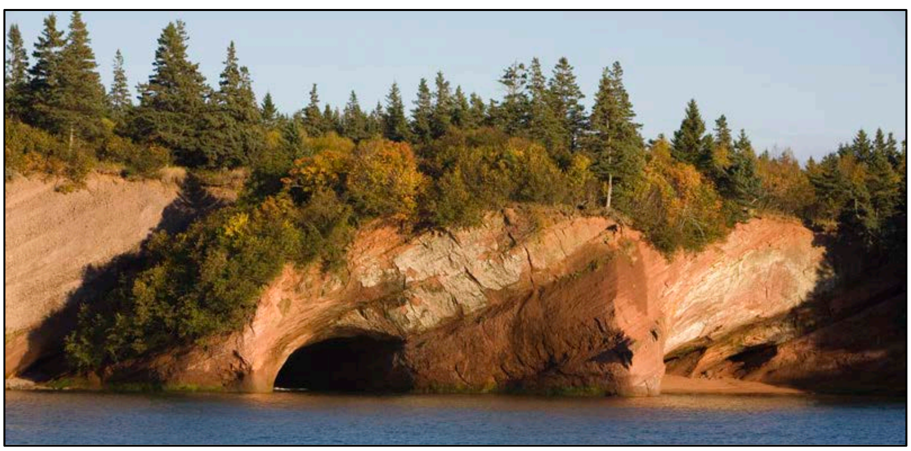
Canadian Weed Science Society
Société canadienne de malherbologie

70th Annual Meeting
November 21st to 24th, 2016

70e Réunion annuelle
21 au 24 novembre 2016



Delta Beauséjour
Moncton, New Brunswick

Thank you to our Platinum sponsors:

Canadian Science Publishing	MONSANTO
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Agricultural Institute of Canada (AIC)	Arysta LifeScience Corporation
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Thanks also go to our local sponsors:

Agricultural Alliance of NB, Bleuets NB Blueberries, Potatoes NB, Growing Forward 2, Vann Winn Woodcraft Inc

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2016 Local Arrangements Committee Members

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

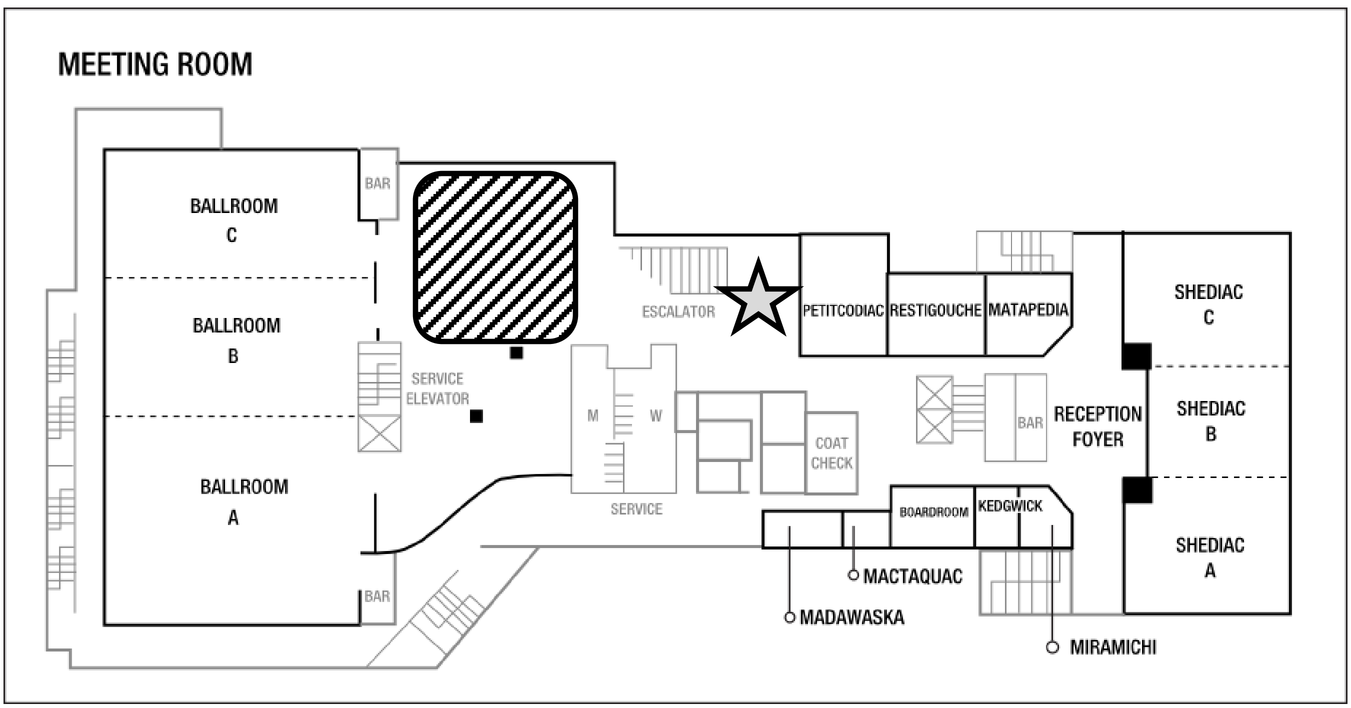
Position	Name	Affiliation
First Vice President (LAC Oversight)	Linda Hall	University of Alberta
Local Arrangements Chair	Gavin Graham	NBDAAF
Plenary Session	Andrew MacRae	Dow AgroSciences
Graduate Student Presentations	Scott White	Dalhousie Agriculture Campus
Photo Contest	Stephen Crozier	PMRA
Poster Session	Breanne Tidemann	University of Alberta
Continuing Education Workshop	Peter Burgess	Perennia
Sponsorship - Local	Kevin McCully	NBDAAF
A/V	Michel Melanson	NBDAAF
Media Coverage & Local Publicity	Rick Hoeg	NSDA
LAC Photography	Angela Hughes	NSDA
Local Arrangements Advisor	Jerry Ivany	Retired
Post-Conference Tour	Charles Comeau	NBDAAF
Registration	Anita Drabyk	CWSS
Program Committee Chair	Linda Hall	University of Alberta
Scholarships and Awards Banquet	Chris Willenborg	University of Saskatchewan
CWSS Executive Liaison and Treasurer	Frances Boddy	DuPont Pioneer
Sponsorship - National	Greg Wilson	Syngenta
Sponsorship - National	Joe McNulty	IPCO

PROGRAM CONCURRENT SECTION CHAIRS

Cereals, Oilseeds and Pulses Steve Shirtliffe University of Saskatchewan	**Soybean, Corn and Edible Beans** Allan Kaastra Bayer CropScience
Horticulture and Specialty Crops Darren Robinson University of Guelph – Guelph	**Weed Biology and Ecology / Invasive and Noxious Weeds** David Clements Trinity Western University
Provincial Reports / Regulatory Affairs Chris Neeser Alberta Agriculture and Forestry	**Forage, Rangeland, Forestry and Industrial Vegetative Management** **No Session in 2016**

DELTA BEAUSÉJOUR MEETING FLOOR PLAN

Meeting on the Second Floor (Convention – CON level on the elevators), top of the escalator



Key Areas

Registration Desk: Top of the Escalator on the Convention Level

Poster/Breaks: Mezzanine, outside Ballroom B/C

CWSS-SCM 2016 ANNUAL MEETING AGENDA

November 20, 2016

12:00 pm - 5:00 pm	CWSS-SCM Board Strategic Planning Meeting - Petitcodiac

November 21, 2016

9:00 am - 5:00 pm	CWSS Board Meeting - Petitcodiac
11:00 am - 8:00 pm	Registration – Mezzanine, at top of escalator
1:30 pm - 5:30 pm	Pre-Conference Event – ARM Training – Shediac A
4:00 pm - 8:00 pm	Exhibits and Poster Set Up – Mezzanine
5:00 pm - 6:00 pm	Grad Student Meet & Greet with Board – Ballroom B/C
5:00 pm - 8:00 pm	General Meet and Greet – Mezzanine (Cash Bar/Light Snack)
7:00 pm - 9:00 pm	President's Dinner – Off-site

November 22, 2016

7:00 am - 8:00 am	Light Breakfast – Mezzanine
7:00 am - 5:00 pm	Exhibits and Poster Set Up – Mezzanine
7:00 am - 5:00 pm	Registration – Mezzanine, at top of escalator
8:00 am - 8:10 am	Welcome and Introduction – Ballroom B/C – Gavin Graham / Andrew MacRae
8:10 am - 8:55 am	Herbicide performance - Why do herbicides cause crop injury? – Dr. Peter Sikkema
8:55 am - 9:40 am	When is the application method at fault? – Dr. Tom Wolf
9:40 am - 10:00 am	Case Studies
10:00 am - 10:30 am	Break – Mezzanine
10:30 am - 11:15 am	Influence of Soil Factors on Phytotoxicity and Persistence of Soil-Active Herbicides – Dr. Jeff Schoenau
11:15 am - 12:00 pm	The Challenge of Defining Pesticide Interactions: A Case Study from Peanuts– Dr. David Jordan
12:00 pm - 12:20 pm	Case Studies / Wrap-up
12:20 pm - 1:15 pm	Lunch – Ballroom A
1:15 pm - 3:15 pm	Grad Student Presentations – Ballroom B/C
3:15 pm - 3:45 pm	Break – Mezzanine
3:45 pm - 5:45 pm	Grad Student Presentations – Ballroom B/C
6:00 pm – 9:00 pm	Free night. Dine-arounds are planned with local hosts. Sign up at registration desk, meet at hotel lobby at 6:00.

