Canadian Weed Science Society
Société canadienne de malherbologie

CWSS-SCM Annual Meeting
November 3rd to 6th 2025

Réunion annuelle

3 au 6 Novembre 2025

Hilton Lac-Leamy Gatineau, QC

CWSS-SCM Sponsors

Thank you to our national sponsors

DIAMOND SPONSORS

PLATINUM SPONSORS

GOLD SPONSORS

SILVER SPONSORS

Adama
AgQuest
Belchim Canada
Canada Journal of Plant Sciences
Manage Resistance Now

Thank you to our local sponsors!

Merry Dairy
Saunders Farms
Canadian Museum of History
Canadian War Museum
Invasive Species Centre
National Gallery of Canada
Ingenium-Canada's Museum of Science and Innovation

2025 KEYNOTE AND PLENARY SPEAKERS

Pedro Peres-Neto : Pedro Peres-Neto is a Professor of Biology at Concordia University and holds the Canada Research Chair (tier I) in Spatial Ecology and Biodiversity. He is a lifetime Fellow of the Ecological Society of America and currently serves as Editor-in-Chief of *Oikos. He* previously held leadership roles as Vice-President of the International Biogeography Society and editorial board member for *Ecography*, *Global Ecology and Biogeography*, and *Methods in Ecology and Evolution*. Internationally recognized for his contributions to spatial ecology and biodiversity science, he has advanced integrative frameworks that link community assembly, trait-based ecology, and spatial processes. By integrating ecological theory with rigorous quantitative methods, his research yields critical insights into predicting community dynamics and biodiversity change across ecological scales, from local habitats to global ecosystems.

Robert Bouchier: Research scientist in insect ecology and biological control with AAFC for more than 30 years, now moved to the University of Toronto. Specific research interests include host-plant insect interactions; population dynamics of biological control agents and their hosts; influence of habitat and climate on the impact and dispersal of biocontrol agents; and risk assessment of biological control. Has been Canadian lead for consortia projects developing new biological control agents for several invasive plants, including *Phragmites*, knotweeds, garlic mustard, flowering rush and swallowworts.

Marla Schwarzfeld : Originally from BC, Marla Schwarzfeld obtained her BSc at the University of Victoria in Biology and Environmental Studies. Following a few years working on bird-insect interactions in Hawaii, she returned to Canada and completed her PhD in Systematics and Taxonomy at the University of Alberta, focusing on a genus of parasitic wasps. She then did a brief post-doc at the University of Northern British Columbia on aquatic ecosystems, before beginning her current position at the Canadian National Collection of Insects, Arachnids and Nematodes, AAFC, in Ottawa as a mite taxonomist.

Annie Marcoux: I hold a bachelor's degree in agronomy and a master's degree in plant biology, with a specialization in phytopathology and plant physiology, both from Laval University, Quebec, completed in 1997. After graduating, I spent three years conducting field crop research at the Agriculture and Agri-Food Canada Research Farm in Normandin, Lac Saint-Jean. This was followed by ten years as an agronomist with an agri-environment consulting club in the Chaudiere-Appalaches region. I then joined the Quebec government—initially at the Agricultural Financial Services of Quebec (FADQ), and later at the Ministry of Agriculture, Fisheries and Food (MAPAQ)—where I served as an agri-environment advisor. Since 2016, I have taken on the role of agronomist-weed scientist for the Plant Protection Directorate (DP) and the Phytoprotection Expertise and Diagnostic Laboratory (LEDP) at MAPAQ, located in Quebec city, where I continue to work today. My interests of study are diverse, with a particular focus on plant physiology and anatomy, crop phytotoxicity, the mechanisms of action of herbicides, and the resistance of weeds to herbicides.

2025 CONFERENCE ORGANIZATIONAL COMMITTEES

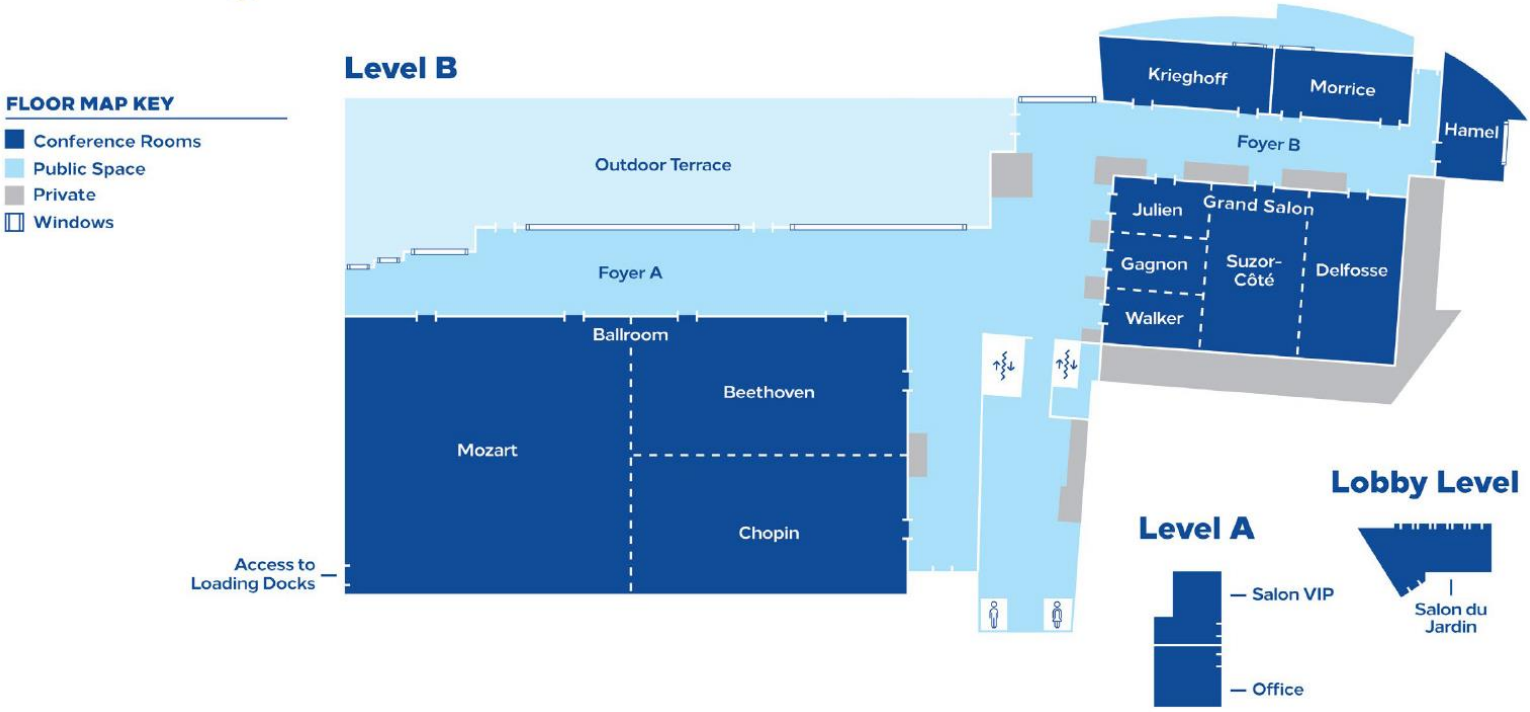
For further information about the meeting please contact the Chair or a Local Arrangements Committee member as listed below:

Position	Name and affiliation
First Vice President (LAC Oversight)	Andrew McKenzie-Gopsill, Agriculture and Agri-Food Canada
Local Arrangements Committee Co-Chairs	Wendy Asbil, Canadian Food Inspection Agency (wendy.asbil@inspection.gc.ca)
	Leonardo Galindo Gonzalez, Canadian Food Inspection Agency (Leonardo.GalindoGonzalez@inspection.gc.ca)
	Sara Martin, Agriculture and Agri-Food Canada (sara.martin@AGR.GC.CA)
	Scott Couture, Health Canada/PMRA (scott.couture@hc-sc.gc.ca)
Local Arrangements Committee	Paulina Cholango Martinez (Institut de recherche et de développement en agroenvironnement) Sandra Flores-Mejia (Centre de recherche sur les grains) Jeanette Gaultier (BASF) Tyler Gullen (Nufarm) Meghan Lange (Belchim) Erin LeClair (Canadian Food Inspection Agency) Monica Liedtke (Invasive Species Centre) Rebecca Lord (Invasives Canada) Kristina Pauk (Canadian Food Inspection Agency) Saanchi Singh (Canadian Food Inspection Agency) Gail Wallin (BC Invasives) Jacob Weedmark (Canadian Food Inspection Agency)
Graduate Student Presentations	Scott White, Dalhousie University
Graduate Student Representative	Natalie LaForest, University of Alberta
Plenary Session and Poster Session	Scott Couture, Health Canada/PMRA
Scholarships and Awards Banquet	Leonardo Galindo Gonzalez, Canadian Food Inspection Agency
Sponsorship	Tyler Gullen, Nufarm
	Meghan Lange, Belchim Crop Protection Canada Inc.

CWSS-SCM CONCURRENT SECTION CHAIRS - 2025

Cereals, Oilseeds and Pulses Breanne Tidemann Charles Geddes Breanne.tidemann@agr.gc.ca Charles.geddes@agr.gc.ca	**Soybean, Corn and Edible Beans** Laura Smith laura.smith@corteva.com
Horticulture and Specialty Crops Jichul Bae Jichul.bae@agr.gc.ca	**Weed Biology and Ecology / Invasive and Noxious Weeds** Marie-Josee Simard Marie-josee.simard@agr.gc.ca
Provincial Reports / Regulatory Issues Kim Brown-Livingston Kim.brown@gov.mb.ca	**Forage, Rangeland, Forestry / Industrial Vegetative Management** Vanessa Deveau Vanessa.deveau@gnb.ca
Industry Meghan Lange Meghan.lange@belchim.com	**Biological Control, Biosurveillance, and Biodiversity** Wendy Asbil Wendy.asbil@inspection.gc.ca

Conference Centre Meeting Rooms



CWSS-SCM 2025 Annual Meeting Agenda

Note that the abstracts for the individual presentations are listed by number in the Abstract section.

Date	Time	Topic/event	Room
Monday November 3	09:00-12:00	Board Breakfast and Meeting	Hamel
	11:00-18:00	Poster set-up	Beethoven
	12:00-17:00	Registration	Foyer Beethoven
	13:00-15:00	Tour of CEF AAFC	Central Experimental Farm
	13:00 -15:00	Plant ID Workshop	Delfosse
	16:00 - 17:00	Prairie Weed Monitoring Network	Suzor-Coté
	17:30 - 18:30	Graduate Student Meet and Greet	Foyer Mozart
	18:30 - 20:00	Sponsorship/Industry Acknowledgement and Welcome Reception	Foyer Mozart

Date	Abstract #	Time	Topic/event	Speaker	Location
Tuesday November 4		07:00-08:00	Breakfast		Mozart
		07:00-18:00	Registration		Foyer Beethoven
		08:00-18:00	Posters		Beethoven
		08:15-08:30	**Opening remarks**		**Mozart**
		08:30-09:00	**Keynote speaker:** Go Big or Go Home: Larger and More Sophisticated Predictive Models for Biodiversity Science and Biosurveillance	Dr. Pedro Peres-Neto	**Mozart**
		09:00-10:00	**Table Talks**		**Mozart**

	10:00-10:30	coffee break		Beethoven
	10:30-12:00	**Plenary session**		**Mozart**
	10:30-11:00	Beyond bees: A (mostly) entomological perspective on biodiversity for food and agriculture	Dr. Marla Schwarzfeld	Mozart
	11:00-11:30	The Laboratory of Expertise and Diagnostic in Plant Protection (LEDP), proud ally of bio-surveillance in Quebec!	Annie Marcoux	Mozart
	11 :30-12 :00	Implementation of biological control of invasive plants in Canada using introduced Phragmites as a case study	Dr. Robert Bourchier	Mozart
	12:00-13:00	Lunch		Mozart
	13:00-15:00	**Graduate Student Presentations**		**Mozart**
20	13:00-13:15	Harvesting spring wheat : a scenario without pre-harvest glyphosate	Shane Collins	Mozart
60	13:15-13:30	Towards a Universal Weed Management Threshold: A Remote Sensing Yield-Loss Model for Canola (Brassica napus L.)	Kosar Eivani	Mozart
37	13:30-13:45	Autonomous robotic and Laser systems for weed control in carrots and beets	Ifesinachi Nelson Ezeh	Mozart
59	13:45-14:00	Impact of Farm Hedgerow Plant Community Structure on Susceptibility to Weed Colonization	Alexis Graves	Mozart
49	14:00-14:15	Influence of Water Hardness and Ammonium Sulfate on Flazasulfuron and Glufosinate Efficacy on Hair Fescue (Festuca filiformis Pourr.)	Marcos Lima	Mozart

8	14:15-14:30	Getting Out of the Weeds: Genomic tools for improving identification of noxious plant species	Saanchi Singh	Mozart
19	14:30-14:45	Machine Learning and Drone-Derived Vegetation Indices for Estimating Herbicide-Induced Crop Injury	Matt Ball	Mozart
46	14:45-15:00	Functional Microbial Shifts and Soil Transfers as Tools for Post-Invasion Restoration	Vanessa Jones	Mozart
	15:00-15:30	coffee break		Beethoven
	15:30-17:30	**Graduate Student Presentations**		**Mozart**
22	15:30-15:45	Evaluating Drone-Based Remote Sensing to Quantify Soybean Canopy Development Dynamics and Weed Suppression Under Different Agronomic Practices	Matt Fallis	
56	15:45-16:00	An Imazethapyr Resistant Biotype of Amaranthus powellii S Wats. Exhibits an Unusual Phenotype in Response to Thiencarbazone-methyl	Malavika S. Nair	
68	16:00-16:15	Assessing the impact of agronomic practices on crop growth dynamics and their influence on weed management using UAV Multispectral imagery	Shirmith Nirmal	
26	16:15-16:30	Carabid beetles as weed seed predators in Alberta cropping systems	Natalie LaForest	
38	16:30-16:45	Towards perennialization - Weed species community composition and structure in annual, intermediate, and perennial farm fields in	Salina Raila	

			Manitoba		
	7	16:45-17:00	Molecular Insights into Herbicide Resistance in Wild Oat: Toward Early Detection and Better Management	Jacob Weedmark	
	71	17:00-17:15	Characterizing root traits in 10 soybean cultivars	Joseph Zvomuya	
	70	17:15-17:30	Cheatgrass as a Post-Fire Colonizer: Patterns of Persistence and Spread After the McKay Creek Wildfire	Virginia Oeggerli	
		18:00	President's Dinner (by invitation); Dine-Arounds		

Date	**Abstract #**	**Time**	**Topic/event**	**Speaker**	**Room**
Wednesday November 5		07:00-08:00	Breakfast		Mozart
		07:00-18:00	Registration		Foyer Beethoven
		08:00-10:00	**Weed Biology, Ecology and Invasive Species**		**Delfosse**

	27	8:00-8:15	Mechanisms of MCPA Resistance in Synthetic Auxin-Resistant Amaranthus powellii	Isabelle Aicklen	Delfosse
	54	8:15-8:30	In vitro assays for glyphosate resistance detection in weeds	Andrea Duclos	Delfosse
	24	8:30-8:45	Mapping and Managing Canada Thistle (Cirsium arvense) with Drone-Based Precision Tools	Sasha Loewen	Delfosse
	30	8:45-9:00	Using Super-Resoluiton Sentinel 2 Images to Map Kochia	Steven Shirtliffe	Delfosse
	31	9:00-9:15	Comparing the preciseness of weed scouting protocols using proximal and remote sensing (UAV) in field crops	Élise Smedbol	Delfosse
	69	9:15-9:30	Shifting directionality of EPSPS copy number variation inheritance in *Amaranthus palmeri*	Sarah Yakimowski	Delfosse
	41	9:30-9:45	Unravelling Non-Target-Site Resistance to ACCase Inhibitors in Wild Oat (*Avena fatua*)	Eya Trabelsi	Delfosse
	67	9:45-10:00	Managing Kochia Seed Production by Using Alternative Wheat Seeding Systems	Shamima Sultana	Delfosse
		08:00-10:00	**Horticulture and Specialty Crops**		**Suzor-Coté**

