brassica napus*) Evapotranspiration in Manitoba

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The ability to generate representative evapotranspiration (ET) from basic weather data is necessary to estimate crop water-use and the dynamics of other important hydrological processes (e.g. soil moisture, runoff, drainage) across Manitoba. The Penman-Monteith equation with crop coefficients can be used in estimating cropland ET with weather data as model inputs. Adjusting the Penman-Monteith equation and crop coefficients to better represent modern canola (*Brassica napus*) grown in Manitoba could improve the accuracy of ET estimation in the province. We hypothesized that incorporating direct measurements of available energy or developing crop coefficients using in-field weekly leaf area index (LAI) values could improve the Penman-Monteith equation’s accuracy in comparison to direct eddy covariance ET measurements. Comparisons between measured and estimated ET were done at 3 canola sites (Carberry, Glenlea and Miami) in the 2018 growing season. Micrometeorological equipment were used to collect data needed to calculate ET with the eddy covariance method and collect meteorological values used to determine reference evapotranspiration through the Penman-Monteith equation. Crop coefficient values calculated from the FAO-56 method and basal coefficient values generated from LAI were used in combination with reference ET to estimate actual evapotranspiration. Measured average daily ET ranged from 2.86 ± 1.59 (S.D.) mm/day (Carberry) to 3.36 ± 1.71 mm/day (Miami) while modelled daily ET ranged from 2.85 ± 1.56 mm/day to 4.12 ± 1.93 mm/day depending on the location and approach used. Agreement between measured ET and ET estimated using adjustments yielded different results depending on the site. Incorporating direct measurements of available energy and adjusted crop coefficient values both improved the modelled ET at Miami ($r^2$ increased from 0.45 to 0.49 and 0.54 respectively), but did not help at Glenlea or Carberry. The reasons for the discrepancies in model performance between locations are being investigated, and further improvement methods will be tested.
Effect of tillage method, plant population and soil moisture conditions on canola yield
Curtis Cavers, Agriculture and Agri-Food Canada, Portage la Prairie, MB R1N 3V6

Many parts of the Canadian Prairies are experiencing extreme weather events that hamper the productivity of conventional cropping systems. In areas that receive excess precipitation and a lack of drying weather conditions, timeliness of operations for crop establishment, addition of inputs and harvest are often made during times of sub-optimal soil conditions for equipment trafficability. As a result, soil compaction is an outcome that negatively impacts soil health and reduces the long-term productivity on affected soils. In addition, there is a trend towards lowering seeding rates for canola but the presence of excess soil moisture or soil compaction may further reduce yields, as fewer individual plants may not be able to branch and thus compensate to the same degree.

Since nearly every commercial field in western Canada will have some portion impacted by increased equipment traffic, there should be merit in quantifying the impacts of soil compaction and soil moisture and linking this data with canola performance. By examining novel tillage practices, whose tillage depths range from approximately 2 inches (5 cm) with shallow vertical tillage to 16 inches (40 cm) under deep tillage (subsoiling), as well as the inclusion of raised beds/controlled traffic concepts, we can provide an assessment that may have implications for precision farming systems and alternatives to surface/tile drainage.

In 2018, this project compared the performance of L252 canola and soil penetrometer measurements to 18 inches (45 cm) at two separate sites at AAFC-Portage, both on imperfectly-drained clay loam soil. One site was newly established, while the second site was established in 2017 using flax as the indicator crop. Four plant populations were established in four tillage treatments and two moisture regimes (rain-fed and aggressively irrigated) to determine how to manage canola stands under compacted/excess moisture conditions for best performance.
Indicators of nitrogen sufficiency for spring wheat grain protein

John Heard, Manitoba Agriculture, Carman MB R0G 0J0

Nitrogen (N) supplementation is critical to produce high yields and to meet protein standards for hard red spring wheat in Manitoba. Eight small plot studies were conducted to determine optimum nitrogen fertilization strategies for a new era of high yielding varieties. In-season N application proved useful at several sites in increasing yield and protein, but to be a profitable practice, it requires the ability to predict the absolute protein content before application. A number of mid-season scouting strategies (Normalized differential vegetation index (NDVI), SPAD chlorophyll readings and flag leaf N concentration) were evaluated to determine nitrogen sufficiency. These measurements frequently had good relationships with grain yield but weaker relationships with grain protein.