November 23, 2016

6:45 am - 7:45 am	2016 and 2017 LAC Breakfast – Petitcodiac
7:00 am - 12:00 pm	Registration – Mezzanine, at top of escalator
8:00 am - 10:00 am	Poster Viewing – Authors Present and Breakfast Smoothies – Mezzanine
10:00 am - 11:30 am	CropLife Resistance Management Panel – Ballroom B/C
11:30 am - 1:00 pm	Lunch – Ballroom A (**Note:** Ballroom B/C split in afternoon)
1:00 pm - 3:00 pm	Concurrent Program 1B: Cereals, Oilseeds and Pulses – Ballroom B
1:00 pm - 3:00 pm	Concurrent Program 1C: Provincial and Regulatory Reports – Ballroom C
3:00 pm - 3:20 pm	Break - Mezzanine
3:20 pm - 5:00 pm	Concurrent Workshop B: Wild Blueberry Production – Ballroom B
3:20 pm - 5:00 pm	Concurrent Workshop C: Teaching Weed Science – Ballroom C
5:30 pm - 6:30 pm	CWSS Industry Reception: Welcome – Mezzanine
6:30 pm - 8:30 pm	CWSS Awards and Dinner – Ballroom A
8:30 pm - 10:00 pm	CWSS Industry Reception – Ballroom A / Mezzanine

November 24, 2016

7:00 am - 9:15 am	Breakfast and CWSS-SCM Annual General Meeting – Ballroom A
9:15 am - 9:30 am	Canadian Science Publishing (CSP) – CWSS-SCM Update – Ballroom A
9:30 am - 10:00 am	Hotel Check-out / Break – Mezzanine
10:00 am - 11:00 am	Concurrent Program 2A: Corn, Soybean and Edible Beans – Ballroom B
11:00 am - 12:00 pm	Concurrent Program 2B: Hort and Special Crops – Ballroom B
10:00 am - 12:00 pm	Concurrent Program 2C: Weed Biology, Ecology, Invasive Species – Ballroom C
12:30 pm - 4:30 pm	Board Lunch and Meeting - Petitcodiac
1:00 pm - 5:30 pm	Field Bus Tour: Meet in Lobby at 1:00 pm

November 25, 2016

8:30 am - 10:00 am	Application Technology Session – Ballroom C
10:00 am - 10:20 am	Break – Mezzanine
10:20 am - 12:00 pm	Application Technology Session – Ballroom C
12:00 pm - 1:00 pm	Lunch – Ballroom C
1:00 pm - 2:30 pm	Application Technology Session – Ballroom C
2:30 pm - 2:50 pm	Break – Mezzanine
2:50 pm - 4:30 pm	Application Technology Session – Ballroom C

CWSS-SCM 2016 DAILY MEETING AGENDAS

NOVEMBER 20, 2016 – SUNDAY		
Time	**Topic/Event**	**Room**
12:00 pm – 5:00 pm	CWSS-SCM Board Strategic Planning Meeting, Lunch in room	Petitcodiac

NOVEMBER 21, 2016 – MONDAY		
Time	**Topic/Event**	**Room**
9:00 am - 5:00 pm	CWSS Board Meeting, Lunch in Room	Petitcodiac
11:00 am - 8:00 pm	Registration	Mezzanine, Top of Escalator
1:30 pm - 5:30 pm	Pre-Conference Event – ARM Training	Shediac A
4:00 pm - 8:00 pm	Exhibits and Poster Set Up	Mezzanine
5:00 pm - 6:00 pm	Grad Student Meet & Greet with Board	Ballroom B/C
5:00 pm - 8:00 pm	General Meet and Greet – Cash Bar and Light Snacks	Mezzanine
7:00 pm - 9:00 pm	President's Dinner – Plenary Speakers	Off-site

Join the conversation: Use **#CWSS_SCM_2016** for Social Media discussions on the meeting.

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NOVEMBER 22, 2016 – TUESDAY

Time	Topic/Event	Room
7:00 am - 8:00 am	Light Breakfast	Mezzanine
7:00 am - 5:00 pm	Exhibits and Poster Set Up	Mezzanine
7:00 am - 5:00 pm	Registration	Mezzanine, Top of Escalator
8:00 am - 12:20 pm	Plenary Session: Forensic Weed Science	Ballroom B/C

PLENARY SESSION: FORENSIC WEED SCIENCE

Plenary Session - Agenda
Tuesday, November 22, 2016 (Ballroom B/C)

Time	Topic	Speaker	Affiliation
8:00 am - 8:10 am	Welcome and Introduction	Gavin Graham Andrew MacRae	NB DAAF Dow AgroSciences
8:10 am - 8:55 am	Herbicide performance - Why do herbicides cause crop injury?	Dr. Peter Sikkema	University of Guelph Ridgetown Campus
8:55 am - 9:40 am	When is the application method at fault?	Dr. Tom Wolf	AgriMetrix
9:40 am - 10:00 am	Case Studies	Peter Burgess Jeanette Gaultier	Perennia Manitoba Agriculture
10:00 am - 10:30 am	**Break**		In Mezzanine
10:30 am - 11:15 am	Influence of Soil Factors on Phytotoxicity and Persistence of Soil-Active Herbicides	Dr. Jeff Schoenau	University of Saskatchewan
11:15 am - 12:00 pm	The Challenge of Defining Pesticide Interactions: A Case Study from Peanuts	Dr. David Jordan	North Carolina State University
12:00 pm - 12:20 pm	Case Studies/ Wrap-up	Graham Collier Andrew MacRae	NuFarm Agriculture Dow AgroSciences
12:20 pm– 1:15 pm	**Lunch**		In Ballroom A

BIOGRAPHIES OF PLENARY SESSION SPEAKERS

Dr. Peter Sikkema

Peter Sikkema is a Professor in the Department of Plant Agriculture of the University of Guelph, Ridgetown Campus. He conducts research on weed management in corn, soybean, cereals and edible beans. Peter teaches Crop Diagnostics and Recommendations and Herbicide Physiology and Biochemistry. Prior to his employment at the University of Guelph, Peter worked for Rhone Poulenc Canada from 1986-1988 as Product Development Manager for Canada and for Union Carbide Agricultural Products Company from 1983-1986 as a Product Development Representative. Peter received his B.Sc. (Agr) in 1981 and M.Sc. (Weed Physiology) in 1983 from the University of Guelph. In 2002, Peter received his PhD from the University of Western Ontario in Plant Sciences. During his career, Peter has published more than 250 peer-reviewed manuscripts and was an author/co-author of more than 250 oral/poster presentations at scientific conferences. Peter has supervised 23 graduate students who have completed their studies. Peter has served on the boards of the Canadian Weed Science Society, the North Central Weed Science Society and the Weed Science Society of America. Peter and his wife, Angela, have three grown children. Peter and his wife reside in Ridgetown.

Dr. Tom Wolf

Tom Wolf grew up on a grain farm in southern Manitoba and has spent his whole life farming or working for farmers. He obtained his BSA (1987) and M.Sc. (1991, Plant Science) at the University of Manitoba, and his Ph.D. (1996, Agronomy) at the Ohio State University, where he specialized in spray application technology. He is a professional agrologist, a member of the American Society of Agricultural and Biological Engineers and a member and past president of the Canadian Weed Science Society. Tom’s expertise is spray drift, pesticide efficacy, and sprayer tank cleanout, and he has published and spoken extensively on these topics on Sprayers101.com as well as on national and international stages.

Dr. Jeff Schoenau

Dr. Jeff Schoenau is a professor of soil fertility and professional agrologist who works in the Department of Soil Science at the University of Saskatchewan. He holds the Saskatchewan Ministry of Agriculture Soil Nutrient Management Chair in the College of Agriculture and Bioresources, and is a fellow of the Agricultural Institute of Canada. He was born in Saskatchewan, raised on the family farm near Central Butte, and completed his undergraduate and graduate degrees in the College of Agriculture at the University of Saskatchewan. He continues to be involved in farming with his wife Lynne.

Dr. David Jordan

David directs statewide educational programs related to peanut production, integrated pest management, and weed management and coordinates projects and activities with the North Carolina Peanut Growers Association. He also conducts applied research in a range of subject matter areas related to peanut-based cropping systems. David also contributes to research efforts in the Department of Crop Science associated with weed management in agronomic crops. David has been involved in various leadership and service capacities with the American Peanut Research and Education Society, American Society of Agronomy, Conservation Tillage Systems Conference, Crop Protection Association of North Carolina, International Weed Science Society, North Carolina Pesticide Minor Use and Registration Committee, North Carolina Pesticide Advisory Committee, Rice Technical Working Group, Southern Weed Science Society, Virginia-Carolina Peanut Advisory Committee, Weed Science Society of America, and Weed Science Society of North Carolina.