25	8:00-8:15	Development of field horsetail (Equisetum arvense L.) management strategies in established cranberry	Jichul Bae	
9	8:15-8:30	The effect of two Rye (Secale cereale L.) seeding rates for rolled mulch combined with three weed control techniques on weed management in organic Spaghetti Squash (Cucurbita pepo) production.	Paulina Cholango Martinez	
34	8:30-8:45	Crushing it: Evaluating the Potato Vine Crusher in Field Trials	Nicolle MacDonald	
3	8:45-9:00	Blasting the competition: Abrasive weed management in potato	Andrew Mckenzie-Gopsill	
15	9:00-9:15	Evaluation of a production cycle management program for hair fescue (Festuca filiformis) in wild blueberry (Vaccinium angustifolium).	Scott White	
	9:15-9:30	Horticulture Pathway for Invasive Plants	Rebecca Lord	
	10:00-10:30	Coffee break		Beethoven
	10:30-12:00	**Poster Viewing**		Beethoven

	12:00-13:00	Lunch		Mozart
	13:00-15:00	**Cereals, Oilseeds and Pulses + Corn, Soybeans and Edible Beans (sequential sessions)**		Julien/Gagnon/ Walker
62	13:00-13:15	Genetic assays reveal distribution of PPO inhibitor (Group 14)-resistant kochia (Bassia scoparia)	Charles Geddes	Julien/Gagnon/ Walker
23	13:15-13:30	Icafolin-Methyl - a New Molecule in the Chemical Class (Isoxazolin-Carboxamides) from Bayer CropScience	Christopher Mansiere	Julien/Gagnon/ Walker
66	13:30-13:45	Introducing a Framework for a Collaborative Kochia Management Program in Pulses	Racquelle Peters	Julien/Gagnon/ Walker
48	13:45 -14:00	Integrating Cultural and Chemical Strategies for Pea and Camelina Intercropping	Shaun Sharpe	Julien/Gagnon/ Walker
	13:00-15:00	**Provincial Reports and Regulatory Updates +Forage, Rangeland, Forestry and Industrial Weed Management + Industry updates (sequential sessions)**		**Delfosse**

	53	13:00-13:15	Valuing stakeholder perspectives: assessing alternative control methods for two regulated plant species	Laura Brennan	Delfosse
	32	13:15-13:30	Droning On: Use of spray drones for range and pasture herbicide research	Kris Guenette	Delfosse
	52	13:30-13:45	Invasive Plants in Forests and Rangelands	Kristina Pauk	Delfosse
	35	13:45-14:00	Beyond the Weeds: Field Scientists Powering the Future of Weed Management	Rory Degenhardt	Delfosse
	57	14:00-14:15	Introducing Valtera Cereals	Tyler Gullen	Delfosse
	73	14:15-14:30	Convintro® Corn 12 Herbicide: A New Residual Herbicide with a Novel Mode of Action for North America from Bayer.	Annemarie Van Wely & Kurtis Pilkington	Delfosse
		15:00-15:30	Coffee break		Beethoven
		15:30-17:30	**Biocontrol, Biosurveillance and Biodiversity**		**Julien/Gagnon/ Walker**
	18	15:30-15:45	Adventive weevils (Insecta: Coleoptera: Curculionoidea) of Canada and their association with weedy hosts	Patrice Bouchard	Julien/Gagnon/ Walker
	16	15:45-16:00	Newly detected Palearctic weed-eating beetles in eastern Canada	Hume Douglas	Julien/Gagnon/ Walker
	36	16:00-16:15	CRISPR-Cas12 fluorescent assays for accurate identification Amaranthus palmeri, Amaranthus watsonii and Amaranthus tuberculatus	Leonardo Galindo Gonzalez	Julien/Gagnon/ Walker

	2	16:15-16:30	Weed seedbank community structure and its relation to soil properties in Prince Edward Island	Andrew McKenzie-Gopsill	Julien/Gagnon/ Walker
	40	16:30-16:45	Examining the Economic Impacts of Invasive Species in Canada	Monica Liedtke	Julien/Gagnon/ Walker
		17:00-18:00	**Pre-dinner drinks reception**		**Mozart Foyer**
		18:00-22:00	**Gala Dinner and Awards Ceremony**		**Mozart**

Date	Abstract #	Time	Topic/event	Speaker	Room
Thursday November 6		07:00-08:00	Breakfast		Mozart
		08:00-09:30	**Annual General Meeting**		**Mozart**
		09:30-11:30	Grant Writing Panel		Mozart
		08:00-11:00	Poster removal		Beethoven
		13:00-15:00	Board Strategic Planning meeting		Hamel

Poster Session

Abstract #	Title	Author
1	Role of aphids and weeds in the epidemiology of Cucumber mosaic virus in Quebec	Sébastien Boquel
4	The critical period of cover crop management	Andrew McKenzie-Gopsill
5	Tolerance of Winter Wheat to Fall, Spring, and Fall + Spring Applications of Clopyralid	Nader Soltani
6	What are the Most Efficacious Herbicides Applied Postemergence for Control of Multiple-Herbicide-Resistant Canada Fleabane in Corn?	Nader Soltani
10	A Mulligan on the Identity of Galium mollugo (Rubiaceae)	Keagan Strober
11	Weed management alerts generated by A.I	Marie-Josée Simard
12	Prescription maps: A tool to control volunteer corn in soybean	Sandra Flores-Mejia
13	Inventory of Quebec Weeds: Insights from the Centre-du-Québec region	Gabriel Verret
14	Detection of common waterhemp (Amaranthus tuberculatus) using satellite images in soybean	Nourhène Aloui
17	Metagenomics: A More Effective Approach to Weed Seedbank Characterization?	Simon Boudreau-Pineault
21	Sticky Problems: What can the genome of false cleavers reveal?	Sara Martin
28	High-Resolution Weed Density Mapping in Switchgrass (Panicum virgatum L.) using Deep Zoom-in Detection	Akhil Meethal
33	Emergence dynamics of Common lamb's-quarters (Chenopodium album, L.) in a context of climate change in Montérégie, QC	Sanaz Zardari
39	Functional synergy and genomic linkage of glyphosate resistance traits in Canada fleabane	Eric Page

42	A drone and AI-based framework for post-wildfire invasive species spatial dynamics assessment	Joyce Chan
43	Investigating Competitive Ability of Wheat and Barley Varieties with Weed Communities in Western Canada	Breanne Tidemann
44	Baseline Weed Survey Considerations for the Bridge to Land-Water-Sky Living Laboratory	Shaun Sharpe
45	Diffusion-based Dataset Augmentation for Downstream Crop Segmentation	Alexander Senden
47	CWRepViT-Net: An Encoder-Decoder Deep Learning Framework with RepViT Blocks for Crop Weed Semantic Segmentation in Soybean Fields through their Life Journey	Masoomeh Gomroki
50	The Critical Weed Free Period in Canola	Daniel Pouteau

Abstracts

1 **Role of aphids and weeds in the epidemiology of Cucumber mosaic virus in Quebec**

Sébastien Boquel[1], Alexis Latraverse[1], Sandrine Corriveau-Tousignant[1], Gabriel Verret[1], Sandra Flores-Mejia[1]

[1]CÉROM

The *Cucumber mosaic virus* (CMV) is a disease transmitted by aphids that can infect a wide variety of plants, including several weeds that may act as reservoirs. It is transmitted in a non-persistent manner which means that most, if not all aphid species, can transmit it. In 2022, CMV and Potyviruses severely affected cucurbit crops in Quebec, with 120 cases detected by the Quebec Plant Protection Diagnostic lab (*Laboratoire d'expertise et de diagnostic en phytoprotection*) in eight regions. This epidemic was attributed to the large population of soybean aphids (*Aphis glycines*) observed that year, though many species were also observed. Moreover, the role of perennial or bi-annual weeds as potential winter reservoir of CMV remains unclear.

To better understand the vectors and reservoirs of the virus, aphid and weed screenings were conducted in 2023 and 2024 in 22 soybean and 24 cucurbit field edges in three regions (Montérégie, Laval and Lanaudière). Nearly three-quarters of the aphids captured in yellow pan traps belonged to the *Aphis* genus. Two flight peaks were observed, one in mid-June/early July and one mid-July/early August, the latter coinciding with the presence of the soybean aphid.

A total of 1,250 weed specimens belonging to 122 different species were sampled, of which only 485 specimens belonged to species known to host CMV. All samples were tested for CMV, but only six plants of six different species were confirmed positive, three of which had never previously been recognized as CMV host. Despite their potential as virus reservoirs, weeds appear to be a minor source of inoculum for aphids - their impact on the epidemiology of the virus is discussed.

2 **Weed seedbank community structure and its relation to soil properties in Prince Edward Island**

Andrew McKenzie-Gopsill[1], Judith Nyiraneza[1], Hannah Arseneault[1], Derek Lynch[2], Tandra Fraser[1]

[1]Agriculture and Agri-Food Canada, [2]Dalhousie University

A diversity of management and environmental factors influence weed seedbank community composition, yet the conditions under which each of these factors is an important driver of the weed seedbank are poorly understood. To investigate this relationship, we used a series of univariate and multivariate analyses to test associations between soil health, nematode community composition parameters, and the composition of the weed seedbank at 59 agricultural sites in the Prince Edward Island Soil Quality Monitoring (PEI SQM) Network spanning a range of land-use intensities and using potato (*Solanum tuberosum* L.) production systems as a case study. Land-use intensity is a nonstandard term that refers to increasing agricultural activity, including tillage and use of synthetic inputs to sustain high crop yield. Sites were classified into low, medium, and high land-use intensity categories based on frequency of potato cultivation in the past 10 yr. A total of 36 different weed species were found across all sites, and while neither seedbank density nor species richness was influenced by land-use intensity, community assemblage was. Seedbank communities at low land-use intensity sites were largely associated with grass weeds and other weakly competitive species, positively correlated with soil CO_2 respiration and nematode community richness and diversity, and negatively correlated with the carbon to nitrogen ratio. In contrast, seedbank

	communities at medium and high land-use intensity sites were similar and composed of many highly competitive weedy species and correlated with the frequency of potato in the rotation and soil N and K, two commonly used soil fertility inputs. The absence of common agricultural weed species at low land-use intensity sites filtered by soil edaphic factors and abundance of neutral species despite past history of annual cropping suggest that these sites are not refuges for these species and may present a template for the design of weed seed-suppressive soils.
3	**Blasting the competition: Abrasive weed management in potato** Andrew McKenzie-Gopsill[1], Marie-Josée Simard[1], Robert Nurse[1], Jichul Bae[1] [1]Agriculture and Agri-Food Canada Abrasive weed control is a novel weed management tactic that uses air-propelled grit material directed at weeds with the intention of inflecting lethal damage. Over the past three years we have evaluated the use of various abrasive grit materials as a component of an integrated weed management program for use in the potato cropping systems of Atlantic Canada. Tested abrasive grits have included crushed walnut shells and corn cobs as well as sodium bicarbonate applied to emerged weeds once prior to potato flowering and again two weeks after. In the first two-years of the experiment the second abrasive grit was followed up with an application of rimsulfuron whereas the third year a combination of caprylic and capric acid was applied with a hooded sprayer to the furrows. In each year of the experiment, weeds of select species were tagged prior to treatment and monitored throughout the season. Neither the use of walnut or corn grit decreased biomass of weed species compared to the control yet while not controlled these species failed to produce seed. In contrast, sodium bicarbonate gave consistent and high levels of control of annual species including common lambsquarters (*Chenopodium album*), corn spurrey (*Spergula arvensis*) and common dandelion (*Taraxacum officinale*) across years. Potato marketable yield was not impacted by abrasive grit material but was higher following the use of either herbicide. Our results show that abrasive grits and in particular sodium bicarbonate can be incorporated into a traditional potato production to reduce seedbank inputs without impacting yield.
4	**The critical period of cover crop management** Andrew McKenzie-Gopsill[1] [1]Agriculture and Agri-Food Canada Buckwheat (*Fagopyrum esculentum* Moench) is a short-duration high-biomass cover crop often grown in potato (*Solanum tuberosum*) rotations to provide select agroecosystem services. However, buckwheat's short generation time challenges its continued viability as a cover crop as seed is rapidly produced, resulting in volunteer issues in subsequent crops with limited control options. Field studies were conducted in Atlantic Canada over two seasons to model buckwheat biomass production and viable seed yield as a function of planting and termination time with the goal of providing a framework to maximize biomass production while minimizing seed return, termed the critical period of cover crop management. The model demonstrated that maximum buckwheat total (979 g m^{-2}) and vegetative (565 g m^{-2}) biomass production could be attained when planted by 2 and 3 growing degree days base 5 (GDD_5) accumulation and grown for 1680 and 2110 GDD_5, respectively. Viable seed production rapidly increased with earlier planting dates and later termination dates up to a maximum of 3653 and 5974 seeds m^{-2}, respectively. Viable seed production could be minimized to 25% of the total if terminated by 696 GDD_5 or sown after 861 GDD_5 had accumulated. Values below this threshold could not be modeled in the termination study. Overall, our results provide a framework for producers to time cover crop planting and termination time to maximize the provision of agroecosystem services while minimizing the return of viable seed to their cropping systems.

5	**Tolerance of Winter Wheat to Fall, Spring, and Fall + Spring Applications of Clopyralid** Nader Soltani[1], Isabelle Aicklen[1], christy Shropshire[1], Peter Sikkema[1] [1]University of Guelph Ridgetown Campus Six field experiments were conducted over two years (2023 and 2024) near Exeter and Ridgetown, Ontario, to evaluate the effects of clopyralid (100, 200, and 400 g ai ha^{-1}) applied in the fall, spring, or sequentially (fall fb spring) on winter wheat injury, height, seed moisture content, and yield. No visible injury was observed at 1, 2, and 4 weeks after application with clopyralid applied in the fall, spring, or sequentially at the evaluated rates. Clopyralid applied in the fall at all rates caused no injury to winter wheat; in contrast, when applied in the spring clopyralid caused 3, 7, and 14% visible injury at 100, 200, and 400 g ai ha^{-1}, respectively. Sequential applications of clopyralid (fall fb spring) resulted in 4, 9, and 17% visible injury at the same respective rates. Clopyralid application at 100, 200, and 400 g ai ha^{-1} in the fall, spring, or sequentially had no significant effect on winter wheat height or seed moisture content. Clopyralid applied at 100, 200, and 400 g ai ha^{-1} in the fall did not affect winter wheat yield. Clopyralid applied at 100 and 200 g ai ha^{-1} in the spring had no impact on yield, but when applied at 400 g ai ha^{-1}, it reduced winter wheat yield by 19%. Sequential applications at 100 fb 100 and 200 fb 200 g ai ha^{-1} also had no significant effect on winter wheat yield, while the 400 fb 400 g ai ha^{-1} treatment reduced winter wheat yield by 17%. These results suggest that clopyralid applied in the fall caused no visible wheat injury and no decrease in wheat height or yield. Clopyralid, applied in the spring at 100 and 200 g ai ha^{-1} caused 3 and 7% visible wheat injury, respectively but no decrease in wheat height or yield.
6	**What are the Most Efficacious Herbicides Applied Postemergence for Control of Multiple-Herbicide-Resistant Canada Fleabane in Corn?** Nader Soltani[1], Isabelle Aicklen[1], Christian Willemse[1], Peter Sikkema[1] [1]University of Guelph Ridgetown Campus Multiple-herbicide-resistant (MHR) Canada fleabane [*Conyza canadensis* (L.) Cronq.] control has become a major concern for corn producers in Ontario. Postemergence (POST) herbicides are critical for the control of emerged MHR Canada fleabane in corn. A study that consisted of five field experiments was conducted in southwestern Ontario in fields with confirmed MHR Canada fleabane to evaluate various herbicide mixtures applied POST for the control of MHR Canada fleabane in corn. Glyphosate + 2,4-D amine, glyphosate/2,4-D choline, glyphosate + clopyralid, glyphosate + *S*-metolachlor/mesotrione/bicyclopyrone, glyphosate + tolpyralate + atrazine, glyphosate + dicamba, glyphosate + dicamba/atrazine, glyphosate + *S*-metolachlor/mesotrione/atrazine, glyphosate + mesotrione + atrazine, glyphosate + bromoxynil + atrazine, glyphosate + *S*-metolachlor/mesotrione/bicyclopyrone/atrazine, glyphosate/*S*-metolachlor/mesotrione + atrazine, glyphosate/dicamba + tembotrione, glyphosate + tembotrione + bromoxynil, glyphosate/dicamba + tembotrione + atrazine, and glyphosate + tembotrione + atrazine applied POST provided 63-99% control, 77-100% density reduction, and 88-100% shoot biomass reduction of MHR Canada fleabane in corn. MHR Canada fleabane interference reduced corn yield up to 58%; reduced MHR Canada fleabane interference with all herbicide treatments resulted in corn yield similar to the weed-free control. Results of this study indicate that among the herbicide mixtures evaluated glyphosate + mesotrione + atrazine, glyphosate + bromoxynil + atrazine, glyphosate + *S*-metolachlor/mesotrione/bicyclopyrone/atrazine, glyphosate/*S*-metolachlor/mesotrione + atrazine, glyphosate/dicamba + tembotrione, glyphosate + tembotrione + bromoxynil, glyphosate/dicamba + tembotrione + atrazine, and glyphosate + tembotrione + atrazine applied POST provided the most consistent control of MHR Canada fleabane in corn.