The estimates from these studies will be evaluated as a decision guide in on-farm-tests where farmers applied in-season N for protein enhancement.
The MB Corn Growers Association commissioned a survey of 100 Manitoba corn growers to document the range of fertilization rates, placements, sources and timing. Results will be displayed.
Survival of three stored-product insects at cold temperatures: Understanding the effect of acclimation on survival of different life stages

Lavanya Ganesan\(^1\) and Paul Fields\(^2\), Department of Entomology, University of Manitoba, Winnipeg, MB R3T 2N2\(^1\), Agriculture and Agri-Food Canada, Winnipeg, MB\(^2\).

The flat grain beetles are some of the most common pests of stored grain and flour mills in Canada. The three species of flat grain beetles found in Canada are: rusty grain beetle (\textit{Cryptolestes ferrugineus}), flour mill beetle (\textit{Cryptolestes turcicus}) and flat grain beetle (\textit{Cryptolestes pusillus}). Previous studies have shown that the rusty grain beetle adults are the most cold hardy, flat grain beetle has intermediate cold tolerance and flour mill beetle have the least cold tolerance of the three sibling species. However, there has not been a study that has examined the effect of cold acclimation on all three species and the different life stages.

The most cold tolerant stage of unacclimated insects were: adults for flour mill beetle, adults and older larvae for rusty grain beetle, data not available for the flat grain beetle. For unacclimated adults, the most cold tolerant to least cold tolerant species was: flour mill beetle, rusty grain beetle and flat grain beetle. For cold acclimated adults, the most cold tolerant to least cold tolerant was: rusty grain beetle, flour mill beetle and flat grain beetle. Even after 7 days at -10\(^\circ\)C there was less than 20% mortality for the rusty grain beetle, whereas the flour mill beetle had over 90% mortality. For flat grain beetle all insects were dead after 1 d.

Current recommendations from the Canadian Grain Commission for control of stored grain insect infestations in the winter are: -5\(^\circ\)C, 12 weeks; -10\(^\circ\)C, 8 weeks; -15\(^\circ\)C, 4 weeks; -20\(^\circ\)C, 1 week. These recommendations will be reviewed at the end of this study.
Planted canola: population, singulation, and spacing - preliminary results
Dane Froese, Primary Agriculture Branch, Manitoba Agriculture, Carman, MB

Project initiated by Manitoba Agriculture in conjunction with the Manitoba Canola Growers Association looks at comparing agronomic advantages and economic performance of low-population canola seeded using a planter when compared to traditional air drill methods. Initial results indicate certain improvements made in stand establishment and singulation can be achieved in planted populations, however yield results tend to be favoured by higher seeding rates under traditional row spacing and placement methods. Development of project allows for closer future examination of variables that are needed to ensure successful establishment of low-population, planted canola fields.
This poster attempts to answer the questions of: which weeds threaten Manitoba agriculture and is herbicide resistance the only factor to watch for? The 2016 Weed Survey measured the relative abundance of weeds present in Manitoba and demonstrated a shift in weed spectrum based on cropping patterns and other management practices. A follow-up study indicated that herbicide resistance could potentially contribute to the increased abundance of some weeds.

Certain species listed are common on Manitoba’s landscape, including wild oat (#4 in relative abundance in the 2016 survey), yellow foxtail (#6), redroot pigweed (#8), lamb’s-quarters (#13) and biennial wormwood (#20).

In the area of herbicide resistance, weeds such as Palmer amaranth, tall waterhemp, giant ragweed, common ragweed and kochia are increasingly a concern. Weed scientists in the Midwest US and eastern Canada have identified these species as a threat because of their ability to compete with crops and to develop resistance to different herbicide sites of action. Some of these weeds are infrequently detected in Manitoba, but their close proximity makes them a risk, especially as cropping patterns increasingly include crops where these weeds are problematic.