November 22, 2016– Tuesday continued		
Time	**Topic/Event**	**Room**
1:15 pm - 3:15 pm	Grad Student Presentations	Ballroom B/C
3:15 pm - 3:45 pm	Break	Mezzanine
3:45 pm - 5:45 pm	Grad Student Presentations	Ballroom B/C
6:00 pm - 9:00 pm	Free Night. Dine arounds with local hosts available. Sign up at registration desk, meet in in hotel lobby at 6.	Off-site

Grad Student Presentations

#	Time	Grad Student Presentation Title	Speaker
1	1:15	Nicosulfuron as a suppressant in a living mulch of annual Ryegrass (*Lolium multiflorum* Lam.) in corn (*Zea mays* L.).	Taïga Cholette
2	1:30	Evaluation of Summer broadcast and Spot Herbicide Applications for Goldenrod Management in Wild Blueberry	Muhammad Hammad Farooq
3	1:45	Survey of herbicide resistance in common ragweed and wild oat in Quebec	Félix Marsan-Pelletier
4	2:00	Halosulfuron Interactions with Other Tomato (*Lycopersicon esculentum*) Herbicides	Jordan E. Eyamie
5	2:15	Evaluation of Fall Herbicide Applications for Red Sorrel (*Rumex acetosella* L.) Management in Wild Blueberry (*Vaccinium angustifolium* Ait.)	Rakesh K. Menapati
6	2:30	Distribution and Control of Glyphosate-resistant Waterhemp (*Amaranthus tuberculatus* var. *rudis*) in Soybean (*Glycine max*) in Ontario	Mike Schryver
7	2:45	Evaluation of foramsulfuron for postemergence perennial grass management in wild blueberry (*Vaccinium augustifolium* Ait)	Linshan Zhang
8	3:00	Flax (*Linum usitassisimum*) tolerance to PPO, HPPD, and VLCFA inhibitors	Moria Petruic
	3:15	Break	Mezzanine

#	Time	Grad Student Presentation Title	Speaker
9	3:45	Two-Pass Weed Management Strategies in Conventional and No-till Dicamba Resistant Soybean (*Glycine max* (L.) Merr.)	Matthew G. Underwood
10	4:00	The cost and control of linuron resistant pigweed in carrots	Tessa J. de Boer
11	4:15	Management of Giant Hogweed with Selective Herbicides	Meghan Grguric
12	4:30	Optimal Seeding Rates for Various Seed Size Classes of Faba bean (*Vicia faba)*	Jessica M. Pratchler
13	4:45	Foxtail barley (*Hordeum jubatum*) control requires residual herbicides	Mathew Vercaigne
14	5:00	Influencing seed fate in the soil seedbank: volunteer canola	Charles M. Geddes
15	5:15	The Effect of Mechanical Weed Control (Rotary Hoeing, Harrowing and Inter-row Cultivation) and Crop Seeding Rate on Yield and Weed Suppression in Organically Grown Pea and Lentil	Oleksandr Alba

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NOVEMBER 23, 2016 – WEDNESDAY

Time	Topic/Event	Room
6:45 am - 7:45 am	2016 and 2017 LAC Breakfast	Petitcodiac
7:00 am - 12:00 pm	Registration	Mezzanine
8:00 am - 10:00 am	Poster Viewing – Authors present Breakfast Smoothies	Mezzanine
10:00 am - 11:30 am	CropLife Canada Resistance Management Panel	Ballroom B/C

CROPLIFE RESISTANCE MANAGEMENT PANEL

How can industry and academia work together to better support resistance management on farm?

What we want to learn:

- Bridging the gap between science and delivery to farmers
- How can academia/industry better communicate resistance management information too farmers?

Time	Panel Topic	Speaker
10:00 am	Panel Introduction - Moderator	Lauren Benoit
10:10 am	Panelist #1: Academic Perspective	Thomas C. Mueller
10:25 am	Panelist #2: Industry Perspective	Paul Hoekstra
10:40 am	Panelist #3: Grower Perspective	
10:55 am	Discussion	
11:30 am - 1:00 pm	Lunch	Ballroom A

BIOGRAPHIES FOR CROPLIFE RESISTANCE MANAGEMENT PANELISTS

Moderator: Lauren Benoit

Analyst, Science and Regulatory Affairs, CropLife Canada

This past spring Lauren received her BSc. (Agriculture) degree from the University of Guelph and will be starting her MSc. Degree in Weed Science at the University of Guelph with Dr. Peter Sikkema in January. Lauren is currently the science and regulatory affairs intern at CropLife Canada. She has a background in crop protection research and has worked as a summer research associate for both E.I. DuPont Canada Inc. and BASF Canada Inc. in Thorndale, Ontario and Lethbridge, Alberta, respectively. Lauren was raised on a grain crop farm near Kirkton, Ontario, recently she has become more involved with both the farm and her families custom application business, Somerset Ag. Services.

Panelist #1: Thomas C. Mueller

Professor in the Department of Plant Sciences at the University of Tennessee

Thomas C. Mueller is a Professor in the Department of Plant Sciences at the University of Tennessee. He received his BS from the University of Illinois in Agronomy, his MS from the University of Kentucky in Crop Science, and his PhD from the University of Georgia in Crop Science. His primary research areas are environmental fate of pesticides (especially herbicides) in soils, water systems, and in the air (via drift), and the confirmation and subsequent control of herbicide-resistant weeds. He has published > 120 refereed articles in > 20 different journals. Dr. Mueller has served on an US-EPA Scientific Advisory Board, has served as an associate editor for Weed Science and Weed Technology, has served on the executive board for the Weed Science Society of America as Secretary, and was named a fellow of the WSSA in 2014.

Panelist #2: Paul Hoekstra

Stewardship and Policy Manager for Syngenta Canada Inc.

Dr. Paul Hoekstra is the Stewardship and Policy Manager for Syngenta Canada Inc., an agri-business committed to sustainable agriculture. With a strong background in regulatory affairs and a passion for science communication, Paul represents Syngenta on several committees including CropLife Canada's Resistance Management Working Group. Paul grew up on a farm in eastern Ontario and received his undergraduate (BSc. Hons) from the University of Waterloo and a PhD (Toxicology) from the University of Guelph with a post-doctoral appointment with the Environment Canada.

Panelist #3: Grower Perspective

Position

Biography

November 23, 2016 – Wednesday continued		
Time	**Topic/Event**	**Room**
11:30 am - 1:00 pm	Lunch	Ballroom A
1:00 pm - 3:00 pm	Cereals, Oilseeds and Pulses	Ballroom B
OR		
1:00 pm - 3:00 pm	Provincial and Regulatory Reports	Ballroom C
3:00 pm - 3:20 pm	Break	Mezzanine

Cereals, Oilseeds and Pulses			
#	**Time**	**Title**	**Speaker**
16	1:00	Pixxaro™ for Annual Broadleaf Weed Control in Eastern Canada Cereal Crops	Laura R. Smith
17	1:15	Cirpreme™ Control of Perennial and Hard-to-Kill Annual Weeds in Western Canadian Cereal Crops	Rory Degenhardt
18	1:30	Pyraflufen-ethyl: a new PPO inhibitor herbicide for pre-emergent broadleaf weed control prior to cereals, pulses and oilseeds in Canada	Graham R. Collier
19	1:45	Paradigm™ Plus Simplicity™ Efficacy on White Cockle and Night Flowering Catchfly in Western Canadian Cereals	Andrew W. MacRae
20	2:00	Targeting weed seed production and dispersal to manage herbicide resistant weeds	Lena D. Syrovy
21	2:15	Evaluation of Harvest-Aid Herbicides as Desiccants in Lentil Production	Eric N. Johnson
22	2:30	Pre- or post-emergence management of glyphosate-resistant canola in glyphosate-resistant soybean crops	Eric Tozzi

Provincial and Regulatory Reports			
#	**Time**	**Title**	**Speaker**
49	1:00	PMRA Update	Michael Downs
50	1:15	New Brunswick Update – ForestInfo Website	Gavin L. Graham
51	1:30	Alberta Update	Chris Neeser
52	1:45	CFIA Update	Wendy Asbil
53	2:00	Nova Scotia Update	Angela Hughes
54	2:15	Manitoba Update	Jeanette Gaultier
55	2:30	Ontario Update – Weed Apps and Poisonous Plants	Mike Cowbrough and Mackenzie A. Lespérance

November 23, 2016 – Wednesday continued		
Time	**Topic/Event**	**Room**
3:00 pm - 3:20 pm	Break	Mezzanine
3:20 pm - 5:00 pm	Wild Blueberry Production	Ballroom B
OR		
3:20 pm - 5:00 pm	Teaching Weed Science	Ballroom C

CONTINUING EDUCATION SESSIONS

Wild Blueberry Production			
#	**Time**	**Title**	**Speaker**
23	3:20	Wild blueberry production and the history of weed management	Peter Burgess, Perennia
24	3:45	Challenges and current weed research in wild blueberry	Scott White, Dalhousie Agriculture Campus; Gavin Graham, NBDAAF
25	4:10	Innovations and the future of herbicide application in wild blueberry	Travis Esau, Dalhousie Agriculture Campus

Teaching Weed Science			
#	**Time**	**Title**	**Speaker**
26	3:20	Case Studies in the Classroom	Peter Sikkema
27	3:40	Engaging Students in Research and Discovery in the Information Age	Eric Johnson and Steve Shirtliffe
28	4:05	Aspirations of Achievement - Do Demographic Factors Determine Who Succeeds in Your Classroom?	Chris Willenborg
29	4:25	Plant Community Assembly	Clarence Swanton
	4:40	My Best Three Minutes	All Welcome