7 **Molecular Insights into Herbicide Resistance in Wild Oat: Toward Early Detection and Better Management**

Jacob Weedmark[1], Leonardo GalindoGonzalez[1], Noah Armstrong[1], Charles Geddes[2], Gillian Cloot[1]

[1]Canadian Food Inspection Agency, [2]Agriculture and Agri-Food Canada

Herbicide resistance in wild oat (Avena fatua) poses a significant challenge to agriculture in the prairie provinces of Canada, especially cereal crops like wheat and barley. Annual economic losses attributed to wild oats are estimated to reach as high as $500 million, representing the combined impact across all affected agricultural sectors in these regions. Currently, resistance is diagnosed through laboratory testing of farmer-submitted seeds, where dose-response curves are generated to determine resistance levels. This process can take up to six months, limiting the ability to implement timely in-season management. Our current research aims to develop molecular diagnostic tools for early detection of herbicide resistance in wild oat populations. Preliminary findings from dose-response experiments revealed that 10 wild oat populations, collected from Alberta, Saskatchewan, and Manitoba, exhibited different levels of resistance to various herbicides, including both group 1 and group 2 herbicides, which target the acetyl-coenzyme A carboxylase (ACCase) and the acetolactate synthase (ALS) genes. Dose-response data indicated that specific populations showed resistance primarily to group 1 herbicides, with notable resistance observed in populations exhibiting known mutations at positions 2088 (Cys to Arg) and 2078 (Asp to Gly) in the ACCase gene. Nanopore sequencing confirmed these mutations and provided allele-specific insights, revealing the allelic frequency of these mutations. The hexaploid nature of wild oats complicates herbicide resistance, emphasizing the necessity for advanced molecular diagnostics to manage this issue effectively. We are currently extending this analysis pipeline to examine resistance to group 2 herbicides to mutational analysis of the same populations at the ALS gene.

8 **Getting Out of the Weeds: Genomic tools for improving identification of noxious plant species**

Saanchi Singh[1], Gillian Cloot[1], Andree Ann Dupras[1], Irina Gymninova[2], Naana Duah[1, 3, 4], Leonardo Galindo-Gonzalez[1, 3]

[1]Molecular Identification Research Laboratory, Canadian Food Inspection Agency, [2]Nematology Diagnostics Laboratory, Canadian Food Inspection Agency, [3]Department of Biology, Carleton University, [4]School of Epidemiology and Public Health, University of Ottawa

Noxious weed seeds can affect our trade when mixed with commodity seed imports and exports, or our crops when they remain in the soil bank, thereby impacting agriculture. Identification of noxious plants is the most effective strategy to preventing their proliferation. However, due to the morphological similarities between noxious seeds, commodities, and closely related species, phenotypic identification is challenging and time intensive, when having to check thousands of seeds for a target contaminant. Here we discuss two alternative identification tools to increase accuracy and efficiency - DNA metabarcoding and DNA macro-barcoding. DNA metabarcoding allows for the identification of multiple taxa in parallel via high throughput sequencing. It relies on the amplification of short, standardized regions of the genome with enough variation to enable unambiguous species identification. Using jointed goatgrass to pilot our methodology we found that ITS2 and rbcL can distinguish this target weed from wheat and nine of its close relatives. The limit of detection of this technology is being tested by Illumina sequencing three dilutions in triplicate of wheat seeds spiked with jointed goatgrass. So far we have been able to detect one jointed goatgrass seed when mixed in 499 wheat seeds. DNA macro-barcoding on the other hand involves sequencing sizeable, medium sized barcodes (up to 10kb) that encompass multiple gene regions in one fragment with long-range sequencing technologies like Oxford Nanopore Technologies (ONT). We sequenced PCR amplicons (~5kb) belonging to eight Amaranthus species using ONT's MinIon. These sequences were validated with Illumina generated chloroplast assemblies. Sequence alignments showed 100% species resolution. Overall, our preliminary tests showed that macro-barcoding with ONT is another

effective identification tool despite the higher error rate in homopolymeric regions. We expect to apply these methodologies to other target weeds including wild mustard, wild oats, and cleavers for more robust testing.

9 **The effect of two Rye (Secale cereale L.) seeding rates for rolled mulch combined with three weed control techniques on weed management in organic Spaghetti Squash (Cucurbita pepo) production.**

Paulina Cholango Martinez[1], Élise Smedbol[1], Maxime Lefebvre[1], Laurence Jochems[1], Justin Ouellette[1]

[1]Institut de recherche et de développement en agroenvironnement (IRDA), Plateforme d'innovation en agriculture biologique, Saint-Bruno-de-Montarville, Québec, J3V 0G7, Canada

Rolled rye (*Secale cereale* L.) mulch is used for weed control in organic cucurbits in Quebec, but additional strategies are needed for season-long weed management. Indeed, as the rye mulch is degraded during the growing season, weed infestation occurs with no weeding options other than hand-weeding. In 2025, a field trial was conducted at IRDA's organic research farm at Saint-Bruno-de-Montarville, Quebec, to evaluate the combination of rolled rye mulch (170 and 300 kg/ha seeding rates) with three weed control methods: electrical weeding (Weed Zapper™), hot water (Houat 500), and a bioherbicide (Biolink®) in a split-plot experiment with four replicates. Rye (cv. Elias) was rolled in spring, spaghetti squash sown mid-June, then weeding treatment were performed. Weed abundance (before and after treatment), biomass, and yield were measured and analyzed using a linear mixed-effects model. Results suggest that seeding rate had minimal effect on weed abundance before weeding treatments were performed, but after application, its interaction with treatment had the strongest influence. Hot water and bioherbicide both reduced weed density. Bioherbicide was more effective at the high seeding rate (45%) than the low rate (32%), while hot water was more effective at the low rate (28%) than the high (9%). Weed biomass was mainly driven by treatment: hot water and bioherbicide reduced biomass under low and high seeding rates, more than electrical weeding. Rye biomass ranged from 5,600 to 6,339 kg/ha but was not significantly affected by any of the factors. Marketable yield was also treatment dependent. At high rye seeding rates, hot water (19,741 kg/ha) and bioherbicide (17,258 kg/ha) outperformed electrical weeding (8,836 kg/ha) and weedy control (7,717 kg/ha). These first-year results suggest hot water and bioherbicide are promising tools for weed suppression in organic rye mulch systems, with a second year of data needed to confirm these preliminary findings.

10 **A Mulligan on the Identity of Galium mollugo (Rubiaceae)**

Keagan Strober[1, 2], Sara L. Martin[1, 2], Tracey James[1], Elizabeth Sears[1]

[1]Researcher, [2]Co-Author

Galium is a diverse genus containing around 650 species. Nineteen of these are weeds, and several have evolved herbicide resistance. *Galium* identification is complicated by similar morphology and environmental variation. Smooth bedstraw (gaillet mollugine*, G. mollugo* L.) is a noxious weed in Ontario that grows quickly and competes with forage crops. Chromosome counts have indicated that smooth bedstraw is 2n = 22, and a sister species, white bedstraw (*Galium album* Mill.), is 2n = 44. However, the Martin lab has found that smooth bedstraw plants in the Ottawa region have two genome sizes: 1.5 and 3.0pg. This raises the question: Is smooth bedstraw in Ottawa one species with cytotype variation, or is a cryptic or newly introduced species present? We undertook an analysis of morphological and genetic differences among populations in the Ottawa area to differentiate these possibilities. Eleven sites with smooth bedstraw were surveyed in July 2025 to measure genome size, morphological characteristics, and take leaf tissue samples for genetic work. Genome size was determined using flow cytometry. A principal components analysis was used with morphological measurements to analyze the contribution of cytotype to measurement variation. DNA was extracted from individuals representing the two genome sizes so that chloroplast markers could be sequenced and compared with sequences downloaded from BOLD. Flow cytometry showed that one of the surveyed sites only had individuals of the smaller ploidy, two sites

had mixed ploidies, and the rest had individuals with the larger ploidy. While morphology varies by location, there was no clear morphological difference between ploidies. Currently, more sites with small ploidy must be surveyed to partition morphological variation between ploidies from environmental variation. In future research, morphological differences between *Galium* species should be clarified. A precise dichotomous key for *Galium* species in Ontario would aid further research into this noxious weed.

11 **Weed management alerts generated by A.I.**

Marie-Josée Simard[1], Etienne Lord[1], Robert E. Nurse[1], Martin Laforest[1], Shaun Sharpe[1]

[1]Agriculture and Agri-Food Canada

Although various crop pests can be monitored using meteorological data alone or in conjunction with spore or insect traps, methodologies currently applicable for weed surveillance remain limited. Low cost cameras could be used to follow the development of weed communities and trigger management alerts, allowing timely weed control. The objectives of this research were: 1. Monitor weed emergence and growth *in situ* using low-cost mini-cameras and computers, called "Weed sentinels"; 2. Use the images and expert knowledge to generate weed management alerts based on Artificial Intelligence (A.I.); 3. Evaluate the efficacy of the alerts in a vineyard. Weed sentinels were installed in different settings in 2023-2024. A subsample of the images generated was sent to four agronomist who have expertise in mechanical weed control. Agronomist were asked to recommend a management decision for each image based on four levels (no intervention, very shallow, shallow, or deep/heavy mechanical weeding). Vineyard plots were then weeded on the vine row (trellis) based on a) the decision of the farm crew (farmer-based), B) every two weeks or c) the weekly recommendation of the A.I. model. At the end of the season, the vine rows weeded using A.I. were weeded more frequently than farmer-based (×3) and bi-weekly (×1.3) treatments. The A.I. model never suggested not to weed. A.I.-based weeding was generally very shallow (70%). Shallow and heavy cultivations were rarely recommended (15% each). Grape yields were equivalent under all weeding treatments. In conclusion, the vine rows weeded using A.I. were shallowly weeded, had limited weed growth and expected grape yields. However, the model could be tailored to lower the number of operations. This research is a first step towards the automation of the timing of weeding operations.

12 **Prescription maps: A tool to control volunteer corn in soybean.**

Sandra Flores-Mejia[1], Laurence Durocher[2], Stéphanie Mathieu[3], Gabriel Verret[1], Josianne Caron[1], Dana Elramahi[1], Samar Ziadi[2], Victor Morin[2]

[1]CÉROM, [2]XLKEY, [3]Direction régionale de la Montérégie. Ministère de l'Agriculture, des Pêcheries et de l'Alimentation (MAPAQ).

Volunteer corn (*Zea mays* L., ZEAMX), especially those with herbicide-tolerant traits, present an increasing challenge for Quebec growers, particularly in soybean (*Glycine max*) production. Its presence can lead to yield reductions, grain contamination, and harvest delays. Moreover, the risk of GMO kernel contamination threatens the marketability of identity-preserved soybean crops.

This project aims to develop, test, and validate a precision spraying system guided by prescription maps generated from drone-based remote sensing of ZEAMX in soybean fields. In its first year, the project focused on: (a) developing an operational pipeline for generating prescription maps; (b) evaluating the accuracy and effectiveness of precision spraying for ZEAMX control compared to conventional broadcast spraying; and (c) identifying potential barriers to the adoption of this technology.

Currently, generating a prescription map from drone imagery takes 12 days. To accelerate this process, we are exploring deep-learning approaches such as YOLOv4.

To assess the precision and efficacy of spraying, we compared broadcast spraying (BS) and precision spraying (PS).

Each treatment covered half the sprayer's width (~15 m) and included three treated quadrats with ZEAMX. The PS treatment also included three untreated quadrats as controls. This design was replicated four times. Treated quadrats showed 91.6% accuracy for both BS and PS. However, most control quadrats were unintentionally sprayed (accuracy of 8.3%), suggesting issues with map alignment, GPS precision, or nozzle control timing. Herbicide application provided 85.9% control in BS and 90.5% in PS. The potential for herbicide reduction and its impact on profitability will also be discussed.

13 **Inventory of Quebec Weeds: Insights from the Centre-du-Québec region**

Gabriel Verret[1], Sandra Flores-Mejia[1], Josianne Caron[1], Amélie Picard[2], David Miville[2], Annie Marcoux[2], Bérenger Bourgeois[3], Yosra Menchari[3]

[1]CÉROM, [2]Laboratoire d'expertise et de diagnostic en phytoprotection (LEDP-MAPAQ), [3]Université Laval

Accurate knowledge of the presence, abundance and distribution of weeds is fundamental for understanding their dynamics and potential impacts on cropping systems. In Quebec, a weed inventory started in the Montérégie region (2021-2023) and is now underway in Centre-du-Québec (CDQ) to document weed distribution across major crop

A total of 243 fields distributed among 26 cultures were surveyed in CDQ. In total, 423 different weed species were identified. Field crops dominated the survey with 352 species, followed by forage crops (278) and horticultural crops (263). The top three crops with the highest weed diversity were soybean (283), meadows (261) and maize (249).

Weed data by crop and crop type were summarized using a relative abundance index (based on frequency, field uniformity and density). Among all crop types, the three most abundant weed species were hairy crabgrass (*Digitaria sanguinalis* L. Scop.; DIGSA) (24,0%), smooth crabgrass (*Digitaria ischaemum* (Schreb. Muhl.; DIGIS) (19,3%) and common dandelion (*Taraxacum officinale* F.H. Wiggers; TAROF) (15,6%). In horticultural crops, shaggy soldier (*Galinsoga quadriradiata* Ruiz & Pavon; GASCI) (26,3%), DIGIS (24,9%) and common lamb's-quarters (*Chenopodium album* L.; CHEAL) (17,8%) represented the top three species. The most abundant species in forage crops were DIGIS (27,2%), quackgrass (*Elymus repens* L. Gould; AGRRE) (18,5%) and annual bluegrass (*Poa annua* L; POAAN) (14,6%). In field crops, DIGIS (26,5%), DIGSA (24,7%) and annual ragweed (*Ambrosia artemisiifolia* L.; AMBEL) (18,9%) were the most abundant species.

Weed flora also varied across regions. A total of 522 weed species were recorded in Montérégie and CDQ: 266 (51%) were shared, 99 (19%) were unique to Montérégie and 157 (30%) to CDQ. Montérégie was more homogeneous, while CDQ had more unique species, reflecting distinct agroclimatic conditions and farming practices, such as cranberry production, typical of CDQ.

14 **Detection of common waterhemp (Amaranthus tuberculatus) using satellite images in soybean**

Nourhène Aloui[1], Sandra Flores-Mejia[2], Lokman Sboui[3]

[1]École Nationale des Sciences de l'Informatique, Université de la Manouba, [2]CÉROM, [3]École de technologie supérieure. Université du Québec.

Common waterhemp (*Amaranthus tuberculatus*, (Moquin-Tandon) J. D Sauer; AMATU) is a fast-spreading, herbicide-resistant weed that poses a major threat to soybean production across the United States and several Canadian provinces (Quebec, Ontario, and Manitoba). Its rapid expansion, competitive dominance and presence of multiple herbicide-resistance amplifies the importance of early detection and the implementation of management practices. Traditional field scouting, although effective at a small scale, is labor-intensive, costly, and difficult to implement across large agricultural areas. Regular ground-truth data collection is essential to understand infestation dynamics and provide reliable references for producers and researchers.