Based on competitiveness, fecundity, ability to adapt, and confirmed cases of herbicide resistance, the compiled list identifies reasons particular weeds are a threat to crop production in Manitoba. Knowing the characteristics of each of these weeds can help farmers and agronomists to get the upper hand in managing them.
In 2017 & 2018, field scale corn trials were setup to determine the effect on yield of nitrogen application timing and rate. There were 20 fields selected for the on-farm trials across southern Manitoba. Two types of trials were conducted. The first being the effects of rate and timing of nitrogen application. The second trial was application of nitrogen to fall-applied manured ground. Seeding dates ranged from May 1 to May 10 with spring nitrogen applications ranging from April 28 to May 23. Nitrogen rates ranged from 80 lbs to 250 lbs of actual N applied. Spring nitrogen was applied as urea ammonium nitrate, anhydrous ammonia or granular urea, with application methods being subsurface banding, broadcast, or broadcast and incorporated before seeding. For the split nitrogen application, the base nitrogen rate in the spring was lowered by 40 lbs, with the 40 lbs side dressed on between V4 and V6. Mid-season nitrogen was applied as urea ammonium nitrate, with a range of application methods used - y-drops, streamed, broadcast, coulter injection, and dribble application. For the nitrogen application to fall-applied manured ground, nitrogen was applied in spring at two different rates compared to no additional application. Throughout the growing season, in-crop scouting tools (i.e. Greenseeker, PSNT, NDVI imagery, stalk-nitrate test) were used to observe differences in the treatments and assess the efficacy of those tools. Yield advantage was variable due to climate, precipitation and soil types among all trials conducted in the 2017 & 2018 seasons.
Lodging in spring wheat commonly results in reduced yield and grain quality. New high yielding wheat varieties require higher rates of nitrogen fertilizer to achieve their yield potential. This leads to increased risk of stem and root lodging under some growing conditions. The objective of this study was to investigate the most effective agronomic strategies to manipulate crop canopy structure to decrease lodging risk without taking resources away from the developing grain. This was investigated through two field experiments during the 2018 growing season at two locations in Manitoba, Canada. The first evaluated nitrogen (N) fertilizer management (reduced rate, split application and controlled release urea), plant growth regulator (PGR) application and their interactions across three common high yield spring wheat varieties. A second study investigated the interactions between plant densities, N application timing, and PGR application across a single spring wheat variety. Dry matter partitioning data were collected at anthesis and physiological maturity to determine the influence of combinations of management strategies on alterations to crop canopy structure and resulting lodging risk. These data will provide agronomy management recommendations to reduce the risk of lodging without sacrificing grain yield and quality.
Effects of preceding residue management practices on soybean production systems: Soil temperature and crop establishment
Aaron Glenn¹, Ramona Mohr¹, Craig Linde², and James Frey³.
¹Agriculture and Agri-Food Canada, Brandon Research and Development Centre, Brandon, MB R7A 5Y3; ²Canada-Manitoba Crop Diversification Centre, Carberry, MB, R0K 0H0; ³Parkland Crop Diversification Centre, Roblin, MB, R0L 1P0.

Post-harvest crop residue management practices can impact the following growing season soil temperature ($T_{SOIL}$) which may influence soybean germination, emergence and early development rates.

The effects of six residue management treatments were assessed at four sites across Manitoba (Brandon, Carberry, Portage, and Roblin) over three years to determine their impact on soil temperature and soybean establishment. Self-logging temperature sensors were installed 5 cm below the surface in treatment replicates at each site and recorded hourly $T_{SOIL}$ readings. Plant counts were conducted periodically for several weeks after planting, from the first evidence of crop emergence until no further change in plant stand was detected, in order to assess the effect of residue management on early season crop development.

Analysis of the hourly $T_{SOIL}$ data indicated that the crop residue management treatments had a significant impact on soil thermal regimes for the majority of site-years. Cumulative soil degree hours greater than 10°C (i.e. the summation of positive values of hourly $T_{SOIL}$-10°C) for 30 days after planting (DAP) were significantly different between crop residue treatments for 9/12 site-years. Cumulative soil degree hours less than 10°C (i.e. the summation of negative values of hourly $T_{SOIL}$-10°C, a measure of the degree of cold soil exposure) for 30 DAP were significantly different between crop residue treatments for 5/12 site-years. Overall the soil warmed 16% faster after planting with prior tillage compared to treatments where cereal stubble was retained on the surface. Preceding tillage warmed the soil 3% faster (nominal but not significant) than direct-seeded treatments where preceding cereal residue had been removed post-harvest. The impact of retained canola residue on the subsequent growing season soil thermal environment was found to be more variable. The results from this study provide valuable information regarding the influence that different management practices may have on spring $T_{SOIL}$ in Manitoba cropland.
Effects of preceding residue management practices on soybean production systems: Yield and quality
Ramona Mohr¹, Aaron Glenn¹, Craig Linde², and James Frey³.
¹Agriculture and Agri-Food Canada, Brandon Research and Development Centre, Brandon, MB R7A 5Y3; ²Canada-Manitoba Crop Diversification Centre, Carberry, MB, R0K 0H0; ³Parkland Crop Diversification Centre, Roblin, MB, R0L 1P0