CWSS-SCM Awards and Industry Reception

November 23, 2016 – Wednesday continued		
Time	**Topic/Event**	**Room**
5:30 pm - 6:30 pm	CWSS-SCM Industry Reception Welcome	Mezzanine
6:30 pm - 8:30 pm	CWSS-SCM Awards and Dinner	Ballroom A
8:30 pm - 10:30 pm	CWSS-SCM Industry Reception	Mezzanine

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November 24, 2016 – Thursday

Time	Topic/Event	Room
07:00 am - 12:00 pm	Exhibits & Poster Boards – **take down**	Mezzanine
7:00 am - 9:15 am	Breakfast and CWSS-SCM Annual General Meeting	Ballroom A
9:15 am – 9:30 am	Canadian Science Publishing (CSP) CWSS-SCM Update	Ballroom A
9:30 am - 10:00 am	Hotel Check Out / Break	Mezzanine
10:00 am - 11:00am	Corn, Soybean and Edible Beans	Ballroom B
11:00 am - 12:00 pm	Horticulture and Special Crops	Ballroom B
OR		
10:00 am - 12:00 pm	Weed Biology, Ecology and Invasive Species	Ballroom C
12:00 pm - 1:30 pm	Board Lunch	Petitcodiac
1:30 pm - 5:30 pm	Board Meeting	Petitcodiac

Soybean, Corn and Edible Beans

#	Time	Title	Speaker
30	10:00	Control of glyphosate resistant Canada fleabane in corn/soybean/wheat rotation	Peter H. Sikkema
31	10:15	The Fight Against Herbicide Resistance: Enlisting New Technologies to Facilitate the Adoption of Integrated Weed Management.	François J. Tardif
32	10:30	Management of Glyphosate Resistant Canada Fleabane and Common Ragweed with Arylex™ Active Plus Broadstrike RC Herbicides in Eastern Canada	Jamshid Ashigh

Horticulture and Special Crops

#	Time	Title	Speaker
33	11:00	Do cultivar and saflufenacil application timing influence development, growth response and yield of succulent pea?	Darren E. Robinson
34	11:15	Seed bank characteristics, seedling emergence, flowering biology, and susceptibility of hair fescue (*Festuca filiformis*) to herbicides in wild blueberry.	Scott N. White

Weed Biology and Ecology / Invasive and Noxious Weeds

#	Time	Title	Speaker
35	10:00	Community dynamics and management of invasive perennial grasses utilizing mowing and prevention of grazing in Garry oak meadows over 7 years	David R. Clements
36	10:15	Plant competition and the concept of an energy imbalance	Clarence Swanton
37	10:30	A chrono-geographical assessment of glyphosate resistance in Canadian populations of *Conyza canadensis* L	Eric R. Page
38	10:45	Suitability of Western Canadian Weeds for Harvest Weed Seed Control	Breanne D. Tidemann
39	11:00	A neighbour's light will stress you out	Andrew G. McKenzie-Gopsill

POSTERS

#	Title	Author (At Poster)
40	Residual Weed Population Shifts in Manitoba 1978-2016	Julia Y. Leeson
41	Soybean injury from dicamba and 2,4-D Tank contamination	Nader Soltani
42	Effect of time of day on efficacy of saflufenacil to control glyphosate resistant Canada fleabane in soybean	Nader Soltani
43	Evaluating the Critical Weed Free Period of *Glycine max* (L.) Grown in Narrow vs. Wide Row Spacing in Northern Climates	Jonathan D. Rosset
44	How much seed can uncontrolled Canada fleabane (*Conyza canadensis*) plants produce in spring wheat, corn and soybean?	Marie-Josee Simard
45	Acetyl-CoA carboxylase overexpression in herbicide resistant crabgrass (*Digitaria sanguinalis*)	Martin Laforest
46	When do Wild Oat Seeds Become Viable?	Breanne D. Tidemann
47	Chemical and physical management of wild parsnip: a community, extension, research partnership.	Mackenzie A. Lespérance
48	Weed Seeds Order, 2016 / L'Arrêté de 2016 sur les graines de mauvaises herbes	Anita Gilmer

ABSTRACTS

1	**NICOSULFURON AS A SUPPRESSANT IN A LIVING MULCH OF ANNUAL RYEGRASS (*LOLIUM MULTIFLORUM* LAM.) IN CORN (*ZEA MAYS* L.).** Taïga Cholette*[1], Darren E. Robinson[1], David C. Hooker[1], Peter H. Sikkema[2]; [1]University of Guelph-Ridgetown, Ridgetown, ON, [2]University of Guelph, Ridgetown, ON Living mulches are seeded at the same time, or after establishment, of a cash-generating crop to reduce nitrate leaching, sequester nutrients, reduce erosion, and improve soil health. However, a living mulch can compete with the main crop for limited resources resulting in reduced grain yield. It is hypothesized that using nicosulfuron at a fraction of its labeled rate could suppress an annual ryegrass living mulch thereby reducing competition between the living mulch and the corn crop. To investigate the hypothesis, annual ryegrass was seeded at the same time as corn at three sites in May 2016 near Ridgetown, ON. Nicosulfuron was applied at seven rates (0.8, 1.6, 3.1, 6.3, 12.5, 25 and 50 g ai ha^{-1}) at the 2-3 leaf stage or 4-5 leaf stage. Annual ryegrass control was assessed 7, 14, 28 and 56 days after application (DAA) and biomass was determined 28 DAA. Control of annual ryegrass at 28 DAA ranged from 8 to 94% as the rate of nicosulfuron increased from 0.8 to 50 g ai ha^{-1}, regardless of whether the herbicide was applied at either the 2-3 or 4-5 leaf stage. Nicosulfuron at 0.8, 1.6, 3.1, 6.3, 12.5, 25 and 50 g ai ha^{-1} applied at the 2-3 leaf stage reduced annual ryegrass biomass 30, 16, 31, 59, 79, 87 and 96%, respectively and 22, 49, 67, 76, 90, 97 and 98%, respectively when applied at the 4-5 leaf stage.
2	**EVALUATION OF SUMMER BROADCAST AND SPOT HERBICIDE APPLICATIONS FOR GOLDENROD MANAGEMENT IN WILD BLUEBERRY.** Muhammad Hammad Farooq*; Student, Truro, NS Goldenrods (*Solidago* spp.) are creeping herbaceous perennials that reproduce through seeds and underground rhizomes and are among the most problematic weed species in wild blueberry production. Current management plans do not provide complete control of goldenrods, therefore weeds remain a serious problem in wild blueberry cropping system. Research trials were therefore conducted in commercial wild blueberry fields at Debert and Portapique, NS in 2016 to evaluate summer broadcast and spot applied herbicides for goldenrod control. Broadcast experiments consisted of 1) an evaluation of sequential mesotrione applications, and 2) evaluation of bicyclopyrone. For the first experiment, mesotrione was applied at 30 cm shoot height followed by sequential mesotrione applications at 7, 14, 21, or 28 days after initial mesotrione application. In the second experiment, postemergence bicyclopyrone applications were compared to mesotrione. In the spot application trial, applications of glyphosate, dicamba, dicamba plus diflufenzopyr, triclopyr, glufosinate, foramsulfuron, mesotrione, clopyralid, tribenuron methyl, flazasulfuron, and bicyclopyrone were applied to goldenrod stems at the early floral bud stage. Preliminary results indicate that sequential mesotrione applications increased goldenrod control when compared to single applications if the sequential application was made 21 days after the initial application. Bicyclopyrone applied alone, or as a tank mixture with mesotrione, reduced goldenrod shoot density, and should be evaluated further for weed control in wild blueberry. Spot applications of glyphosate, mesotrione, flazasulfuron, and bicyclopyrone reduced goldenrod shoot density when compared to all other spot application treatments.

3

SURVEY OF HERBICIDE RESISTANCE IN COMMON RAGWEED AND WILD OAT IN QUEBEC. Félix Marsan-Pelletier*[1], Anne Vanasse[1], Marie-Josee Simard[2], Marie-Édith Cuerrier[3], Danielle Bernier[4]; [1]Université Laval, Québec, QC, [2]Agriculture and Agri-Food Canada, Saint-Jean-sur-Richelieu, QC, [3]Centre de recherche sur les grains (CÉROM), Saint-Mathieu-de-Beloeil, QC, [4]MAPAQ, Québec, QC

Herbicide resistant weeds are becoming increasingly common and widespread. These weeds threaten crop profitability, especially in crops where fewer herbicides are available. The objective of this project was to evaluate the occurrence of herbicide resistance to inhibitors of acetyl CoA carboxylase (ACCase, group 1) in wild oat (*Avena fatua L.)* and to inhibitors of acetolactate synthase (ALS, group 2) in common ragweed (*Ambrosia artemisiifolia L.*) in cereal and soybean production areas (Saguenay-Lac-Saint-Jean and Montérégie, respectively) in Quebec. In 2014 and 2015, seeds of wild oat in cereal fields and common ragweed in non-GMO soybean fields were collected from plants (> 40 plants/field) that were present after herbicide treatments. In total, 72 (wild oat) and 123 (common ragweed) bulk seed samples were collected, stored, stratified (common ragweed) and sown in multi-cell flats in a greenhouse. The experiment included four repetitions of 15 plants for each of the two treatments (no herbicide: water + adjuvant, if necessary; and a standard rate) applied on the collected samples as well as control herbicide sensitive and resistant populations. Fenoxaprop-p-ethyl (91,8 g a.i./ha) was applied when the wild oat was at the three to four leaf stage and imazethapyr (100,8 g a.e./ha) was applied on common ragweed at cotyledon to two leaf stage. Visual assessments of herbicide injury were made two and four weeks after treatment (WAT) and aboveground biomass was collected, dried and weighed four WAT. Of the 72 wild oat samples, 35% had some level of resistance and 65% were clearly sensitive. Of the 123 ragweed samples, 81% had some level of resistance and only 19% were clearly sensitive. These results confirm the presence of numerous herbicide resistant wild oat and common ragweed populations in Quebec and the need to implement effective management practices to slow their spread.