	In this study, we present an innovative biosurveillance approach to support large-scale monitoring of AMATU infestations in soybean fields. We first collected ground-truth data directly from soybean plots, recording the precise locations of AMATU infestations. These field observations were then used to guide the selection of high-resolution (0.5 m) Pleiades satellite imagery, ensuring that the images covered areas relevant for detection and analysis. The ground-truth data also served as essential reference points for training and validating the classification models. By computing key vegetation indices and analyzing spectral signatures, soybean and AMATU populations could be reliably distinguished under diverse field conditions. Artificial intelligence algorithms were applied to automatically classify infested areas and generate probability maps identifying low, moderate, and high-risk zones. Hotspots aligned with high-probability zones (p >0.6) in the predicted map with 81 % accuracy. Occasional false positives occurred primarily in bare soil areas and dense soybean canopies due to spectral signature overlap with AMATU. This approach demonstrates how integrating satellite technology and artificial intelligence can transform weed surveillance into a proactive and precise process. It offers a powerful, scalable, and cost-effective tool for precision agriculture, helping producers make informed management decisions while supporting sustainable farming practices and long-term crop health.
15	**Evaluation of a production-cycle management program for hair fescue in wild blueberry** Scott White[1] [1]Dalhousie University TBD
16	**Newly detected Palearctic weed-eating beetles in eastern Canada** Hume Douglas[1], Mikko Pentinsaari[1] [1]Agriculture and Agrifood Canada, Ottawa Research and Development Centre Canada is home to hundreds of species of introduced herbivorous Coleoptera, many of which feed on weeds. Our work has focused on documenting new arrivals of beetles through collaboration with amateur and professional entomologists and targeted collecting in eastern Canadian cities. This work has uncovered new North American records of mainly European beetles feeding on Asteraceae, Brassicaceae, Cannabaceae, Fabaceae, Lamiaceae, Polygonaceae and Solanaceae. These species feed on roots, leaves, and reproductive structures, sometimes in ways that might affect plant populations.
17	**Metagenomics: A More Effective Approach to Weed Seedbank Characterization?** Simon Boudreau-Pineault[1, 2], Bérenger Bourgeois[1], Élise Smedbol[2] [1]Université Laval, [2]Institut de recherche et de développement en agroenvironnement - IRDA Knowledge of the weeds present in the soil seedbank is essential to predict and target the species that threaten crop production. Two main methods are currently used to study seedbanks: the seedling emergence method, which consists of germinating soil samples under controlled greenhouse conditions, and the microscopic method, which relies on morphological identification of seeds extracted from soil samples. However, these approaches require a high level of taxonomic expertise, are time-consuming to implement, and present several methodological biases, notably due to the difficulty of reproducing field conditions and the risk of misidentification. The main goal of this study is to develop a metagenomic approach that enables a fast and reliable characterization of the weed seedbank from seeds extracted from soil samples. The approach will consist of extracting genomic DNA from a mixture of seeds separated from a soil sample by differential flotation, followed

by high-throughput sequencing. Sequencing data will be aligned to a custom genomic reference database built from publicly available genomes and low coverage sequencing reads generated for weed species lacking complete reference genomes. The developed method will be validated by comparison with traditional seedbank assessment techniques. In a first validation phase, mock samples combining soil and seeds from about ten weed species will be prepared and analyzed using the three methods, to compare the accuracy of the molecular approach in terms of species identification and quantification. A second validation phase will apply the three methods to soil samples collected from agricultural fields, to assess the robustness and field applicability of the metagenomic protocol, and to identify its potential limitations. This work will contribute to the advancement of knowledge in weed ecology and provide the methodological basis for a novel molecular tool designed to support evidence-based decision-making in integrated weed management, ultimately helping to reduce herbicide use in agroecosystems.

18 **Adventive weevils (Insecta: Coleoptera: Curculionoidea) of Canada and their association with weedy hosts**

Patrice Bouchard[1]

[1]Agriculture and Agri-Food Canada

Weevils, one of the most diverse group of beetles on the planet, are herbivorous insects that attack various parts of plants. Approximately 150 non-native weevil species, mostly from Europe, have become established in Canada since the early 1600s. While several species feed on a broad number of plant hosts, others a closely associated with one or a few hosts. A summary of the association of adventive weevils with their plant hosts, many of which are considered weeds in Canada, will be discussed.

19 **Machine Learning and Drone-Derived Vegetation Indices for Estimating Herbicide-Induced Crop Injury**

Matt Ball[1], Kris Guenette[2], Rory Degenhardt[2], Kevin Falk[2]

[1]University of Alberta, [2]Corteva Agriscience

Accurate estimation of crop injury from herbicide applications is critical for balancing effective weed control with crop safety. Traditional field ratings of phytotoxicity are labour-intensive and subjective, limiting reproducibility and scalability. To address these challenges, this study evaluates the use of vegetation indices derived from high-resolution RGB and multispectral drone imagery to estimate herbicide-induced crop injury. Vegetation indices proved especially effective at capturing symptoms of chlorosis and growth inhibition, showing strong agreement with manual ratings. Machine learning algorithms were compared with statistical modelling methods using a dataset of plot-level entries from 2025 Alberta herbicide trials, which encompassed multiple crops and herbicide modes of action. Machine learning consistently produced more accurate estimates, with root mean square error (RMSE) values between 9 and 12, whereas statistical approaches typically exceeded 20. Validation on independent trials confirmed that the machine learning framework generalises beyond the training dataset, although some reduction in accuracy was observed - underscoring the need to expand datasets across crops, environments, and herbicide modes of action. These results demonstrate the potential of machine learning to provide reliable estimations of herbicide-induced crop injury from vegetation indices, offering a scalable complement to subjective visual ratings and advancing data-driven approaches in weed science.

20 **Harvesting spring wheat : a scenario without pre-harvest glyphosate**

Shane Collins[1], Guillermo Hernandez Ramirez[1], Robert Gulden[2], William May[3], Zhenyi Li[4]

[1]University of Alberta, [2]University of Manitoba, [3]Agriculture and Agri-Food Canada, [4]Valent Canada

The group 9 herbicide glyphosate has frequently been used as a pre-harvest treatment in spring wheat (*Triticum aestivum L.)* to control weeds and facilitate crop desiccation. Due to growing concerns about glyphosate residues

	in food products and the rising number of glyphosate-resistant weed species, there has been an increased interest in alternative herbicides. A two-year field study in Alberta, Saskatchewan, and Manitoba evaluated 12 herbicides that could become potential pre-harvest alternatives to glyphosate. Herbicide applications were performed on spring wheat before harvest, when moisture content approached 30 percent, using CO_2-pressurized backpack sprayers. Herbicide effectiveness was assessed based on visual crop desiccation ratings, weed control ratings, wheat grain moisture content, and green cover analysis from overhead imagery. Results indicated that the group 10 herbicide glufosinate ammonium and several group 14 herbicides (saflufenacil, flumioxazin, trifludimoxazin + saflufenacil, and tiafenacil) provided effective desiccation and weed suppression. The degree of herbicide effectiveness, however, was influenced by both site and year. Given the increasing evidence linking glyphosate exposure to health risks and the global threat of weeds to food security, identifying effective pre-harvest alternatives is essential.
21	**Sticky Problems: What can the genome of false cleavers reveal?** Sara Martin[1], Tracey James[1], Elizabeth Sears[1], Shaun Sharpe[1], Breanne Tidemann[1] [1]Agriculture and Agriculture Canada *Galium spurium* is an aggressive weed that has risen in abundance to be among the top ten weeds for the Canadian Prairies. Here we assemble a chromosome scale draft of its' genome, laying the foundations for determining the genetic basis of auxinic herbicide resistance and for systematic research into its' polyphyletic genus. The genome assembly covers approximately 85% of *G. spurium*'s expected 360Mbp genome size with 94% of BUSCO genes complete and most single copy (89%). Approximately 37% genome is repetitive elements and 35,540 genes were annotated using RNA-Seq data. This included homologs for 46 genes involved or potentially involved in herbicide resistance. Double digested RADseq data for the 19 populations from the Canadian Prairies indicate that *G. spurium* has high levels of population structure (F_{ST} = 0.5). Variation in flowering time and seed weight largely overlapped among populations grown in the greenhouse and a redundancy analysis investigating a genotype-phenotype association showed the majority of highly loading SNPs were associated with mericarp hook density. Several genes of interest including CUL1, AXR1, and TMK are located in areas of the genome with evidence of selection and could be targets for further investigation into the genetic basis of auxinic herbicide resistance.
22	**Evaluating Drone-Based Remote Sensing to Quantify Soybean Canopy Development Dynamics and Weed Suppression Under Different Agronomic Practices** Matt Fallis[1], Kristen MacMillan[1], Dilshan Benaragama[1] [1]University of Manitoba Remote sensing (RS) can quantify the agronomic benefits of best management practices (BMPs) that are difficult to assess at the farm scale due to spatial and temporal variability. In soybean (*Glycine max*), early-season weed pressure reduces growth and yield, but tracking these effects is labour-intensive. We evaluated whether drone-based RS can detect soybean canopy responses to BMPs relevant to weed management. A factorial field experiment with four replicated blocks tested seeding rate (low - 80,000; standard - 160,000; high - 240,000 seeds ac^{-1}), row spacing (7.5, 15, and 22.5 inches), and weed status (weedy, weed-free). Weekly drone flights over 12 weeks acquired LiDAR point clouds and multispectral imagery. LiDAR provided canopy volume, 90th-percentile height, and ground cover, while multispectral data produced NDVI and NDRE mosaics. Under weed-free conditions, LiDAR features strongly differentiated cultural practices over time (R^2 = 0.795 for canopy volume, 0.72 for height, and 0.66 for ground cover). Higher seeding rates with narrower rows produced the fastest canopy development and consistently higher NDVI values, whereas the low seeding rate with 22.5-inch spacing showed the slowest closure and highest weed biomass in weedy plots. Initial findings indicate that LiDAR-derived

canopy structure proficiently monitors soybean responses to management; however, the correlations between weed-free canopy characteristics and weed pressure remain weak. Overall, drone-based LiDAR and multispectral data provide sensitive, temporally resolved indicators of soybean responses to seeding rate and row spacing; ongoing work will test whether specific canopy trajectories predict weed suppression in weedy plots and assess the utility of these RS metrics for operational BMP evaluation at the field scale.

23 **Icafolin-Methyl - a New Molecule in the Chemical Class (Isoxazolin-Carboxamides) from Bayer CropScience**

Angela Kazmierczak[1], Christopher Mansiere[1], Dr. Lothar Lorentz[1], Allan Kaastra[1]

[1]Bayer Cropscience

Icafolin-Methyl - a New Molecule in the Chemical Class (Isoxazolin-Carboxamides) from Bayer CropScience Angela Kazmierczak1, Christopher Mansiere1, Allan Kaastra1, Lothar Lorentz1

Icafolin-methyl is a unique molecule being developed by Bayer CropScience across a broad range of crops (soybean, cereals, pulses, oilseed crops, as well as pome and stone fruits, tree nuts, grapes, and citrus) for preemergent /preplant burndown of difficult to control grass and broadleaf weeds. Icafolin-methyl is classified as a group 23 herbicide in the new chemical class Isoxazolin-Carboxamides. Icafolin interrupts the assimilate transport from source to sink within the plant leading to a starvation of the sink tissue. It also inhibits the meristematic tissues which slowly dies off from either starvation and interrupted cell cycles. Icafolin-methyl will control all known resistant biotypes of proposed labeled weeds and will be used in an integrated weed managment strategy to protect other effective modes of actions and delay the onset of new resistant biotypes. Icafolin-methyl is currently under review and pending registration from the EPA and PMRA.

24 **Mapping and Managing Canada Thistle (Cirsium arvense) with Drone-Based Precision Tools**

Sasha Loewen[1], Dilshan Benaragama[1], Martin Entz[1]

[1]University of Manitoba

The weed Canada thistle (*Cirsium arvense*) is one of the pre-eminent challenges faced by organic farmers across the prairies. The plants' ability to regenerate and spread from deep perennial roots makes thistle management difficult. Management techniques, from cover crops to biocontrol offer only partial suppression, while repeated tillage - though effective - is highly damaging to soil health. New drone technology now enables rapid, high-resolution mapping of thistle patches, helping farmers visualise infestations, assess management efficacy, and anticipate future spread for preventative action. While drone technology is developing quickly, questions persist as to the timing and resolution of imagery to optimize thistle mapping. To understand these processes we collected drone flight imagery from research plots at the university of Manitoba, and from eight organic farmer's fields across southern Manitoba. The objectives of the project were 1) to ascertain best management practices for timing and resolution of drone images to detect thistle; 2) to test if thistles were found in particular topographic spaces on fields; and 3) to ask whether precision seeding rates can suppress thistle establishment. Early results highlight immense variability between crop species for best visualization of thistle, that the most predictive topographic variable for thistle placement is coarse-scale topographic position index (TPI), and that while increased seeding rates tend to reduce thistle biomass in fields, more testing in real field conditions is necessary moving forward. As drone technology continues to evolve, researchers must help develop strategies for building the technology into adaptive management strategies for effective use by farmers.

25 **Development of field horsetail (Equisetum arvense L.) management strategies in established cranberry**

Jichul Bae[1], Nathan Young[2], Madelaine Jorgensen[3], Jade Sherwood[4]

	[1]Agriculture and Agri-Food Canada, [2]Simon Fraser University, [3]University of British Columbia, [4]Ocean Spray Canada Field horsetail (*Equisetum arvense*) is the most problematic creeping perennial weed species in British Columbia (BC) cranberry production. This persistent weed species is seldom controlled by a single herbicide application because of its deeply buried and extensively branched rhizomes. From 2021 to present, this study aims to 1) identify effective and safe herbicide layering strategies to manage field horsetail in established cranberry fields in BC and 2) develop and implement a cost-effective electric weeding tool as a late post-emergent weed control alternative to wick-wiping of glyphosate. The present study demonstrates that dichlobenil applied at 3600 g ai ha^{-1} between late January and early February can be the key component of the herbicide layering strategy to manage field horsetail in established cranberry fields. Dichlobenil applied in winter can be directly absorbed by and/or translocated to field horsetail belowground organs such as rhizomes and tubers. The herbicide can disrupt accumulation of carbohydrate reserves in the storage organs and/or damage or kill the organs, therefore, limiting the plant's regenerative ability in the following spring. This study shows that the pre-emergent application of sulfentrazone at 140 g ai ha^{-1} is not necessary to manage field horsetail during the early season when the winter application of dichlobenil is included in the herbicide layering. However, early post-emergent herbicide application (i.e. mesotrione at 101 g ai ha^{-1} or rimsulfuron at 15 g ai ha^{-1}) in April is necessary to manage field horsetail plants that escape from the residual herbicide applied in the winter and emerge in early summer and thus maintain a season-long efficacy of the layering treatment. A portable electric weeder has been built to evaluate its efficacy on field horsetail since 2025 Summer. A new project will develop a mobile weeding robot platform tailored for field horsetail through the application of electrical shock.
26	**Carabid beetles as weed seed predators in Alberta cropping systems** Natalie LaForest[1], Boyd Mori[1] [1]University of Alberta
27	**Mechanisms of MCPA Resistance in Synthetic Auxin-Resistant Amaranthus powellii** Isabelle Aicklen[1], Mithila Jugulam[2], Todd Gaines[3], William Kramer[3], Martin Laforest[4], Darren Robinson[1], Peter Sikkema[1], Francois Tardif[1] [1]University of Guelph, [2]Texas A&M University, [3]Colorado State University, [4]Agriculture and Agri-Food Canada In 2021, a population of *Amaranthus powellii* (green pigweed) with suspected resistance to synthetic auxin herbicides (SAHs) was collected from a field site near Dresden, Ontario following the application of MCPA ester at 600 g a.e. ha^{-1}. Preliminary dose response experiments confirmed that the population of *A. powellii* had evolved resistance to several synthetic auxin herbicides (SAHs) including 2-methyl-4-chloro-phenoxyacetic acid (MCPA) with a resistance factor of 4.4. Based on these findings, studies were devised to characterize the mechanism of resistance to MCPA at the molecular level. Experiments to quantify absorption, translocation, and metabolism between resistant and susceptible *A. powellii* populations were conducted using ^{14}C-MCPA. An additional RNA sequencing study was conducted to identify differentially expressed genes (DEGs) between susceptible and resistant *A. powellii* populations. The results of the absorption, translocation, and metabolism studies indicated no differences between resistant and susceptible *A. powellii* populations at any timepoint over the 72-hour study. Major genes of interest in the gene expression analysis study were linked to a probable target site mutation. Further investigation indicated a single nucleotide polymorphism causing a leucine to phenylalanine substitution in the PB1 domain of auxin response factor 9 (ARF9). The results indicate that the mechanism of resistance is likely linked to a modification of a target gene in the auxin response pathway.
28	**High-Resolution Weed Density Mapping in Switchgrass (Panicum virgatum L.) using Deep Zoom-in Detection**

Akhil Meethal[1], Mohammed Niang[1], Marc-Olivier Gasser[1], Élise Smedbol[1]

[1]Institut de recherche et de développement en agroenvironnement (IRDA), Saint-Bruno-de-Montarville, Québec, Canada

Weed pressure mapping in large-scale farms is essential for planning optimal herbicide applications that minimize environmental impact and reduce costs. Unlike selective sampling methods used to assess weed pressure, high-resolution weed pressure mapping provides precise localization of weed distribution across the entire farm. Standard processing pipelines rely on vegetation indices or high-resolution whole images are often inefficient for precise localization. Mapping accuracy also varies significantly with changes in drone flight height. Processing entire images directly is often inefficient for accurately localizing weed plants, as their resolutions typically exceed 4K pixels. In this work, we designed an efficient processing pipeline that accurately detects weed pressure across a wide range of drone flight heights. Our approach processes images by extracting uniform patches from each image and performing detection on them. The resulting patch-level detections are then aggregated to generate full image-level detection. Finally, detections from all images collected during a flight session are mosaicked to produce a farm-level weed pressure map. We conducted empirical validation on strategically selected sites using data collected over two consecutive years. The high-resolution maps generated by our approach enable comparisons of weed pressure both across years and within a single growing season.