With the introduction of early-maturing soybean cultivars adapted to Manitoba conditions, the industry in this province has grown rapidly over the past decade. Despite this, soybean remains a cold sensitive crop, and current provincial recommendations suggest that soybean be planted when the average soil temperature is ≥10°C, with 18-22°C being ideal. Preceding residue management practices have the potential to alter soil temperature and moisture conditions early in the growing season and, as such, may affect the conditions that soybeans are exposed to during crop establishment.

A series of field studies were conducted at four locations across Manitoba (Brandon, Carberry, Portage, Roblin) over four years to determine the effect of preceding crop residue management practices on soybean yield and quality. A randomized complete block design (RCBD) with four replicates was established, comprised of six residue management treatments: a control (wheat residue, tilled), and five stubble treatments (wheat with straw chopped and retained, wheat with straw removed, oat with straw chopped and retained, oat with straw removed, and canola with straw chopped and retained).

Residue management frequently affected soil temperature and moisture at time of planting. Practices such as tillage, and straw removal in no-till stubble systems, were effective in increasing soil temperature at planting to varying degrees depending upon the site and year. Despite observed effects on soil temperature, residue management influenced soybean yield in only two of twelve site-years. Residue management also had limited effects on soybean seed quality factors such as seed weight, test weight, percent protein and percent oil. In part, because soybeans in this study were planted during or near to the recommended planting window for Manitoba, and soils at planting were greater than or equal to 15°C, the effects of residue management on the soybean crop may have been limited.
Soybean Phenology in Manitoba

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Soybean (Glycine max L Merr.) is the third most popular planted crop in Manitoba with just over 1.9 million acres in 2018. The introduction of short season varieties has allowed for this expansion, however current methods that use temperature to predict soybean phenological development are not accurate for Manitoba. Manitoba's crop production environments have long summer days and a shorter growing season than the traditional soybean growing regions of North America. Paired experiments in 2008-2010 were conducted to evaluate the influence of this longer photoperiod and short growing season on the phenological development of ten soybean varieties in Morden, MB (49.19°N) and Ottawa, ON (45.39°N). Soybean varieties were selected to represent maturity groups from 000 to 1. During the experiment, growth stages were recorded multiple times a week and paired with daily weather records. The experiment from 2008-2010 was repeated in 2017 and 2018 in Carman, MB (49.50°N) and Ottawa, ON with the same treatments. The different growing environments, more specifically accumulated temperature and photoperiod (latitude) effects soybean growth and resulted in a difference in phenological development. In Manitoba, soybean spent an average of 10% more thermal time in the vegetative stage, which lead to less time spent in the reproductive stages compared to Ontario. The same soybean varieties required different amounts of crop heat units to reach critical growth stages and ultimately maturity (R8) between the two locations for all maturity groups tested. These differences highlight the need to adapt current soybean phenology models for this new growing environment. The main objective of this experiment is to build a phenological model based on photoperiod and crop heat units for Manitoba.
Results for the first and second year of a research project on hybrid response to starter fertilizer in Manitoba are presented. The objectives of the study are to evaluate starter fertilizer impacts on grain yield, plant growth and plant development of corn hybrids, both within and between relative maturity groups. In the first year, 8 Dekalb hybrids, with two treatments, a control (no SF) and one in-furrow treatment SF in the form of APP (10-34-0, 5 US gallons per acre) were planted at 4 locations. In the second year, the study focused specifically on hybrid response to starter phosphorus. The treatments for year 2 was 19.8 lbs P$_2$O$_5$ ac$^{-1}$ in the form of APP and a control with no in-furrow fertilizer but 5.8 lbs N ac$^{-1}$ in the form of UAN applied pre-emergence to equalize the N applied in APP. Preliminary results show that grain yield for only one of the hybrids, DKC 26-28, was significantly greater for treatments with starter fertilizer, compared to treatments without starter fertilizer over the entire 4 site years. None of the other hybrids responded consistently to starter fertilizer. These results represent only 4 site years of yield data total. Another 4 locations looking at both hybrid response to SF and hybrid response to starter P will be established in 2019.