4

HALOSULFURON INTERACTIONS WITH OTHER TOMATO (*LYCOPERSICON ESCULENTUM)* HERBICIDES. Jordan Eyamie[1], P. Sikkema[1], R. Van Acker[2], N. Soltani[1], D. Robinson[1] ([1]Dept. of Plant Agriculture, University of Guelph, Ridgetown campus, Ridgetown, ON N0P 2C0, [2] Dept. of Plant Agriculture, University of Guelph, Guelph, ON., N1G 2W1)

Tomatoes are an important crop in Ontario with a farm gate value of $70,100,000.00. However, they can be very susceptible to yield loss due to weed competition. Halosulfuron is a new herbicide that could be useful in tank-mixes with other tomato herbicides. While this mixture could significantly improve weed control, herbicide interactions have the potential to be antagonistic or synergistic. This study aims to investigate the interaction of halosulfuron with other tomato herbicides and how these interactions affect tomato growth as well as weed control. Based on their modes of action, it is hypothesized that halosulfuron will be antagonistic with grassy herbicides thus reducing grass weed control. It is also hypothesized that halosulfuron will not work synergistically with other broadleaf tomato herbicides tank-mixes for control of broadleaf weeds and will not cause any injury to tomatoes. In 2015 and 2016, both field and greenhouse trials were conducted in Ridgetown, Ontario. Treatments included common grass and broadleaf tomato herbicides alone and in combination with varying rates of halosulfuron. Tomatoes in the field were analyzed for visual injury (%) and light attenuation using a LI191R line quantum sensor. In the greenhouse, five weed species, redroot pigweed

	(*Amaranthus retroflexus)*, lamb's quarters (*Chenopodium album)*, eastern black nightshade (*Solanum ptycanthum)*, hairy crabgrass (*Digitaria sanguinalis)* and green foxtail (*Setaria viridis)* were monitored for weed control (%). It was found that halosulfuron did not synergize broadleaf herbicide tank-mix partners for control of broadleaf weeds. Halosulfuron tank-mixes with grass herbicides were shown to antagonize grass control. Halosulfuron tank-mixes were not found to injure tomato or affect light attenuation.
5	**EVALUATION OF FALL HERBICIDE APPLICATIONS FOR RED SORREL (*RUMEX ACETOSELLA* L.) MANAGEMENT IN WILD BLUEBERRY (*VACCINIUM ANGUSTIFOLIUM* Ait.).** Rakesh K. Menapati*; Graduate student, Truro, NS Red sorrel is a common creeping herbaceous perennial weed in commercially managed wild blueberry fields in Nova Scotia, Canada. Flowering and seed production occur primarily in overwintering ramets, and fall herbicide applications may reduce or prevent flowering and seed production in this species, contributing to management. The objective of this experiment is to evaluate herbicides for fall control of red sorrel ramet populations prior to overwintering in wild blueberry fields. Herbicides evaluated included propyzamide, glufosinate ammonium, dicamba, flumioxazin, flumioxazin + hexazinone, tribenuron-methyl, glyphosate, clopyralid, nicosulfuron/rimusulfuron, pyroxsulam, dichlobenil, and dicamba + diflufenzopyr. All herbicides were applied in early November 2015. Preliminary results indicate significant reductions in overwintering and flowering ramet density by dicamba, dichlobenil, glufosinate ammonium, and tribenuron-methyl, and these herbicides are tentatively recommended for fall red sorrel management in wild blueberry.
6	**DISTRIBUTION AND CONTROL OF GLYPHOSATE-RESISTANT WATERHEMP (*AMARANTHUS TUBERCULATUS* VAR. *RUDIS*) IN SOYBEAN (*GLYCINE MAX*) IN ONTARIO.** Mike Schryver*[1], David C. Hooker[2], Patrick J. Tranel[3], Darren Robinson[2], Peter H. Sikkema[2]; [1]University of Guelph, London, ON, [2]University of Guelph-Ridgetown, Ridgetown, ON, [3]University of Illinois, Champaign, IL Glyphosate-resistant (GR) waterhemp (*Amaranthus tuberculatus* var. *rudis*) (WH) was first confirmed in Lambton County, Ontario in 2014. This small-seeded, summer annual, broadleaf weed has an extended emergence pattern, has high genetic diversity, is a prolific seed producer, and is very competitive. In Ontario, WH interference has been documented to reduce soybean yield by 73%. The focus of this research was to determine the distribution of GR WH in Ontario and to develop strategies for its control in soybean. Forty-eight WH seed samples were collected in the fall of 2015, and screened for resistance to: Group 9 (glyphosate), Group 5 (atrazine) and Group 2 (imazethapyr). Survey results conclude there are 39 sites with GR WH populations (81% of all samples) found in Essex, Chatham-Kent and Lambton counties. In addition, 100% of the samples surveyed were resistant to imazethapyr (Group 2) and 75% to atrazine (Group 5). At 84 days after application (DAA), pyroxasulfone/flumioxazin, pyroxasulfone/sulfentrazone and s-metolachlor/metribuzin provided 95, 91 and 85% GR WH control, respectively. At 84 DAA, in Liberty Link soybean, a sequential application of pyroxasulfone/flumioxazin, pyroxasulfone/sulfentrazone or s-metolachlor/metribuzin applied PRE followed glufosinate applied POST provided 98, 96, and 94% GR WH control, respectively. This research provides valuable information for growers by documenting the distribution of GR WH in Ontario and developing control programs in soybean.

7	**EVALUATION OF FORAMSULFURON FOR POSTEMERGENCE PERENNIAL GRASS MANAGEMENT IN WILD BLUEBERRY (*VACCINIUM AUGUSTIFOLIUM* AIT)**. Linshan Zhang*, Scott N. White; Dalhousie University Faculty of Agriculture, Truro, NS Perennial grasses are common weed problems in wild blueberries in Nova Scotia. The availability of herbicides for controlling perennial grasses in wild blueberry fields, however, is limited, and overuse of certain herbicides has caused herbicide resistance. The introduction of new herbicide products is required to limit spread and impact of perennial grasses in wild blueberry fields. Foramsulfuron was recently registered for wild blueberry and provides a new herbicide mode of action for perennial grass management in wild blueberry in Canada. The spectrum of weed control associated with this herbicide, however, is unclear, and tank mixtures with registered broadleaf herbicides have not been evaluated. Studies were therefore conducted to evaluate foramsulfuron for postemergence perennial grass management in wild blueberry. Experiment 1 was a dose response study with treatments consisting of 0X, 0.25X, 0.5X, 1X, 2X, 4X, 8X and 16X, where X = 15 g a.i. ha^{-1}. Target grass weeds were ticklegrass (*Agrostis hyemalis*), poverty oat grass (*Danthonia spicata*), and Canada bluegrass (*Poa compressa*). Experiment 2 was a tank mixture study to evaluate the effect of mesotrione on foramsulfuron efficacy on ticklegrass and poverty oat grass. Foramsulfuron efficacy varied across grass species. Poverty oat grass was most tolerant to foramsulfuron and required 43 g a.i. ha^{-1} foramsulfuron to reduce inflorescence number by half. In contrast, ticklegrass and Canada bluegrass were very susceptible to foramsulfuron, requiring approximately 8 and 5 g a.i. ha^{-1}, respectively, to reduce inflorescence number by half. Foramsulfuron efficacy was not affected by mesotrione. Based on results, foramsulfuron can be used to control important perennial grasses in wild blueberry fields, and can be applied in a tank mixture with the currently registered broadleaf herbicide mesotrione.
8	**FLAX *(LINUM USITATISSIMUM)* TOLERANCE TO PPO, HPPD, AND VLCFA INHIBITORS**. Moria Petruic*[1], Eric N. Johnson[1], Robert Gulden[2], Bill May[3], Christian J. Willenborg[1]; [1]University of Saskatchewan, Saskatoon, SK, [2]University of Manitoba, Winnipeg, MB, [3]Agriculture and Agri-Food Canada, Indian Head, SK Flax *(Linum usitatissimum)* is a poor competitor with weeds in comparison to other crop species. As such, crop yield loss may be limited by the use of herbicides. However, there is a lack of diversity in herbicides registered for safe use in flax. The objective of this study was to assess the tolerance of flax to seven unregistered herbicides from three herbicide groups including PPO (Group 14), VLCFAS (Group 15), and HPPD inhibitors (Group 27). The study was conducted for two years (2015, 2016) at multiple locations: Saskatoon, SK, Indian Head, SK and Carmen, MB. Crop tolerance to 18 different treatments were examined 7 – 14, 21 – 28, and 56+ DAT using the CWSS phytotoxicity rating scale, as well as weed biomass and crop yield. A Dunnett's comparison to the control, calculated from 5 site years of data, showed that pyroxasulfone, pyroxsasulfone + sulfentrazone, flumioxazin, and topramezone + bromoxynil did significantly reduce the crop population. Additionally, applications of fluthiacet-methyl + MCPA initially caused significant crop injury. However, this damage did subside over the course of the growing season. Despite the initial damage caused by these products, crop height, boll production, yield, and thousand seed weight were not significantly affected by any treatment. Furthermore, our analysis showed a significant site x treatment interaction for population, height and yield. For instance, population was significantly reduced at Carmen in