29 **Go Big or Go Home: Larger and More Sophisticated Predictive Models for Biodiversity Science and Biosurveillance**

Pedro Peres-Neto[1]

[1]Concordia University

Biodiversity science is undergoing a profound transformation. Explosive growth in data generation, from genomic surveys to global remote sensing, offers unprecedented opportunities to understand the patterns and processes shaping life's diversity. Yet this potential remains fragmented, with methods often specialized, developed for narrow contexts, and difficult to compare across studies. I will argue that the next era of biodiversity science and biosurveillance requires the development of larger, more sophisticated predictive models that combine broader streams of information to improve prediction. Such models can serve as flexible frameworks, integrating diverse data sources and bridging scales from local communities to global change. This new generation of models will strengthen our ability to anticipate species' responses to environmental shifts, identify emerging risks, and inform conservation and monitoring strategies. I will also emphasize the importance of building shared digital platforms and collaborative infrastructures, so that predictive frameworks are reproducible, comparable, and accessible worldwide. By investing in unified, scalable, and predictive approaches, we can accelerate the transition from isolated studies to a coherent, evidence-based science of biodiversity and biosurveillance, one capable of guiding decision-making and early detection in a rapidly changing world.

30 **Using Super-Resoluiton Sentinel 2 Images to Map Kochia**

Steven Shirtliffe[1]

[1]University of Saskatchewan

TBD

31 **Comparing the preciseness of weed scouting protocols using proximal and remote sensing (UAV) in field crops**

Élise Smedbol[1], Akhil Meethal[1], Zachary Bélisle[1], Mylène Généreux[1], Caroline Côté[1]

[1]Institut de recherche et de développement en agroenvironnement

Scouting for weeds is time-consuming and labor-intensive, however important since it will determine when to weed and how (type of herbicide or mechanical weeding tool). Using remote sensing with UAVs for weed scouting could reduce the time allocated for weed scouting on-farm. It could also provide a better understanding of weeds distribution within a field, thus allowing for site-specific weed management, or provide data regarding the efficiency of weeding interventions over one or several growing seasons. The objective of this work was to explore different weed scouting methods and compare their preciseness and feasibility. Weed scouting was performed in field crops in 2025. The weed abondance and coverage was measured *in-situ* in nine quadrats per field, and a cellphone picture was taken (proximal sensing). Simultaneously to field observations, a drone flight was performed using two different scouting patterns: 1) One drone image of the nine georeferenced quadrats was taken at a low altitude (15 meters), and a linear route with several sampling points was also performed at the same altitude. The images from the linear route were cropped and used to train different weed detection models (object detection or segmentation), that will be used for weed detection in the nine georeferenced quadrats. 2) A complete field mapping was also performed at a high-altitude (80 meters). The individual images were also cropped for weed detection then reassembled to create a full weed map. By comparing the outputs from the field and the drone scouting at two different resolutions (heights), it seems that the field observations are being more precise, providing an absolute weed density for example. However, this level of preciseness at a small scale (little area covered) might provide lesser relevant information's that would be useful at the field scale, in a farm management perspective.

32 **Droning On: Use of spray drones for range and pasture herbicide research**

Kris Guenette[1], Kevin Falk[1], Mark Johns[1], Markus Weber[2], Angela Fawcett[1]

[1]Corteva Agriscience, [2]Landview Drones

Despite growing interest in application of herbicides via remotely piloted aircraft systems (RPAS) in Canada, there is currently only one herbicide approved for this type of application by the pest management regulatory agency (PMRA), Garlon XRT. Thus, it is imperative that research be carried out to validate herbicide label expansion for drone application of new and existing products. Replicated small plot research was conducted at multiple sites in Western Canada in 2025 targeting pasture and rangeland weed species to compare traditional ground applications vs. RPAS applications. Inherent differences between ground and RPAS applications make field-based comparisons of herbicide efficacy nuanced, as there is currently no industry wide consensus on how best to perform these comparative studies. Factors defining field trial design include plot size, pest location, crop type and canopy structure, spray path direction, wind speed and angle, and environmental conditions that influence deposition. In addition, drone application settings such as application water volume, use of drift-reducing adjuvants, nozzle type and droplet size, altitude, tilt angle, spray swath width, velocity, acceleration/deceleration zones, number of passes per plot, and overlap strategy must be considered. Ultimately, best management practices used to achieve proper spray coverage via RPAS need to be established and employed when conducting herbicide research; however, these practices also need to be tempered by practical application logistics.

33 **Emergence dynamics of Common lamb's-quarters (Chenopodium album, L.) in a context of climate change in Montérégie, QC.**

Sanaz Zardari[1, 2], Sandra Flores-Mejia[2], Élise Smedbol[3], Ramata Magagi[4], Bérenger Bourgeois[1]

[1]Département de Phytologie, Faculté des Sciences de l'Agriculture et de l'Alimentation, Université Laval, 2425 rue de l'Agriculture, Québec, Québec, G1V 0A6, Canada, [2]Centre de recherche sur les grains (CEROM), [3]Institut de

recherche et de développement en agroenvironnement (IRDA), Saint-Bruno-de-Montarville, Québec, J3V 0G7, Canada, [4]Centre d'applications et de recherches en télédétection (CARTEL), Université de Sherbrooke, 2500 Boulevard de l'Université, Sherbrooke, Québec, J1K 2R1

ABSTRACT: Climate change increases the complexity of weed management by altering weed emergence timing, reducing herbicide effectiveness, and challenging current control strategies. One of the most economically damaging and widespread weeds in Quebec's maize production systems is common lamb's-quarters (*Chenopodium album* L., CHEAL). This weed is known for its aggressive growth, strong reproductive capacity, growing herbicide resistance, and tolerance to various environmental conditions which significantly reduce crop yields and raise control costs. This research aims to develop predictive emergence models to help farmers optimize control measures. It will compare the effectiveness of Thermal Time (TT) model, which accounts for soil heat accumulation, and Hydrothermal Time (HTT) model, which considers both soil temperature and moisture, to predict *C. album* emergence. Three principal objectives guide this work: 1) adapting and refining existing parametric models to predict *C. album* emergence based on in-situ soil sensors and soil characteristics, 2) evaluating the efficiency of a weather-based and a satellite-based approaches relative to in-situ sensors in improving the prediction of *C. album* emergence dynamics in maize fields across the Montérégie region, and 3) integrating these findings into a robust, multi-source model that incorporates different climate change scenarios. Preliminary findings indicate that soil texture significantly influences both the timing and intensity of *C. album* emergence, with peak emergence occurring from mid-May to mid-July in accordance with soil physical properties. By providing accurate, time-specific predictions of *C. album* emergence, this research will enable farmers to optimize herbicide applications with precision, enhancing control efficacy, reducing input costs, and supporting more sustainable, environmentally responsible weed management.

34 **Crushing it: Evaluating the Potato Vine Crusher in Field Trials**

Nicolle MacDonald[1], Andrew McKenzie-Gopsill[1]

[1]AAFC

Harvest weed seed control (HWSC) is a suite of tools and tactics that have been shown to be effective at reducing weed seedbank inputs by destroying or removing weed seeds at harvest. However, few studies have explored their use in non-cereal crops. Recently, researchers demonstrated that the Potato Vine Crusher (PVC) - originally designed to crush European corn borer larvae within potato vines - could also devitalize weed seeds at harvest under controlled conditions. However, it is not known how the PVC will function under field conditions or how processing affects seed viability over-winter. Field trials were conducted in Harrington, PE from 2023 to 2025 to determine the PVC's efficacy in reducing weed seed viability and if seeding a cover crop post-potato harvest may influence weed development. Seeds of five weed species were enclosed in fine mesh bags, processed with the PVC during harvest, and retrieved both post-harvest and the following spring for viability testing. Processing with the PVC reduced seed viability of all species, with decreases of 9-32% after harvest and up to 17% in the spring, depending on the species. Despite harvesting with the PVC having no impact on weed biomass, these results demonstrate its potential to destroy weed seeds during potato harvest and contribute to sustainable potato production.

35 **Beyond the Weeds: Field Scientists Powering the Future of Weed Management**

Byron Sleugh[1], Rory Degenhardt[1], David Simpson[1], Craig Alford[1], Norbert Satchivi[1], Kelly Backscheider[1], John Wiles[1], Andrew Leader[1]

[1]Corteva Agriscience

Field scientists are essential to the development and success of herbicides and other crop protection products.

	The journey from discovery to commercialization is complex, multifaceted, and demands expertise across multiple disciplines. Practical skills such as crop management and farm operation expertise must be combined with deep scientific knowledge and business insight. Field scientists bridge the gap between research and market adoption, ensuring new products are scientifically sound, economically viable, and aligned with strategic goals. Their unique integration of field skills, technical depth, and commercial understanding enables them to anticipate market trends, respond to evolving customer needs, and identify opportunities for innovation. In product development, they evaluate efficacy, safety, and environmental impact under real-world conditions. This is critical for making timely and informed decisions. This presentation will examine the pivotal role of field scientists throughout the crop protection product lifecycle. It will highlight academic requirements, core responsibilities, and real-world career profiles. Guidance will be offered on experiences that prepare candidates for success in this dynamic and rewarding profession.
36	**CRISPR-Cas12 fluorescent assays for accurate identification Amaranthus palmeri, Amaranthus watsonii and Amaranthus tuberculatus** Leonardo Galindo Gonzalez[1], Andrée Ann Dupras[1], Lubaina Kothari[2] [1]Canadian Food Inspection Agency, [2]University of Guelph *Amaranthus* species including palmer amaranth (*Amaranthus palmeri* S. Watson) and tall waterhemp (*Amaranthus tuberculatus* (Moq.) Sauer) are regulated as plants or/and seeds in North America, and their spread has resulted in major production losses in crops like corn, cotton and soybean. Their ability to outgrow crops, produce up to a million seeds per plant and generate multi-herbicide resistance results in additional costs through management. Increasing efficiency of early detection during trade and through other levels of the value chain (e.g., identifying the weed seed from soil samples), will reduce management costs and impact on production. We have standardized rapid fluorescent molecular tests based on CRISPR-Cas12 technology, to identify *A. palmeri, A. watsonii* (*A. palmeri's* sister species) and *A. tuberculatus,* using single seeds or any other plant tissue samples. The tests can be performed in an hour and without lab equipment once DNA has been extracted. Our tests were validated with 64 accessions comprising 17 *Amaranthus* species, and then our assays were used to identify 118 blind samples. Our first test that distinguishes *A. palmeri* + *A. watsonii* from other *Amaranthus* species was 100% accurate identifying palmer amaranth out of the blind samples. A second serial test to identify *A. watsonii* from samples identified either as *A. palmeri* or *A. watsonii,* was close to 90% accuracy, while our *A. tuberculatus* assay was also 100% accurate. No false positives were present with either tests, among a total of 15 species that were revealed after completing our assays. Since our assays were designed based on chloroplast sequences, we have implemented a bioinformatics pipeline to discover unique fixed alleles in the nuclear genome from accessions representing five *Amaranthus* species. We expect to use this information to generate nuclear-based CRISPR-Cas12 assay that reflect biparental inheritance to potentially detect hybrids.
37	**Autonomous robotic and Laser systems for weed control in carrots and beets** Ifesinachi Nelson Ezeh[1], James Watt[1], Kevin Vander Kooi[1], Geoff Farintosh[1], Mary McDonald[1] [1]University of Guelph Holland Marsh vegetable growers face herbicide-resistant weeds, labour shortages, and limited herbicide availability, especially in beets. Alternative weed control strategies are needed. Autonomous precision systems offer potential solutions by integrating robotics into cultivation and spraying. This study evaluated the Naïo Orio autonomous electric robot and the Pixelfarming Laser One-I prototype for weed control in carrots and table beets on muck and mineral soils in Ontario, during the 2024 and 2025 growing seasons. Field trials in a completely randomized design compared the Naïo Orio robot with conventional tractor-based operations for cultivation and

	herbicide application in 2024. Treatments were cultivation and herbicide application with both systems. Data were collected on weed density, biomass, canopy cover, operational efficiency, and yield. Weed pressure in table beets was higher in Orio-managed muck soils than in tractor plots, resulting in lower beet yields (24.9 t ha^{-1} vs. 40.7 t ha^{-1}). Carrot yields did not differ, with 54.3 t ha^{-1} in Orio plots and 47.6 t ha^{-1} in tractor plots on muck soil. Weed biomass was negatively correlated with beet yield in muck soil but not in mineral soil or carrots. The Orio applied herbicides in carrots on mineral soil, with low and non-significant canopy injury while travelling at different speeds and spray modes in 2025. By contrast, the Laser One-I prototype showed inconsistent performance, with frequent targeting errors, soil scorching, and crop injury. Findings highlight the potential of autonomous robots to deliver weed control comparable to tractors under moderate weed pressure. Although system refinements are required to improve reliability and efficiency. Laser-based system requires redesign for practical field use. Matching technologies to soil type, weed pressure, and crop is critical to advancing sustainable vegetable production.
38	**Towards perennialization - Weed species community composition and structure in annual, intermediate, and perennial farm fields in Manitoba** Salina Raila[1], Dauglas Cattani[1], Robert Gulden[1] [1]University of Manitoba With the goal of improving and adapting agricultural practices in response to climate change, the LEAP (Leveraging Ecosystems to Transform Agriculture on the Prairies) project was launched to investigate the path to lower greenhouse gas emissions by increasing the duration of plant cover and moving towards increased perennial plant production. Several studies are being conducted under this initiative, and our research focuses on understanding weed ecology along a continuum from annual to perennial production systems. The continuum was divided into three field types: annual crops, intermediate management systems where live plant ground cover was longer than in strict annual crops, and perennial crops with season-long live plant ground cover. In 2025, we evaluated mid-season weed community composition and structure in these fields. Principal component analysis results revealed distinct differences in weed community composition and structure among the three divergent crop types. Shannon-Weiner diversity was greater in intermediate fields compared with fields containing annual crops. Diversity in perennial fields was intermediate. Species richness and species evenness mirrored Shannon-Weiner diversity in significance and magnitude, indicating both contributed to diversity. Total weed density was different in each field type and on average ranging from 2.8 plants m^{-2} in annual cropped fields to 100.2 weeds m^{-2} in perennial fields with 15 weeds m^{-2} in intermediate fields. Future research will sample more fields and examine the links with insect groups and soil parameters in these crop types.
39	**Functional synergy and genomic linkage of glyphosate resistance traits in Canada fleabane** Eric Page[1], Sara Martin[1], Sydney Meloche[1], Alyssa Thibodeau[1], Martin Laforest[1] [1]Agriculture and Agri-Food Canada Glyphosate resistance in *Conyza canadensis* (Canada fleabane) has been primarily attributed to non-target-site resistance (NTSR) mechanisms such as vacuolar sequestration, though these have not been formally elucidated. While a target-site mutation at EPSPS2 (P106S) was recently identified, it failed to account for many resistant cases. These findings underscore the need to re-evaluate the genetic basis of glyphosate resistance in this species. Using an F_2 population derived from glyphosate-resistant and susceptible biotypes, we disentangled the individual and combined effects of target-site resistance (TSR) and non-target-site resistance (NTSR). Dose-response phenotyping and genotyping revealed that NTSR conferred broad protection across a wide range of glyphosate doses, while TSR provided a more limited, dose-dependent benefit. When both mechanisms were present, LD_{50}

values greatly exceeded additive expectations, indicating a synergistic interaction. QTL mapping identified a major-effect locus associated with NTSR on chromosome 4, with candidate genes linked to membrane transport and subcellular compartmentalization processes. Segregation distortion and recombination frequency estimates suggest moderate genetic linkage between TSR and NTSR loci, facilitating co-inheritance of resistance alleles.

This study provides the first explicit quantitative analysis of gene × gene interactions underlying herbicide resistance in *Conyza canadensis*. By disentangling TSR and NTSR, we show that single copies of the TSR and NTSR alleles confer approximately 9-fold and 7-fold glyphosate resistance, respectively. When combined, these mechanisms exhibit synergism, resulting in resistance levels that exceed additive LD_{50} expectations by more than 2-fold. Both TSR and NTSR loci have been mapped to chromosome 4, and moderate genomic linkage (~27% recombination) between them will likely contribute to the persistence and spread of high-level resistance, even under low selection pressure.