	2015 by pyroxasulfone, pyroxasulfone + sulfentrazone, flumioxazin, and topramezone + bromoxynil. In 2015, crop height was also reduced by fluthiacet-methyl + MCPA, flumioxazin, and topramezone + bromoxynil at Carmen. In 2016, flumioxazin also significantly reduced plant population at Kernen (Saskatoon, SK). These results show that flax has a good tolerance to all three herbicide groups. The application of fluthiacet-methyl (Group 14), pyroxasulfone (Group 15), and topramezone (Group 27) resulted in minimal crop injury and no significant reduction in yield or quality. As a result, these products have the potential to be registered for flax production in western Canada.
9	**TWO-PASS WEED MANAGEMENT STRATEGIES IN CONVENTIONAL AND NO-TILL DICAMBA RESISTANT SOYBEAN (*GLYCINE MAX* (L.) MERR.)**. Matthew G. Underwood*[1], Nader Soltani[1], David C. Hooker[1], Darren E. Robinson[1], Joseph P. Vink[2], Clarence J. Swanton[3], Peter H. Sikkema[1]; [1]University of Guelph, Ridgetown, ON, [2]Monsanto, Winnipeg, MB, [3]University of Guelph, Guelph, ON Weed control is critical for producing a profitable soybean crop. While one-pass herbicide programs have demonstrated effective weed control in the past, there is an increasing trend towards the use of 2-pass weed control programs incorporating multiple modes of action. These practices can improve the level of weed control, reduce the risk of selecting for herbicide-resistant (HR) weed species, and can improve control of HR weed species. Glyphosate resistance is one of the most challenging aspects of weed control farmers are facing today, and the prevalence of GR weeds is increasing. A transgenic soybean cultivar has been developed with resistance to both glyphosate and dicamba (RR Xtend Soybean). Applying glyphosate plus dicamba reduces soybean yield losses caused by glyphosate resistant weeds. Limited data is available for comparing industry standards to the level of weed control achieved by dicamba applied pre-plant (PP) or pre-emerge (PRE) in a two-pass weed control program in RR Xtend soybean. Six field experiments were conducted over 2014 and 2015 at three sites in Ontario to compare the level of weed control achieved by dicamba compared to current industry standards. Dicamba was applied on its own (600 g ai ha^{-1}) or in a tank-mix (300 g ai ha^{-1}) with dimethenamid-p (544 g ai ha^{-1}) PP or PRE. Weed control and soybean yield were evaluated. Dicamba applied alone or with dimethenamid-p PP or PRE provided 58-59% greater yield than the weedy control; yields were consistent with current industry standards in no-till and conventional till environments. While yields were comparable between dicamba treatments and industry standards, treatments containing dicamba prior to the post-emerge application of glyphosate demonstrated reduced control of grass weeds and some broadleaves. This research indicates that applying dicamba PP or PRE can allow for comparable yields to current products available, though weed control may be reduced compared to commercial standards.
10	**THE COST AND CONTROL OF LINURON RESISTANT PIGWEED IN CARROTS.** Tessa J. de Boer*, Clarence J. Swanton; University of Guelph, Guelph, ON Linuron resistant pigweed (*Amaranthus*) is a major problem for carrot growers in Ontario's Holland Marsh. Few herbicides are registered for use in carrots leaving farmers with limited options to control resistant pigweed. Currently hand weeding is one of the only means to control linuron resistant pigweed. At a cost of 2000-2500 dollars per hectare in labour it is very expensive. During the summer of 2016 numerous field trials were established to determine the effectiveness of alternative weed control strategies for carrots. Wick weeding was evaluated as

	an alternative strategy for control of established pigweed. Initial studies suggest that wick weeding can be an effective strategy, costing less than twelve dollars per hectare. The implementation of this approach could save growers 1988-2400 dollars per hectare. Additionally, linuron free herbicide trials were established to test the effectiveness of weed control for various combinations of alternative herbicides. Differences in weed control were evident, and no significant damage to carrots was observed. In combination with wick weeding a comprehensive weed management strategy can be created to help carrot growers cost effectively manage linuron resistant pigweed.
11	**MANAGEMENT OF GIANT HOGWEED WITH SELECTIVE HERBICIDES.** Meghan Grguric*[1], Francois Tardif[1], Mike Cowbrough[2]; [1]University of Guelph, Guelph, ON, [2]Ontario Ministry of Agriculture, Food and Rural Affairs, Guelph, ON Giant hogweed (*Heracleum mantegazzianum*) is a highly toxic and invasive plant that is of great concern because of its environmental, economic and public health impacts. Its persistence and ability to spread rapidly make it hard to manage. Glyphosate is an efficient herbicide for the control of this weed, but its lack of selectivity and soil persistence allow for seedlings to emerge later in the season and establish an overwintering root system. We hypothesize that residual selective herbicides exist that can provide adequate, immediate and lasting control over giant hogweed. Four trials were conducted at three locations within Southwestern Ontario in the summer of 2016. There were seven herbicides: Milestone (aminopyralid), Clearview (aminopyralid + metsulfuron), Sightline (aminopyralid + metsulfuron+ fluroxypyr), Lontrel (clopyralid), Garlon (triclopyr), Tordon (picloram), and Ally (metsulfuron-methyl). They were compared to Roundup (glyphosate) and Truvist (aminocyclopyrachlor + chlorsulfuron) applied as known positive control. Treatments were applied in May 2016 to young and older seedlings, as determined by height, leaf number and average leaf diameter. Data recorded were visible injury of treated plants and density of new seedlings, other dicots and grass species. Results to date indicate that the three following herbicides, Sightline, Garlon, and Tordon provided as good giant hogweed control as Roundup and Truvist while leaving the grass cover intact and preventing seedling recruitment.
12	**OPTIMAL SEEDING RATES FOR VARIOUS SEED SIZE CLASSES OF FABA BEAN (*VICIA FABA*).** Jessica M. Pratchler*, Steve J. Shirtliffe; University of Saskatchewan, Saskatoon, SK Faba bean (*Vicia faba* L. *minor*) has become increasingly popular in Saskatchewan as a substitute for pea and lentil in cropping rotations. Unfortunately, agronomic information is unavailable, outdated, or taken from other growing regions. Faba bean seeding rate which are currently recommended are based on older varieties from a single seed size class. Presently, two seed size classes are regularly produced in Saskatchewan: small seeded (355g/ 1000 seeds) and large seeded (680g/ 1000 seeds). It is hypothesized that small seeded and large seeded varieties will require different seeding rates in order to maximize yield. During 2015 and 2016, three faba bean varieties were seeded at 20, 40, 60, 80, and 100 viable seeds m^{-2}, at Melfort and Saskatoon, Sask. CDC SSNS-1 and CDC Snowdrop are small seeded varieties and the two most commonly grown varieties in the province; while FB9-4 has the largest thousand kernel weight of the large seeded varieties. In addition, a smaller experiment consisting of CDC Snowdrop seeded at 20, 40, 60, 80, and 100 viable seeds m^{-2} was planted at 5 locations. Results from 2015 indicated that

	CDC SSNS-1 yield plateaus after 60 seeds m^{-2}, while CDC Snowdrop and FB9-4 yields stabilize at 40 seeds m^{-2}. Lastly, this experiment will help to identify the optimal seeding rate for faba bean varieties and help to advance faba bean as a valuable pulse crop in Saskatchewan.
13	**FOXTAIL BARLEY (*HORDEUM JUBATUM*) CONTROL REQUIRES RESIDUAL HERBICIDES.** Mathew Vercaigne*, Linda M. Hall; University of Alberta, Edmonton, AB Foxtail barley (*Hordeum jubatum*) is a perennial grass increasing in prevalence in western Canadian cereal fields. Seedling, over wintering juvenile and mature stages makes herbicide timing and selection challenging for producers. Field experiments were conducted at six sites over two years to characterize the response of established seedling and mature foxtail barley populations to combinations of short residual PRE and POST herbicides with glyphosate. Experiment one evaluated PRE short residual herbicides: ALS1 (2), flucarbazone-sodium/tribenuron and pyroxasulfone at rates of 7.5, 10, 21.79 and 150 g ai ha^{-1} respectively, tank-mixed with glyphosate at 450 and 900 g ae ha^{-1}. Experiment two evaluated combinations of ALS1, flucarbazone/tribenuron and pyroxasulfone with the high rate of glyphosate followed by a POST application of ALS2 at 4.94 g ai ha^{-1}. Foxtail barley seedling and mature populations varied among sites, Scott having the highest mature population at 76 mature plants m^{-2}, while St. Albert had the highest seedling population at 81 seedlings m^{-2}. Visual control, seedling emergence density, foxtail barley biomass, wheat biomass and wheat seed yield were quantified. PRE residual herbicides in the absence of glyphosate failed to control mature foxtail barley. However, ALS1 at 10 g ai ha^{-1}, flucarbazone/tribenuron and pyroxasulfone applied in combination with the high rate of glyphosate increased control to 73.9%, 72.1% and 74.4% at Lethbridge 2016, Olds and Scott, respectively. Moreover, at Lethbridge 2015, Vermilion and St. Albert control increased to 90.4%, 90.8% and 89.3%, respectively. Pyroxasulfone tank-mixed with the high and low rate of glyphosate reduced foxtail barley seedling emergence compared to rates of glyphosate applied alone (29 to 4 seedlings m^{-2}). Glyphosate at both rates applied with and without residual herbicides reduced foxtail barley biomass compared to the non-treated check. However, glyphosate at the high rate did not reduce foxtail barley biomass more than the low rate (49.91 to 27.45 g m^{-2}). The addition of residual herbicides to the high rate of glyphosate did not increase wheat biomass or seed yield. Tank-mixing ALS1 at 10 g ai ha^{-1} with the high rate of glyphosate followed by ALS 2 reduced foxtail barely biomass compared to the high rate of glyphosate applied alone (28.67 to 4.53 g m^{-2}). Seedling emergence was observed over an extended period in spring and post-harvest, suggesting that both pre-seeding and post-emergent control timings along with a multiyear strategy may be required to reduce future foxtail barley populations.
14	**INFLUENCING SEED FATE IN THE SOIL SEEDBANK: VOLUNTEER CANOLA**. Charles M. Geddes*[1], Robert Gulden[2]; [1]Graduate Student, Winnipeg, MB, [2]University of Manitoba, Winnipeg, MB Volunteer canola (*Brassica napus* L.), derived mainly from canola harvest losses, is a problematic weed in Canadian crop production. Seedbank persistence of this weed (averaging three to four years for a single cohort) is longer than most conventional crop rotations practiced on the Canadian prairies. The retention of unwanted weediness traits (secondary dormancy and silique shatter) and weed seed return from unmanaged volunteers contribute to volunteer canola

	seedbank persistence in rotation. Genetically-engineered herbicide-resistance (HR) and adventitious presence of unwanted HR traits in pedigreed seedlots cause additional problems when canola is grown in the same crop rotation as other crops with the same HR trait, like soybean (*Glycine max* (L.) Merr.). This study focussed on post-harvest soil disturbance for management of volunteer canola seedbank persistence over the first winter following canola production. The effect of timing (early autumn, late autumn or spring) and implement (zero tillage, tine harrow or tandem disc) of soil disturbance following canola harvest on volunteer canola population persistence was evaluated at five field locations in Manitoba, Canada in 2013-2016. Timing of soil disturbance had a greater effect on volunteer canola population persistence than implement. Early autumn soil disturbance resulted in approximately double the rate autumn seedling recruitment and half the population persistence from autumn to spring, compared to zero tillage. Almost all autumn recruited volunteers did not survive the winter. Therefore, disturbing the soil in early autumn, regardless of implement, can deplete the volunteer canola seedbank via autumn recruitment and subsequent winterkill. Furthermore, spring soil disturbance stimulated spring volunteer recruitment. Hence, low-disturbance in spring can reduce volunteer canola recruitment in-crop. These results indicate that timing of soil seedbank disturbance is an effective tool that should be included in an integrated weed management strategy to decrease volunteer canola densities prior to soybean production.
15	**THE EFFECT OF MECHANICAL WEED CONTROL (ROTARY HOEING, HARROWING AND INTER-ROW CULTIVATION) AND CROP SEEDING RATE ON YIELD AND WEED SUPPRESSION IN ORGANICALLY GROWN PEA AND LENTIL.** Oleksandr Alba*, Saskatoon, SK Weed control is a major challenge for organic producers, as synthetic herbicides, fertilizers and pests are prohibited in organic production. Nevertheless, organic farmers mainly rely on crop rotation and cultural practices, tillage still remains important component of their weed management system. This study will determine effect of mechanical weed control (rotary hoeing, post-emergence harrowing and inter-row cultivation) and crop seeding rate on yield and weed suppression in organically grown pea and lentil. Experiments will be conducted on certified organic land in Kernen Research Farm and Goodale in Saskatoon, SK during 2016/2017 field seasons. Seeding rates for both crops will be 1x and 2x according to organic recommendations. Initially, two passes of Rotary-mini will be done as a pre-emergence weed control. Next, harrow will be applied as a post-emergence weed control. Finally, as the Rotary mini-till and harrowing could not suppress large weeds the inter-row cultivator will be used. Achieved results will be presented at the conference.
16	**PIXXARO™ FOR ANNUAL BROADLEAF WEED CONTROL IN EASTERN CANADA CEREAL CROPS**. Laura R. Smith*; Dow AgroSciences, Winnipeg, MB, Jamshid Ashigh, Rory Degenhardt, Andrew MacRae and Len Juras; Dow AgroSciences Canada Inc., Calgary, AB Pixxaro™ is a combination of Pixxaro A, a pre-formulated mixture containing Arylex™ active (halauxifen-methyl) and fluroxypyr-meptyl, and Pixxaro B, MCPA ester. This new herbicide, developed by Dow AgroSciences, is a post-emergent solution to control broadleaf weeds in Eastern Canada cereal crops. Small plot research trials were conducted from 2012 to 2016 in Ontario and Quebec to determine the crop safety in cereals and the efficacy on common

	broadleaf weeds found in Eastern Canada. This mixture applied at a rate of 82 g ae/ha Pixxaro A plus 350 g ae/ha Pixxaro B was shown to be safe to spring and winter wheat. Pixxaro provided effective control of many difficult to manage broadleaf weeds including glyphosate-resistant giant ragweed (*Ambrosia trifida*) and Canada fleabane (*Conyza canadensis*). Pixxaro is compatible with Simplicity™ herbicide (pyroxsulam) to further expand the weed spectrum controlled. Growers in Eastern Canada now have another tool for controlling hard-to-kill broadleaf weeds in spring and winter wheat crops. ™Trademark of The Dow Chemical Company ("Dow") or an affiliated company of Dow
17	**CIRPREME™ CONTROL OF PERENNIAL AND HARD-TO-KILL ANNUAL WEEDS IN WESTERN CANADIAN CEREAL CROPS**. Rory Degenhardt*[1], Len T. Juras[2], Laura R. Smith[3], Andrew W. MacRae[4]; [1]Dow AgroSciences, Edmonton, AB, [2]Dow AgroSciences Canada Inc., Saskatoon, SK, [3]Dow AgroSciences, Winnipeg, MB, [4]Dow AgroSciences Canada Inc., Winnipeg, MB Cirpreme™ is a new post-emergence broadleaf weed herbicide from Dow AgroSciences Canada containing Arylex™ active (halauxifen-methyl), florasulam and clopyralid. Between 2014 and 2016, Cirpreme was evaluated in small plot field research trials in Western Canada for control of perennial and hard-to-kill annual weeds in cereal crops. Applications at the target use rate of 5 g ae/ha Arylex plus 5 g ai/ha florasulam plus 75 g ae/ha clopyralid, with or without a phenoxyacetic acid herbicide tank-mix partner, were safe to spring wheat, durum wheat and spring barley. Cirpreme provided excellent control of a wide range of hard-to-kill annual and perennial weeds including, Canada thistle (*Cirsium arvense*), dandelion (*Taraxacum officinale*), false cleavers (*Galium spurium*), narrow-leaved hawk's-beard (*Crepis tectorum*), scentless chamomile (*Tripleurospermum inodorum*) and volunteer alfalfa (*Medicago sativa*). In fields without resistant weed biotypes, Arylex plus florasulam plus clopyralid will offer two distinct modes of action with overlapping activity on many weeds for durable resistance management. Excellent compatibility was observed between Cirpreme and graminicides pyroxsulam (Simplicity™), flucarbazone-sodium, thiencarbazone and pinoxaden. Cirpreme will provide Western Canadian farmers with a new one-pass solution to control challenging annual and perennial broadleaf weeds in wheat and barley crops. ™ Trademark of The Dow Chemical Company ("Dow") or an affiliated company of Dow.
18	**PYRAFLUFEN-ETHYL: A NEW PPO INHIBITOR HERBICIDE FOR PRE-EMERGENT BROADLEAF WEED CONTROL PRIOR TO CEREALS, PULSES AND OILSEEDS IN CANADA.** Graham R. Collier*[1], Patti Turner[2], James C. Ferrier[3]; [1]Nufarm Agriculture Canada, Ponoka, AB, [2]Nufarm Agriculture Canada, Calgary, AB, [3]Nufarm Agriculture Canada, Alma, ON Pyraflufen-ethyl is a protoporphyrinogen oxidase (PPO) inhibitor herbicide of the phenylpyrazole sub-group, newly introduced by Nufarm Agriculture Inc. Pyraflufen-ethyl is a non-residual herbicide with contact-type activity and has been registered for post-emergent broadleaf weed control, either prior to seeding or prior to the emergence of several crop species. This includes but is not limited to wheat (spring, durum, winter), barley, oats, triticale, rye (spring, winter), corn (field, sweet, pop), field pea, lentil, chickpea, soybean, fababean, canola and mustard. As part of an effort to simplify herbicide resistance management for Canadian

growers, pyraflufen-ethyl will be made available in pre-formulated mixtures containing multiple herbicidal modes of action, designed to be tank-mixed with 450-900gae/ha glyphosate. Initial pre-formulated mixtures will combine either MCPA ester (GoldWing®), or 2,4-D ester (BlackHawk®), with pyraflufen-ethyl. These pre-formulated products, with both contact and systemic activity will provide options for multiple mode of action pre-seed and pre-emergent weed management in many of the major field crops grown in Canada including cereals, pulses, corn, soybeans, and flax. Pyraflufen-ethyl based products provide exceptional control of spring annual, winter annual, and over-wintered broadleaf weed species. This includes several species with populations that have developed, or are considered to be at high risk to develop, resistance to other commonly used herbicide modes of action, such as kochia (*Kochia scoparia*), cleavers (*Galium aparine*), Canada fleabane (*Conyza canadensis*), narrow-leaved hawk's-beard (*Crepis tectorum*), wild buckwheat (*Polygonum convolvulus*), wild mustard (*Sinapsis arvensis*), common ragweed (*Ambrosia artemisiifolia*), giant ragweed (*Ambrosia trifida*), all biotypes of volunteer canola (*Brassica napus*), and Russian thistle (*Salsola kali*), among others.