40 **Examining the Economic Impacts of Invasive Species in Canada**

Monica Liedtke[1]

[1]Invasive Species Centre

Invasive Species present an accelerating ecological and economic challenge across Canada's agricultural, forestry, and natural landscapes, with management and control efforts costing billions of dollars each year. This presentation introduces several priority invasive plant species and explores the economic dimensions of their spread, the challenges faced in management, and the opportunities for cost- effective prevention through early detection and rapid response. By linking ecological impacts with economic realities, the session aims to support informed management decisions and guide future research directions.

41 **Unravelling Non-Target-Site Resistance to ACCase Inhibitors in Wild Oat (Avena fatua)**

Eya Trabelsi[1], Martin Laforest[2], Reshma Patil[1], Andréa Duclos[1], David Miville[3], Yosra Menchari[1]

[1]Département de Phytologie, Faculté des Sciences de l'Agriculture et de l'Alimentation, Université Laval, QC, Canada, [2]Agriculture and Agri-Food Canada, Saint-Jean-sur-Richelieu, Québec, QC, Canada, [3]Laboratoire d'Expertise et de Diagnostic en Phytoprotection (LEDP) - MAPAQ, Québec, QC, Canada

Wild oats (*Avena fatua*) represent a major weed problem in Canadian cereal production. Resistance to herbicides from groups 1 (ACCase inhibitors) and 2 (ALS inhibitors) has been widely reported, significantly limiting management options. This study aims to elucidate non-target-site resistance (NTSR) mechanisms underlying resistance to ACCase-inhibiting herbicides (Group 1). Two wild oat populations (Pop. 54 and 55), each consisting of resistant (R) and susceptible (S) plants, were used. At the 2-3 leaf stage, plants were treated with fenoxaprop-p-ethyl at both the recommended and double field doses, and resistant plants were identified phenotypically 21 days post-treatment.

To characterize the non-target-site resistance (NTSR) mechanism, resistant plants did not contain any of the known ACCase mutant resistant alleles were used. Total RNA was extracted prior to mRNA sequencing. Transcriptome profiling was conducted using Illumina paired-end sequencing of 20 samples (10 resistant and 10 susceptible plants). Quality control was performed using FastP, followed by alignment to the *A. fatua* reference genome (International Weed Genomics Consortium) using HISAT2 and downstream processing with SAMtools and featureCounts. Mapping efficiency averaged ~96.5%, with ~80-90% of reads assigned to annotated genes.

Differential expression analysis using DESeq2 identified 223 significant DEGs in the resistant versus susceptible comparison across populations. Population-specific analyses revealed 416 DEGs in Pop. 54 and 584 in Pop. 55. GO

term distribution (WEGO) indicated that Pop. 54 exhibited strong enrichment in membrane transport, ribosomal, and translational processes, while Pop. 55 showed enrichment in nuclear, DNA-binding, and signal transduction functions. WGCNA identified key co-expression modules associated with resistance, highlighting networks of genes potentially involved in metabolic and regulatory pathways conferring herbicide tolerance.

Future work will focus on identifying and validating key genes and pathways emerging from DEG and WGCNA analyses using qRT-PCR, to enable the development of molecular markers for herbicide resistance detection and management in *A. fatua*.

42 **A drone and AI-based framework for post-wildfire invasive species spatial dynamics assessment**

Joyce Chan[1], Jennifer Grenz[1]

[1]university of british columbia

In our new climate reality of increasingly frequent and intense wildfires, invasive plants disrupt recovery of key ecological processes, overtaking native species return and contributing to fire-invasion feedback loops. Rote restoration practices such as labour-intensive foot-surveys are slow and miss important spatial dynamics, necessitating more efficient, site-specific management during critical recovery periods. Rapidly understanding how plants disseminate and establish on post-wildfire landscapes is key to better utilizing limited resources for recovery across vast, burned areas. Advancements in remote sensing and artificial intelligence (AI) provide important tools to hasten and improve land assessments, enabling broad, top-down observations of vegetation changes.

This project evaluates prominent AI models and drone-based LiDAR, RGB, and multispectral imagery in detecting invasive and culturally important plants in the McKay Creek Wildfire area. This ~46,000 ha wildfire burned in 2021, 11km north of Lillooet, British Columbia, severely impacting cultural food systems of the St'at'imc Nation communities of Ts'kw'aylaxw, Xwisten, and T'it'q'et-P'egp'ig'lha and the winter range of Mule Deer (*Odocoileus hemionus*). Under current government management, recovery is estimated to take 80+ years, underscoring the need to leverage rapidly advancing technology. Drone imagery was captured in June 2024 and 2025 during peak flowering of target species. We will test by-pixel classification, bounding box detection, and segmentation by training Random Forest, YOLO, and U-Net models on 4000+ ground-truthed observations of 19 species. Models will be cross-validated and compared to determine the most accurate method for each species. Results will determine the feasibility of using drone imagery and chosen models to detect important plants, providing insight into practical methods that can be employed by local land guardians in future wildfire recovery efforts. Future research will target a more complete list of important species in a variety of growth forms and environments, broadening the applicability of these methods to other wildfire scenarios.

43 **Investigating Competitive Ability of Wheat and Barley Varieties with Weed Communities in Western Canada**

Breanne Tidemann[1], Charles Geddes[2], Shaun Sharpe[3], Chris Willenborg[4]

[1]Agriculture and Agri-Food Canada Lacombe, [2]Agriculture and Agri-Food Canada Lethbridge, [3]Agriculture and Agri-Food Canada Saskatoon, [4]University of Saskatchewan

Herbicide-resistant weeds are increasingly problematic on the Canadian Prairies increasing the need for integrated weed management. Competitive varieties is a suggested management strategy that is theoretically sound but practically challenging due to limited availability of information. The objective of this study was to investigate competitiveness of spring wheat (*Triticum aestivum*) and barley (*Hordeum vulgare*) varieties to weed communities, and to a single species.

Field studies were conducted over three years (2022-2024) in Lacombe and Lethbridge, AB and two locations in

	Saskatoon, SK. The Alberta locations and one Saskatchewan locations utilized a regionally representative weed community while the second Saskatchewan location utilized only *Brassica napus*. Each variety was grown under weedy and weed-free conditions to evaluate their ability to compete and ability to withstand competition. Varieties were selected based on insured acres grown on the Prairies, and to proportionally represent wheat and barley classes. Thirteen barley varieties from three different classes were investigated, while sixteen wheat varieties from five different classes were investigated. Wheat and barley varieties can be ranked on their competitiveness, however rankings vary by year and environment. Class does not determine competitiveness. Weed community trials are likely more representative of actual varietal performance. There is potential to develop a ranking system to use varietal competitiveness as an integrated weed management strategy. Additional protocol development needs to account for confounding pests such as wheat stem sawfly. Finally, determining the relative effectiveness of varietal competitiveness as an IWM strategy to determine if it is worth industry investment is an important next step.
44	**Baseline Weed Survey Considerations for the Bridge to Land-Water-Sky Living Laboratory** Shaun Sharpe[1], Leonard Chester[1], Kyle Rosvold[1], Shaelyn St. Jacques[1] [1]Agriculture and Agri-Food Canada The Bridge to Land-Water-Sky is Canada's first Indigenous-led Living Laboratory. In 2024, a weed survey was conducted in four fields to evaluate the baseline weed community. Wild buckwheat [*Fallopia convolvulus* (L.) Á.Löve], lambsquarters (*Chenopodium album* L.), and shepherds purse [*Capsula bursa-pastoris* (L.) Medik.] were the most abundant weed species present in the cropped fields. The presence of provincially noxious asters including Canada thistle [*Cirsium arvense* (L.) Scopoli] were detected at low densities (≤0.01 No. m^{-2}) but are recommended scouting targets. Consultations between indigenous and colonial farmers with indigenous lands committees, elders, and knowledge keepers are advised to identify and protect culturally significant plants to indigenous communities which may be found in or around cropped fields.
45	**Diffusion-based Dataset Augmentation for Downstream Crop Segmentation** ALexander Senden[1], Masoomeh Gomroki[1], Robert Gulden[1], Christopher Henry[1] [1]University of Manitoba Semantic segmentation, the task of classifying each pixel in an image according to the object it represents, has become a common approach for automated weed detection. Implemented as a deep neural network, advances in semantic segmentation have led to substantial growth in model size and, consequently, in the required training data. Although unlabelled crop field images are plentiful, creating segmentation masks requires domain knowledge and a significant amount of human labour. We propose a generative approach to alleviate this data labelling bottleneck by training a diffusion model to act as a synthetic data generator, which can then be used to augment the training dataset. Our approach requires a small amount of labelled data to bootstrap the process. A Vision-Language Model paired with weak contextual information (such as the imaged crop) creates short captions for the raw training images. The image structure is automatically extracted from annotated images in the form of scribble annotations. This 4-tuple of image, caption, optional scribble annotation, and optional segmentation mask is used to train a modified version of the FLUX.1-dev image diffusion model. This model learns to incorporate a text caption and scribble-structure to generate realistic crop field imagery complete with segmentation masks.
46	**Functional Microbial Shifts and Soil Transfers as Tools for Post-Invasion Restoration** Vanessa Jones[1], Jennifer Grenz[1] [1]The University of British Columbia

The study of plant-soil interactions within the soil microbiome is an emerging area of research. Interactions among soil fungi, bacteria, and plants play key roles in nutrient cycling, plant health, and the resilience of natural and managed ecosystems. While most work in this field has been conducted in agricultural systems, the role of soil microbes in plant invasion dynamics and ecological restoration remains less understood. Building upon evidence that plant invasion can significantly alter both root and rhizosphere microbial communities, this study characterizes and compares the soil microbiomes of native and invasive plant species across multiple ecosystems.

Rhizosphere soil samples were collected in triplicate from 3 native and 1 invasive plant species and analyzed using 16S rRNA gene sequencing for bacteria and ITS2 sequencing for fungi on the QIIME2 bioinformatics platform. Microbial taxa were further grouped into functional groups using the Picrust2 pipeline: guilds of bacteria and fungi defined by ecological roles such as nutrient cycling, mutualistic symbiosis (e.g., arbuscular mycorrhizal fungi), or pathogenicity. We found significant differences in the relative abundance of microbial functional groups between native and invasive plants, suggesting that shifts in microbial function contribute to invasion success and influence post-eradication soil recovery.

In addition, soil transfer experiments, which involve the relocation of soil and its associated microbial community from healthy native sites to previously invaded areas, demonstrate promise in restoring microbial assemblages that benefit native species. These transfers show potential to mitigate or reduce legacy effects that persist after invasive species removal, improving native plant establishment and long-term restoration outcomes. Ultimately, these findings highlight the importance of understanding soil microbial functional dynamics to inform more effective, soil-based invasive plant management strategies.

47 CWRepViT-Net: An Encoder-Decoder Deep Learning Framework with RepViT Blocks for Crop Weed Semantic Segmentation in Soybean Fields through their Life Journey

Masoomeh Gomroki[1], Cristopher Henry[1], Nasem Badreldin[1], Dilshan Benaragama[1], Robert Gulden[1]

[1]University of Manitoba

With the world's population growing, demand for agricultural products is increasing. To meet this expanding need, it is critical to employ cutting-edge knowledge and technologies. Remote sensing data in conjunction with computer vision algorithms, plays an emerging and increasingly important role in precision weed management, which is essential for food security and safety. Drone images are one of the most accessible and efficient forms of remote sensing data that can be collected in field crop production. In this study, drone images were captured at six intervals during June and July 2024 (i.e., 21, 26, 33, 39, 45, and 52 days after seeding (DAS)) during soybean vegetative growth phases. By employing a Deep Learning (DL) network, we performed the crop vs. weed semantic segmentation on these captured images. The data set employed in this research was from a soybean experiment field that included five classes: soil, soybean crops, volunteer canola, other broadleaf weeds, and volunteer wheat plus other grassy weeds. The proposed semantic segmentation method is based on an encoder-decoder architecture, where the encoder path uses RepViT blocks, and the decoder path uses Modified UNet (MUNet) blocks. Since the network is trained to segment soybean crops, volunteer canola and other weed species, the proposed method is referred to Crop-Weed-RepViT-Net (CWRepViT-Net). This study outlines a five-step framework designed to segment crops and weeds in soybean fields using drone imagery. The steps consist of: (1) pre-processing image data, (2) training the segmentation network, (3) performing semantic segmentation of crop and weed classes, (4) evaluating model performance, and (5) applying the trained network to early-season soybean growth stages. The CWRepViT-Net model achieved an overall accuracy of over 95% and a Kappa coefficient of 0.91, indicating strong agreement between predicted and actual labels and confirming the method's effectiveness for early-stage crop and weed differentiation.

48 **Integrating Cultural and Chemical Strategies for Pea and Camelina Intercropping**

Shaun Sharpe[1], Kyle Rolsvold[1], Leonard Chester[1], Shaelyn St. Jacques[1], Michelle Hubbard[1], Lana Shaw[2], Christina Eynck[1]

[1]Agriculture and Agri-Food Canada, [2]South East Research Farm

Intercropping is a cultural weed management strategy to promote canopy closure and increase environmental resiliency by growing two crops together. Field pea (*Lathyrus oleraceus* Lam.) is a common pulse crop for Saskatchewan. Camelina [Camelina sativa (L.) Crantz] is an alternative oilseed. Experiments were conducted in the 2024 growing season at Saskatoon Research and Development Centre research farm in Saskatoon, SK. The first experiment evaluated seeding rates and use pre-emergent ethalfluralin while the second evaluated a stale seedbed technique, pre-emergent ethalfluralin, and intercropping. Ethalfluralin did not have any visual injury on camelina and field pea. Wild oat was the dominant weed species across both trials. In the stale seedbed study, July wild oat density was affected by a ethalfluralin and planting date interaction, where highest densities in the late planted, no ethalfluralin treatment (4 plants m^{-2}) compared to the use of ethalfluralin in both timings and the untreated early timing (0 to 1 plant m^{-2}). July wild oat density within the seeding rate study was reduced with ethalfluralin (19 to 1 plant m^{-2}). Wild oat biomass was reduced by ethalfuralin in the stale seedbed study (43 g m^{-2} to 5 g m^{-2}) and in the seeding rates study (198 to 25 g m^{-2}). Use of the herbicide increased camelina yields in the seeding rate study (656 to 1567 kg ha^{-1}) and in the stale seedbed study (778 to 1162 kg ha^{-1}). Intercropping reduced camelina yield from 1225 to 714 kg ha^{-1} in the stale seedbed study. Field pea yield was unaffected by treatments in the seeding rates study. Field pea yield was reduced by intercropping (2031 to 1048 kg ha^{-1}) but increased using an early planting date (1381 to 1698 kg ha^{-1}).

49 **Influence of Water Hardness and Ammonium Sulfate on Flazasulfuron and Glufosinate Efficacy on Hair Fescue (Festuca filiformis Pourr.)**

Marcos Lima[1], Scott White[1], Andrew McKenzie-Gopsill[2], Travis Esau[3]

[1]Department of Plant, Food, and Environmental Sciences, Faculty of Agriculture, Dalhousie University, Truro, Nova Scotia, Canada, [2]AAFC/AAC, Charlottetown Research and Development Centre, Charlottetown, PE, Canada, [3]Department of Engineering, Faculty of Agriculture, Dalhousie University, Truro, NS, Canada

Hair fescue (Festuca filiformis Pourr.) is one of the most frequent weeds on lowbush blueberry fields and currently has been controlled with post-emergence herbicides that may exhibit reduced efficacy in hard water due to interactions between divalent and trivalent cations with dissociated herbicide molecules. The objective of this experiment was to determine the effect of water hardness on flazasulfuron and glufosinate on hair fescue and to analyze the effect of ammonium sulfate on mitigating hard water antagonism. A factorial greenhouse experiment evaluated six water hardness levels (0-1000ppm) and presence of AMS. Hair fescue plants were treated with flazasulfuron, glufosinate and flazasulfuron + glufosinate in separated experiments, and SPAD, biomass, visual injury, leaf number and regrowth were assessed 49 days after treatment. Data were analyzed using linear or generalized linear mixed-effects models, with Dunnett-type comparisons to the untreated control. Across both experiments, AMS consistently enhanced herbicide performance. For the glufosinate + flazasulfuron mixture, AMS reduced SPAD and leaf value, corresponding to reductions of 2.5 and 2.9 units, respectively, and increased 25.6% of the visual injury 49 days after spraying. For glufosinate alone, AMS lowered SPAD, from 14.7 to 9.2 units and leaf number from 14.5 to 7.2, and reduced biomass. Biomass results for hair fescue sprayed at a hardness level of 1000ppm without AMS was not significantly different compared to the untreated control. Without AMS, visual injury was lower at 200 and 600 ppm, indicating antagonism at intermediate hardness levels. With AMS, injury demonstrated high control values (73-84%) across hardness levels. AMS enhanced herbicide efficacy and mitigated antagonism at intermediate hardness levels, maintaining consistent control, while water hardness alone

did not significantly affect hair fescue control.

50 **The Critical Weed Free Period in Canola**

Daniel Pouteau[1], Steve Shirtliffe[2], Breanne Tidemann[3], Charles Geddes[3], Robert Gulden[1]

[1]Univeristy of Manitoba, [2]Univeristy of Saskatchewan, [3]AAFC

Canola emergence and plant stand densities can vary considerably among environments and to maintain canola productivity and yield under those circumstances, effective and efficient weed management is critical. To facilitate effective and efficient weed management in canola, the critical weed free period (CWFP) was determined in 14 environments across western Canada over 4 years. The CWFP was determined at three target canola stand densities (30, 60 and 90 plants m^{-2}) in two herbicide systems (glufosinate (fast acting) and glyphosate (slow acting)) in 3x2 factorial design using natural weed populations. A canola variety resistant to both glufosinate and glyphosate was used in these experiments. A CWFP with an acceptable yield loss of 5% was observed at 11 of 14 environments where at least one treatment showed more than 5% yield loss. The CWFP ranged from the seedling stage to season-long, but ended between the seedling and 4-leaf stage in over two thirds of the cases. The detection and duration of the CWFP depended largely on the size of the natural weed population present in each experiment and at locations where the natural weed population was small, the CWFP could not always be modelled. In specific, in- crop herbicides were not required to limit yield loss to less than 5%. When significantly different, low canola stand densities lengthened the duration of the CWFP. The CWFP was longer in the glufosinate herbicide system than the glyphosate system in most cases when a difference between the herbicide systems was detected. Knowledge of the weed population and canola stand density are important for decisions on ideal herbicide timing for weed management in canola.

51 **The Laboratory of Expertise and Diagnostic in Plant Protection (LEDP), proud ally of bio-surveillance in Quebec!**

Annie Marcoux[1]

[1]LEDP-MAPAQ (QC)

LEDP, attached to the Phytoprotection Direction of MAPAQ, is a central player in the biosurveillance of crop pests in Quebec. Its mission is to support agricultural producers by identifying phytosanitary problems present on their farms and also by disseminating knowledge to promote integrated pest management (IPM), which aims to reduce pesticide use while protecting crops. By participating in the identification of pests, diseases, and weeds, in collaboration with its main partner, the Phytosanitary Warning Network (RAP), it enables regular monitoring and the issuing of phytosanitary warnings that will guide field interventions.

LEDP also contributes to the detection of invasive species, such as waterhemp (*Amaranthus tuberculatus*), a highly competitive weed that is resistant to several groups of herbicides. The laboratory's significant involvement, particularly through conducting herbicide resistance detection tests for affected producers, has contributed to the successful implementation of the five-year Phytosanitary Plan to combat waterhemp. By focusing on acquiring knowledge about this formidable species, detected on nearly 3,000 hectares, the laboratory has helped, together with the stakeholders involved, to limit its spread across the territory.

Finally, the LEDP develops innovative diagnostic tools, notably through CIMDEC, for rapid and reliable identification that supports informed decision-making; it collaborates on various research projects and ensures the transfer of its expertise through training, the drafting and publication of technical documents, and the enhancement of digital tools, such as IRIIS Phytoprotection and the online Herbarium, developed by the laboratory team. Through its actions, it actively supports the reduction of pesticides and has become an essential ally in bio-surveillance in Quebec, contributing to crop protection and the sustainability of Quebec agriculture.

52 **Invasive Plants in Forests and Rangelands**

Kristina Pauk[1]

[1]CFIA

The Canadian Food Inspection Agency's Invasive Plants Program aims to prevent or limit the introduction and spread of terrestrial plants that could threaten Canada's plant resource base. Invasive plants can invade forests and rangelands causing serious damage to our economy and environment. This presentation will provide an overview of the Program emphasizing the impact of these species on the natural, commercial, and urban environments. It will also highlight the importance of partnerships in the success of this program. The presentation will focus on several examples of regulated invasive plants that are currently impacting or have potential to impact forest and rangeland environments in Canada, namely: kudzu (*Pueraria montana*), Japanese stiltgrass (*Microstegium vimineum*) and yellow starthistle (*Centaurea solstitialis*).

53 **Valuing stakeholder perspectives: assessing alternative control methods for two regulated plant species**

Laura Brennan[1]

[1]Canadian Food Inspection Agency

When federally-regulated plant species are detected on private land, landowners are responsible for their control and must use CFIA-approved treatments. Two of Canada's federally-regulated plant species, jointed goatgrass (*Aegilops cylindrica*) and Japanese stiltgrass (*Microstegium vimineum*), have been detected in different areas of Canada, with jointed goatgrass in BC and Japanese stiltgrass in ON. Across the country, landowners are becoming more interested in alternative control treatments and some are requesting permission to use them when controlling regulated species, rather than relying on traditional herbicides. Upon landowner request for alternative treatments for jointed goatgrass and Japanese stiltgrass, the CFIA's Plant Health Risk Assessment Unit evaluated the potential efficacy of salt (sodium chloride) and vinegar (acetic acid). A caprylic and capric acid product was also evaluated for treatment of jointed goatgrass. Based on the available information, regular household vinegar (5% acetic acid) applied early in the growing season was expected to be a successful control treatment for jointed goatgrass and Japanese stiltgrass. Specifically for jointed goatgrass control in organic vineyards in BC, caprylic/capric acid products were also deemed likely to be effective. However, due to a lack of applicable scientific studies and considerable variation in salt tolerance across and within plant species, salt was not recommended as an alternative treatment for jointed goatgrass or Japanese stiltgrass. Based on our assessment, interested landowners can now use vinegar to treat either species and caprylic/capric acid products for jointed goatgrass.

54 **In vitro assays for glyphosate resistance detection in weeds**

Anne Marion[1], Andrea Duclos[1], David Miville[2], Martin Laforest[3], Yosra Menchari[1]

[1]Université Laval, Québec, Qc, [2]Laboratoire d'expertise et de diagnostic en phytoprotection (LEDP), MAPAQ, Québec, [3]Agriculture et Agroalimentaire Canada, Saint-Jean-Sur-Richelieu, Qc

The increasing number of herbicide resistance cases has become one of the major challenges in agriculture, posing a serious threat to crop productivity and food security. This growing issue leads to inefficient herbicide applications, resulting in avoidable economic losses and environmental impacts. In Quebec, resistance involving eight herbicide groups has been documented in 17 weed species, across over 881 populations tested from 2011 to

2024. Among those, seven species have developed resistance to glyphosate (group 9), one of the most widely used herbicides worldwide. Resistance confirmation usually relies on greenhouse bioassays, where herbicides are applied on whole plants. While these tests are reliable, they are both time- and space- consuming, limiting the number of populations that can be tested.

In response to the growing demand for resistance diagnosis, *in vitro* assays offer a promising alternative for rapid resistance detection. As part of the project, tests targeting group 9 herbicide were first developed for *Ambrosia artemisiifolia* and *Brassica rapa.* The discriminating concentration of glyphosate was determined by comparing known sensitive and resistant populations. Tests were conducted on agar-based media supplemented with a range of glyphosate concentrations, and plant survival was assessed after 14 days. To validate the *in vitro* results, classical greenhouse tests were performed in parallel, and statistical comparisons confirmed the reliability of the new method. While these initial developments focused on glyphosate, additional *in vitro* assays are currently being developed for other herbicides to expand the diagnostic toolkit. Ultimately, this project will contribute to the development of a rapid, reliable, and scalable resistance detection protocol, which will be transferred to laboratories conducting routine herbicide resistance testing.

55 **Import and release of biological control agents into Canada**

Erin LeClair[1]

[1]CFIA

Biological control agents are insects, mites, nematodes and other organisms used to control plant pests such as weeds or insects. Despite their potential benefits for managing pests, they present a risk to the environment because they themselves can become pests or carriers of pests. To prevent direct or indirect harm to plant health the Canadian Food Inspection Agency (CFIA) sets requirements that govern the import, handling and release in Canada of biological control organisms. This talk will provide a brief overview of how biological control agents are considered and how the CFIA regulates the import, handling and eventual release of these organisms.

56 **An Imazethapyr Resistant Biotype of Amaranthus powellii S Wats. Exhibits an Unusual Phenotype in Response to Thiencarbazone-methyl**

Malavika S. Nair[1], François J. Tardif[1]

[1]Department of Plant Agriculture, University of Guelph, Ontario, Canada N1G 2W1

Herbicide resistance in weeds represents a major challenge to sustainable agriculture, with acetolactate synthase (ALS)-inhibiting herbicides exhibiting the highest chances for resistance development among herbicide classes.ALS inhibitors primarily act by blocking the biosynthesis of the branched-chain amino acids (valine, leucine, and isoleucine), leading to growth inhibition and plant death. Resistance can arise via target-site mutations (TSR) in the ALS enzyme, which alter herbicide binding, or non-target-site resistance (NTSR) mechanisms, including enhanced metabolism, reduced uptake, or altered translocation. Common TSR mutations reported in weeds include substitutions at Ala_{122}, Pro_{197}, Ala_{205}, Asp_{376}, Trp_{574}, and Ser_{653}, which confer variable cross-resistance levels among different ALS-inhibitor chemical families.This study evaluated three *Amaranthus powellii* biotypes (R284, R297, and S511) from Ontario for their responses to field rates of imazethapyr (Pursuit, 75 g ai ha^{-1}) and thiencarbazone-methyl (Varro, 5 g ai ha^{-1}) at the 4-5 leaf stage, with biomass assessed 21 days after treatment (DAT). ALS gene sequencing was performed to identify TSR mutations, and biotypes exhibiting atypical regrowth were examined for potential NTSR mechanisms. ALS gene sequencing revealed that biotypes R284 and R297 carried ALS substitutions Ala122Thr and Ser653Asn/Thr, consistent with imazethapyr resistance, while S511 lacked these mutations and remained susceptible.Both R biotypes showed resistance to imazethapyr with 100% survival and

	biomass reduction relative to untreated of 44% for R284 and 34% for R297.Both R297 and R284 were resistant to Pursuit (34.0% vs. 43.9%) but highly sensitive to Varro (85.8% vs. 87.5%). Following Varro application, neither biotype showed regrowth at 21 DAT. However, at 28 DAT, R297 displayed unexpected regrowth from axillary meristematic tissues, restoring biomass near control levels, while R284 showed no recovery despite identical ALS mutations.These observations suggest the presence of an NTSR mechanism in R297, indicating that identical ALS mutations can result in distinct phenotypes, highlighting the complexity of cross-resistance to ALS inhibitors.
57	**Introducing Valtera Cereals** James Ferrier[1] [1]Nufarm Agriculture Inc Valtera Cereals is a new herbicide combination being launched for cereal growers in Canada. The active ingredients work uniquely together to provide both foliar and soil residual weed control. This talk will discuss the research behind the product and relevant information to weed scientists practicing in the field.
58	**Carabid beetles as weed seed predators in Alberta cropping systems** Natalie LaForest[1], Boyd Mori[1] [1]University of Alberta Ground beetles (Coleoptera: Carabidae) are a diverse group of beneficial insects that suppress crop pests and weed seeds, with their diversity and abundance influenced by ecological and agronomic factors. We investigated how crop type and distance to non-crop habitat affect ground beetle assemblages in central Alberta. Across all sites, assemblages were dominated by *Pterostichus melanarius*, followed by *Amara littoralis*, and *Pterostichus adstrictus*. Both *P. melanarius* and *P. adstrictus* are omnivorous ground beetles, and *A. littoralis* is a primarily granivorous species. Species co-occurrence analyses revealed negative correlations between *P. melanarius*, and *A. littoralis* and *P. adstrictus*. Wheat sites assemblages were more compositionally similar, while hemp assemblages were more variable between sites. These patterns highlight crop-type differences in ground beetle communities. They also raise questions about how the dominance of *P. melanarius*, being an omnivorous species, contributes to weed seedbank management. Understanding the role of *P. melanarius* and whether this non-native omnivorous species enhances or limits weed suppression is essential for integrating ground beetles into integrated weed management strategies on the Prairies.
59	**Impact of Farm Hedgerow Plant Community Structure on Susceptibility to Weed Colonization** Alexis Graves[1], Jennifer Grenz[1] [1]University of British Columbia While hedgerows are well known to provide many ecological benefits, the role of plant community structure in susceptibility to weed invasion is a little explored area of study. We investigated the role of plant community structure on susceptibility to invasion by noxious weeds. We examined 13 hedgerows bordering perennial and annual active crop fields at farms in the Lower Mainland, BC, Canada, concentrated in Delta and Surrey. At each site, percent cover was visually estimated for noxious weeds at three plots along a transect at both understory and canopy levels. These values were averaged to create one number for canopy and one for understory at each hedgerow. Hedgerow characteristics were divided into three categories: *canopy structure*, *crop*, and *plant characteristics*. We ran univariable generalized linear models for every variable in each of these categories; from this we created bivariable models with the strongest predictors from each category separately for canopy and understory. We found that the most important predictors of canopy noxious weeds in univariable models were light transmittance in hedgerow centre within the *canopy structure* category and planted status in *plant*

	characteristics category (i.e., whether the hedgerow was intentionally planted or arose spontaneously). Light transmittance and planted status were found to be correlated with planted status significantly predicting light transmittance. The *crop* category had no significant variable. The single most important predictor of understory noxious weeds was hedgerow width. Invasive species have many adverse effects within their environments and require substantial resources for their control each year. We hope that understanding the impact of hedgerow plant community structure will inform hedgerow establishment and management practices to discourage noxious weeds.
60	**Towards a Universal Weed Management Threshold: A Remote Sensing Yield-Loss Model for Canola (Brassica napus L.)** Kosar Eivani[1], Robert Gulden[1], Nasem Badreldin[2], Dilshan Benaragama[1] [1]Department of Plant Science, Faculty of Agricultural and Food Sciences, University of Manitoba, 66 Dafoe Road, Winnipeg, MB, R3T 2N2, Canada, [2]Department of Soil Science, Faculty of Agricultural and Food Sciences, University of Manitoba, 66 Dafoe Road, Winnipeg, MB, R3T 2N2, Canada Advancements in remote sensing technology that capture functional traits may enable rapid and large-scale quantification of crop-weed interference. We carried out field experiments in 2023 and 2024 at the University of Manitoba with canola to develop a yield loss model based on UAV remotely sensed crop and weed features. Weed competition was manipulated by seeding two pseudo weed species, soybean and wheat, representing a broadleaf and grassy weed, respectively, at seven seeding densities. Weekly drone flights were conducted, utilizing a multispectral sensor, with simultaneous ground-truth data collection including crop emergence counts, biomass, and yield measurements. Orthomosaiced images were segmented to crop and weed pixels using deep learning neural networks, and spectral and pixel information was extracted from them. A non-linear sigmoidal (three-parameter logistic model) was fitted to the RS and ground truth dataset in canola four-leaf stage. A strong relationship was observed between total weed pixels and weed densities for both broadleaf and grassy weed types in the years 2023 (R^2 = 0.80 and R^2 = 0.90) and 2024 (R^2 = 0.93 and R^2 = 0.98), respectively. Weed biomass also showed a high correlation with total weed pixels of broadleaf and grassy weed types for both 2023 (R^2 = 0.83 and R^2 = 0.81) and 2024 (R^2 = 0.94 and R^2 = 0.95), respectively. In addition, the percentage yield loss was explained by the total number of weed pixels and weed ground cover (a proportion of the total pixels), with R^2 values of 0.71 and 0.94 for broadleaf and grassy weeds in 2023 and 0.71 and 0.82 in 2024, respectively. Further exploration of the various vegetation indices and other ground parameters is underway. Initial results support the idea that remote-sensed features can capture crop-weed competition intensity, thus can be used to develop new decision-making tools for farmers for weed control.
62	**Genetic assays reveal distribution of PPO inhibitor (Group 14)-resistant kochia (Bassia scoparia)** Charles Geddes[1], Gaganpreet Dhariwal[1], Laura Kennedy[1], Kim Brown[2], Shaun Sharpe[3], Julia Leeson[3] [1]Agriculture and Agri-Food Canada, Lethbridge, AB, CA, [2]Manitoba Agriculture, Carman, MB, CA, [3]Agriculture and Agri-Food Canada, Saskatoon, SK, CA Kochia [*Bassia scoparia* (L.) A.J. Scott] is a problematic tumbleweed known for its competitiveness, abiotic stress tolerance, and ability to cause substantial crop yield losses. It has evolved resistance to five herbicide sites-of-action, including: auxin mimics (Group 4), and inhibitors of acetolactate synthase (Group 2), photosystem II (Group 5), 5-enolpyruvylshikimate-3-phosphate synthase (Group 9), and protoporphyrinogen oxidase (PPO; Group 14). Multiple resistance in kochia severely limits chemical control options. PPO inhibitor-resistant kochia was first confirmed in west-central Saskatchewan (2021), followed by North Dakota (2022), Alberta (2023), South Dakota (2023), and Montana (2025). As of 2023, only two Canadian fields had confirmed PPO inhibitor-resistant kochia.

	This study aimed to assess the distribution and frequency of PPO inhibitor-resistant kochia across the Canadian Prairies using genetic assays. Collaboration with BASF identified novel PPO1 mutations (F454V/I/L) conferring PPO inhibitor resistance in kochia. rhAmp assays were designed for single nucleotide polymorphism genotyping to detect these mutations using DNA extracted from kochia leaf tissue. Assays were validated using samples from a randomized-stratified survey of 205 fields in Saskatchewan in 2024 and grower/agronomist-submitted samples from 82 fields across the Canadian Prairies in 2025. In 2024, PPO inhibitor-resistant kochia was found in 63/279 samples (23%), representing 57/205 fields (28%) surveyed in Saskatchewan. Most resistant samples showed low resistance frequency (<20% plant survival) following saflufenacil treatment, indicating early resistance selection. About one-quarter showed moderate/high resistance (≥20% plant survival), likely resulting in visible herbicide failure. In 2025, PPO inhibitor-resistant kochia was found in 150/812 plants (18%) representing 23/82 fields (28%). Of these, 101 had the F454I substitution, 45 had F454V, 3 had F454I/V, and 1 had F454L. These findings suggest rapid evolution and/or spread of PPO inhibitor-resistant kochia across all three prairie provinces. With increasing resistance and limited chemical options, farmers urgently need alternative strategies, including greater reliance on non-chemical practices.
65	**Evaluation of a production cycle management program for hair fescue (Festuca filiformis) in wild blueberry (Vaccinium angustifolium).** Scott White[1], Sergio Sani[1] [1]Dalhousie University Hair fescue is a competitive perennial grass that reduces wild blueberry yield. Hair fescue can be managed in the non-bearing year with pronamide, terbacil, or the recently registered herbicide flazasulfuron (most often applied in tank mixture with glufosinate for improved weed control). Bearing year hair fescue management was traditionally limited to pronamide, but the recent discovery of hair fescue suppression by clethodim provides a new alternative to pronamide for bearing year hair fescue management. Opportunity therefore exists to evaluate production-cycle management programs for hair fescue that may or may not include pronamide. The objective of this research was to determine the effect of these management programs on hair fescue tuft density, estimated seed production, biomass, and seed banks in wild blueberry. The experiment was a 5 X 3 factorial arrangement of non-bearing year management (none, terbacil, fall flazasulfuron + glufosinate, spring flazasulfuron + glufosinate, pronamide) and bearing year management (none, clethodim, pronamide), with data from one of three sites presented. Non-bearing year pronamide applications reduced all hair fescue response variables by >90%, with minimal benefit from bearing year herbicide applications. Terbacil reduced non-bearing year hair fescue response variables but required bearing year herbicide applications to maintain reductions in tuft density and seed production. Fall flazasulfuron + glufosinate applications were more effective than terbacil but also benefited from additional bearing year herbicide applications to maintain tuft density and seed production reductions. Non-bearing year terbacil or flazasulfuron + glufosinate applications used in conjunction with bearing year clethodim applications generally provided reductions in seed production similar to that of pronamide, suggesting growers can reduce reproduction and seed dispersal of hair fescue without pronamide. This will be important for growers during periods of low crop prices, but will also contribute to sustainable pronamide use for hair fescue management in wild blueberry.
66	**Introducing a Framework for a Collaborative Kochia Management Program in Pulses** Racquelle Peters[1], Steve Shirtliffe[1], Charles Geddes[2], Shaun Sharpe[3], Jessica Enns[4], Lewis Baarda[5] [1]Department of Plant Sciences, University of Saskatchewan, Saskatoon, SK, [2]Agriculture and Agri-Food Canada, Lethbridge Research and Development Centre, Lethbridge, AB, [3]Agriculture and Agri-Food Canada, Saskatoon Research and Development Centre, Saskatoon, SK, [4]Western Applied Research Corporation, Scott, SK, [5]Farming

Smarter, Lethbridge, AB

Kochia (*Bassia scoparia*) remains one of the most difficult weeds for Prairie growers to manage due to its ability to thrive in saline soils and its widespread herbicide resistance. To address this challenge, the Saskatchewan Pulse Growers, in partnership with the University of Saskatchewan, Agriculture and Agri-Food Canada, Farming Smarter, and the Western Applied Research Corporation, launched the *Framework for a Collaborative Kochia Management Program in Pulses*. This multi-year initiative brings together researchers, producers, and industry collaborators to coordinate applied research focused on kochia and other weed management in pulse crops. The framework integrates herbicide screening, saline-site systems trials, and mowing evaluations to develop practical, integrated strategies for pulse growers.

The program includes three main study areas. The first focuses on optimizing herbicide programs for lentil, including metribuzin-based premixes and combinations, to define rates that balance crop safety and kochia control. This work also incorporates metribuzin dose-response studies and resistance screening of Prairie kochia populations to guide herbicide selection and refine management strategies. The second examines how soil salinity affects herbicide performance and crop tolerance through trials comparing saline and non-saline areas, as well as a strip study that tracks kochia response across a natural salinity gradient. The third explores mowing as a management tool to reduce kochia seed production and seedbank persistence, with both field and on-farm demonstration sites planned.

Preliminary results from the 2025 herbicide screening trial show strong early-season control of kochia and several other weed species from fall-applied metribuzin co-packs. However, control declined as the season progressed, highlighting the need for layered, season-long programs. These findings are guiding the next phase of trials evaluating combinations of fall-applied and in-crop treatments to extend weed control through harvest. Ultimately, this framework is transforming collaborative research into on-farm solutions that strengthen weed management and sustain Prairie pulse production.

67 **Managing Kochia Seed Production by Using Alternative Wheat Seeding Systems**

Shamima Sultana[1], Dilshan Benaragama[1], Charles M. Geddes[2]

[1]Department of Plant Science, Faculty of Agricultural and Food Sciences, University of Manitoba, 66 Dafoe Road, Winnipeg, MB, R3T 2N2, Canada, [2]Agriculture and Agri- Food Canada, Lethbridge Research and Development Centre, Lethbridge, AB, Canada

Understanding weed phenology is important for controlling multiple herbicide-resistant weeds like kochia [*Brassia scoparia* (L.) A. J. Scott]. Weed seed production can be managed by understanding the critical period for weed seed control (CPWSC), which is the period of the growing season when weed control can minimize weed seed production by targeting weeds during phenological stages critical for seed development. Field experiments were conducted at two sites near Carman, MB and Lethbridge, AB in 2024 and 2025 to determine how alternative wheat seeding systems [winter wheat (WW), ultra-early spring wheat (UESW), typical spring wheat (TSW) and fallow] affect the kochia CPWSC. Each experiment included four wheat seeding systems with four replications and two component curves: CPWE (8 kochia planting dates) and CPSP (8 kochia harvest dates). Kochia emergence dates were recorded when ~50% of the kochia plants emerged. Kochia seed retention and shatter were estimated by harvesting seed from biomass samples and assessing viability, and using seed catch trays, respectively. Kochia total seed production was the sum of seed retention and shatter. The CPWSC (20% seed threshold) ranged from July 2 to September 8 (1107 to 2412 GDD), T base = 0°C) for fallow, July 5 to September 3 (1147 to 2337 GDD) for TSW, July 7 to September 13 (1198 to 2505 GDD) for UESW and May 6 to September 24 (258 to 2704 GDD) for WW. Fallow, having a shorter CPWSC, resulted in the greatest kochia seed production (maximum of 5,344,425 seeds m^{-2} at Carman in 2024) and WW with the longest management window (May-September) corresponded to the lowest overall seed production at the end of the growing season. This indicates that earlier-seeded systems,

	particularly WW, can suppress kochia seed production and return to the soil seedbank by extending the CPWSC management window.
68	**Assessing the impact of agronomic practices on crop growth dynamics and their influence on weed management using UAV Multispectral imagery** Shirmith Nirmal[1], Dilshan Benaragama[1], Rob Gulden[1] [1]Department of Plant Science, University of Manitoba Integrating cultural practices that enhance crop competitiveness is a key strategy for weed management in Western Canada; however, adoption remains limited due to spatial variability in crop growth and weed distribution. Developing remote sensing tools to evaluate crop growth and weed control under different integrated weed management (IWM) practices can support broader adoption. A split-plot experiment was conducted in Carman, Manitoba (2024) to assess UAV-based remote sensing for evaluating the effects of cultural IWM and nitrogen (N) management on wheat (Triticum aestivum L.) growth and weed control. Treatments included weed competition (weed-free, weedy), two N rates (50%, 100%), two seeding rates (200 and 400 plants m^{-2}), and two row spacings (15 and 30 cm). Tame oat (Avena sativa L.) and canola (Brassica napus L.) were sown in weedy plots to mimic weed competition. Weekly crop growth was monitored using multispectral UAV imagery, from which spectral and structural features were derived. N rates had no significant influence on spectral, structural, or ground-based parameters, including crop biomass, weed biomass, and grain yield. A high seeding rate combined with narrow row spacing enhanced early-season ground cover, though differences diminished later in the season. Remote sensing-derived ground cover was strongly correlated with crop biomass in weedy plots, particularly under high seeding rate and narrow spacing ($R^2 = 0.78$). Among spectral indices, the Modified Soil Adjusted Vegetation Index (MSAVI) most effectively differentiated treatments over time ($R^2 = 0.95$), with high seeding rate and narrow row spacing producing the greatest MSAVI values. Under weed competition, yield was affected only by seeding rate, with NDRE measured in week four explaining yield variation among treatments ($R^2 = 0.58$). Overall, UAV multispectral imagery effectively captured spectral and structural responses of wheat to agronomic practices, providing valuable insights into crop growth dynamics and yield responses under weed competition.
69	**Shifting directionality of EPSPS copy number variation inheritance in Amaranthus palmeri** Sarah Yakimowski[1] [1]Queen's University In this talk, I will focus on the evolutionary genetics of resistance to the herbicide glyphosate in Palmer Amaranth (*Amaranthus palmeri*). Glyphosate resistance is primarily conferred by copy number variation of the target gene *EPSPS*, with copy number ranging from a single copy up to >160 copies. Although at least one copy of *EPSPS* is chromosomal, copies also occur on extrachromosomal DNA, raising fundamental questions about the inheritance and stability of resistance gene copies: What is the relation between parent and offspring copy number, across the dynamic copy number range? And, are gene copies stable among tissue samples within individual plants? Copy number variation for the glyphosate resistance gene *EPSPS* was quantified using digital droplet PCR within individuals, and for parents and offspring of controlled crosses. This revealed a non-linear pattern of gene copy number inheritance and shifting directionality: parents with fewer gene copies yield offspring with similar or increased mean copy number, whereas offspring of high copy number parents have fewer copies than parents. Intra-individual variance in copy number increases with mean copy number. Overall, this suggests that declining transmission of *EPSPS* copies from parent to offspring could impose a limit on the evolution of increased copy number. This pattern of inheritance will be discussed in the context of the distribution of copy number variation within and among agricultural populations, toward the longer-term goal of understanding the evolutionary

	trajectory of gene copy number variation and resistance.
70	**Cheatgrass as a Post-Fire Colonizer: Patterns of Persistence and Spread After the McKay Creek Wildfire** Virginia Oeggerli[1], Jennifer Grenz[1] [1]The University of British Columbia Post-wildfire vegetation recovery in British Columbia's interior is influenced by burn severity, invasive species, and environmental gradients. This research examines early post-fire vegetation trajectories following the 2021 McKay Creek Wildfire (MCW) on St'át'imc Nation territory, with a focus on the establishment and spread of cheatgrass (*Bromus tectorum*), a highly transformative invasive annual grass. Vegetation recovery was assessed using percent cover data collected from fixed plots stratified by burn severity and monitored annually from 2023 to 2025 and analyzed using mixed-effects and correlation models to evaluate temporal changes and environmental relationships. Three years of vegetation monitoring across multiple burn severities and elevations reveal variable recovery trajectories among plots, with marked differences in bare ground persistence and cheatgrass colonization. Preliminary analyses indicate that cheatgrass presence has expanded across portions of the burn area, particularly where bare ground remained extensive in the initial post-fire years. Trends suggest that cheatgrass abundance increases in low-elevation and higher-severity plots, while low-severity sites remain largely resistant to invasion. Bare ground cover declined significantly between 2023 and 2025 across all burn severities, coinciding with gradual increases in cheatgrass cover, especially in moderate and high-severity plots. Early colonization appears linked to residual bare patches, consistent with invasion processes observed in other post-fire ecosystems. These findings highlight the potential for post-fire conditions, specifically high disturbance and slow ground cover recovery, to favor opportunistic annuals under certain environmental contexts. We look to inform strategies for supporting long-term recovery by identifying how vegetation trajectories affect native species regeneration and soil stabilization. This research contributes to understanding how novel fire regimes shape invasive species dynamics in British Columbia's interior and will inform Indigenous-led restoration approaches, including cultural burning and targeted invasive control, aimed at promoting ecological resilience, biodiversity, and food sovereignty within fire-affected landscapes.
71	**Characterizing root traits in 10 soybean cultivars** Joseph Zvomuya[1], Rob Gulden[1] [1]University of Manitoba Soybean [*Glycine max* (L.) Merr.] is an important oilseed legume crop that is not very competitive with weeds. In addition to competing for light, weeds compete with crops for space, water, and nutrients. Soybean cultivars have different root traits. Characterizing root traits in soybean may lead to a better understanding of belowground attributes that contribute to soybean competitiveness with weeds. While rooting depth has previously been studied and provided insights into soybean competitiveness with weeds, the contribution of other traits, such as total root length, primary root length, root volume, and root surface area, remains poorly understood. This study evaluated 10 soybean cultivars grown in pots in the growth room to the V3 stage, focusing on variations in root volume, total root length, and surface area. The cultivars exhibited large variations in rooting traits. Some cultivars had significantly larger total root length, root volume and root surface area, while others had the smallest root system. There was a 4-fold difference in total root length between the cultivar with the largest root system compared with the cultivar with the smallest root system. In our previous field study, cultivars which had greater rooting depth suffered less yield loss while those with reduced rooting depth suffered greater yield loss due to interference with weeds. Greater total root length, root volume, and surface area observed in this study were associated with improved weed competitiveness. The observed variation among cultivars indicates that a suite of

	soybean root traits are important determinants of the outcome of interference with weeds.
72	**Connecting Science and Action - Canada's National Invasive Species and Climate Change Network** Gabby Nichols[1] [1]Invasives Canada TBD
73	**Convintro® Corn 12 Herbicide: A New Residual Herbicide with a Novel Mode of Action for North America from Bayer.** Annemarie Van Wely & Kurtis Pilkington Bayer Crop Science Convintro® Corn 12 herbicide is a novel formulation that will be available commercially for the 2026 season for use on field and seed corn. It offers broad-spectrum residual weed control of both annual grass and broadleaf weeds. Convintro® Corn 12 is a premix of a new group 12 herbicide (diflufenican) and a group 27 (isoxaflutole) and co-packed with a group 15 (s-metolachlor). Diflufenican will be the first group 12 available for use in North America. Diflufenican is very effective on amaranthus species including herbicide resistant biotypes.

2025 CWSS-SCM Board of Directors

Board Position	Contact
President	Robert Nurse
Past President	Jeanette Gaultier
1st Vice-President	Andrew McKenzie-Gopsill
2nd Vice-President	Charles Geddes
Treasurer	Deanna Mclennan
Secretary	Sara Martin
Regulatory Representative	Wendy Asbil
Regulatory Representative	Michael Downs
Governance Director	Shaun Sharpe

Publications Director	Jichul Bae
Research Representative	Leonardo Galindo González
Crop Life Representative (East)	Meghan Dilliot
Crop Life Representative (West)	Tyler Gullen
Communication Director	Tasha Wright
Member-At-Large (East)	Martin Laforest
Member-At-Large (West)	Ethan Bertholey
Graduate Student Representative	Natalie Laforest
Local Arrangements Chair (2025 Gatineau)	Leonardo Galindo González Wendy Asbil Sara Martin