19 **PARADIGM™ PLUS SIMPLICITY™ EFFICACY ON WHITE COCKLE AND NIGHT FLOWERING CATCHFLY IN WESTERN CANADIAN CEREALS.** Andrew W. MacRae*[1], Rory Degenhardt[2], Laura R. Smith[3], Len T. Juras[4], Jamshid Ashigh[5]; [1]Dow AgroSciences Canada Inc., Winnipeg, MB, [2]Dow AgroSciences, Edmonton, AB, [3]Dow AgroSciences, Winnipeg, MB, [4]Dow AgroSciences Canada Inc., Saskatoon, SK, [5]Dow AgroSciences Canada Inc., London, ON

Paradigm™ + Simplicity™ is a registered tank-mix for one pass, post-emergence broadleaf and grass weed control in spring, durum, and winter wheat in Western Canada. Paradigm is a co-formulation of florasulam and Arylex™ active (halauxifen-methyl) at a 1:1 ratio while Simplicity contains the single active pyroxsulam. White cockle (*Silene latifolia*) and night flowering catchfly (*Silene noctiflora*) are difficult to control weeds present throughout Western Canada's agricultural regions. Both weeds are prolific seed producers and members of the Caryophyllaceae family (pink family). Trials were conducted in Western Canada to determine the efficacy of a Paradigm plus Simplicity tank mix on white cockle and night flowering catchfly. Herbicide applications were made in the spring to early summer using small plot equipment delivering a water volume of 100 L/ha. Paradigm at 10 g ae/ha or Simplicity at 15 g ai/ha applied alone provided suppression (70-80% control) of white cockle and night flowering catchfly. When tank mixed, Paradigm at 10 g ae/ha + Simplicity at 15 g ai/ha provided very good (>85%) control of both white cockle and night flowering catchfly.

20 **TARGETING WEED SEED PRODUCTION AND DISPERSAL TO MANAGE HERBICIDE RESISTANT WEEDS.** Steve J. Shirtliffe, Lena D. Syrovy*, Eric N. Johnson, Christian J. Willenborg; University of Saskatchewan, Saskatoon, SK

Harvest weed seed management targets weed seed production and dispersal in order to decrease additions to the weed seed bank over time. Three experiments were conducted in 2015 and 2016 in central Saskatchewan to determine the potential of harvest weed seed management techniques to reduce viable weed seed production and dispersal in prairie weed species. The first used canola as a test crop and measured the timing of seed shed of kochia, wild buckwheat,

	and cleavers to determine the percentage of weed seeds remaining on the plant at harvest. A high percentage of weed seeds retained on the plant indicates that a similar percentage of seeds could be collected and disposed of while harvesting the crop. The second and third experiments tested herbicide application either selectively to flowering weeds with a weed wiper, or as a crop topping (desiccation) treatment to both weeds and crop near crop maturity, and were conducted in lentil using wild mustard as the targeted weed. Both herbicide experiments tested multiple herbicides and timings, and aimed to reduce viable weed seed production. Preliminary analysis of timing of seed shed experiments suggests that 90+% of kochia, wild buckwheat, and cleavers seeds could be removed from the field with timely harvest combined with chaff collection or pulverization techniques. Wiping wild mustard with glyphosate or 2,4-D during early stages of weed flowering reduced weed seed production without damaging the crop. Crop topping treatments were not effective at reducing wild mustard seed production. Seed viability tests are in progress. Techniques to collect weed seeds at harvest or prevent their formation by herbicide application with a wiper during weed flowering show potential to reduce weed seed bank additions.
21	**EVALUATION OF HARVEST-AID HERBICIDES AS DESICCANTS IN LENTIL PRODUCTION.** Ti Zhang[1], Eric N. Johnson*[2], Christian J. Willenborg[2]; [1]University of Saskatoon, Saskatoon, SK, [2]University of Saskatchewan, Saskatoon, SK Desiccants are currently used to improve lentil dry-down prior to harvest. Applying desiccants at growth stages prior to maturity may result in reduced crop yield and quality, and leave unacceptable herbicide residues in seeds. Field trials were conducted at Saskatoon and Scott, SK from 2012 to 2014 to determine whether additional desiccants applied alone or tank mixed with glyphosate improve crop desiccation and reduce the potential for unacceptable glyphosate residue in seed. Glufosinate and diquat tank mixed with glyphosate were the most consistent desiccants, providing optimal crop dry-down and a general reduction in glyphosate seed residues without adverse effects on seed yield and weight. Saflufenacil provided good crop desiccation without yield loss, but failed to reduce glyphosate seed residues consistently. Pyraflufen-ethyl and flumioxazin applied alone or tank mixed with glyphosate were found to be inferior options for growers as they exhibited slow and incomplete crop desiccation, and did not decrease glyphosate seed residues. Based on results from this study, growers should apply glufosinate or diquat with preharvest glyphosate to maximize crop and weed desiccation, and minimize glyphosate seed residues.
22	**PRE- OR POST-EMERGENCE MANAGEMENT OF GLYPHOSATE-RESISTANT CANOLA IN GLYPHOSATE-RESISTANT SOYBEAN CROPS.** Eric Tozzi*, Chris Willenborg; University of Saskatchewan, Saskatoon, SK The seeded area of soybeans has been steadily increasing in western Canada. In 2015 there were approximately 2.19 million hectares of soybeans seeded in Canada, with over 109,000 hectares seeded in Saskatchewan. The majority of the soybean acreage is glyphosate resistant (GR); therefore, one of the biggest weed control challenges for soybean growers is volunteer GR canola, which accounts for close to 50% of the canola grown annually in western Canada. Limited information exists for the cultural and chemical control of volunteer GR canola in GR soybean. To address this issue, three separate experiments were conducted at four locations (Saskatoon, Scott, Indian Head, SK; Carman, MB) in 2014 and 2015. Experiments

	included an evaluation of various PRE- herbicides; evaluation of various POST- herbicides; and, evaluation of sequential PRE- and POST- herbicide treatments for volunteer canola control. PRE- applications containing cloransulam-methyl (First Rate®) and florasulam were the most consistent in controlling volunteer RR canola and increasing soybean biomass and yield. Most of the POST- herbicides evaluated (Basagran®, First Rate®, Odyssey®, Reflex®, Solo®, and Viper ADV®) provided acceptable control of volunteer canola and resulted in increases in soybean biomass and yield. Sequential treatments containing tribenuron PRE- and imazamox + bentazon POST- were generally ranked highest in terms of volunteer canola control and low soybean phytoxocity. Sequential treatments containing thifensulfuron POST were generally ranked lowest due to high phytotoxicity (partially due to error in application rate) and low efficacy. Treatments containing saflufenacil PRE- and cloransulam-methyl, fomesafen, or bentazon POST also resulted in satisfactory volunteer canola control and crop safety.
23 **24** **25**	**WILD BLUEBERRY PRODUCTION AND THE HISTORY OF WEED MANAGEMENT.** Peter Burgess, Perennia **CHALLENGES AND CURRENT WEED RESEARCH IN WILD BLUEBERRY.** Scott White, Dalhousie Agriculture Campus and Gavin Graham, NBDAAF **INNOVATIONS AND THE FUTURE OF HERBICIDE APPLICATION IN WILD BLUEBERRY.** Travis Esau, Dalhousie Agriculture Campus Wild Blueberries (*Vaccinium angustifolium* AIT.) are a critical crop in eastern North America. In 2016, well over 350 million pounds were harvested between Quebec, Maine, New Brunswick, PEI and Nova Scotia. It is a uniquely challenging crop, as all fields are naturally occurring and planting is not part of the establishment process. Farmers encourage plant spread through various methods but are very limited on effective cultural and physical weed control techniques. As a result, herbicides have become critical to maintaining economic yields and high fruit quality. The unique weed populations that develop, in this low pH environment, create challenges for effective weed control over large acreages with varied soil types and terrain. This three part session will focus on: 1) the historical development of the crop and the historical challenges and success with respect to weed management (Peter Burgess); 2) the current state of weed challenges within the industry and how research is looking to address these challenges (Scott White); 3) the future of application technology in wild blueberries through real time variable rate and site specific application of herbicides (Travis Essau).
26	**CASE STUDIES IN THE CLASSROOM.** Peter H. Sikkema, University of Guelph, Ridgetown, ON
27	**ENGAGING STUDENTS IN RESEARCH AND DISCOVERY IN THE INFORMATION AGE.** Eric Johnson and Steve Shirtliffe, University of Saskatchewan, Saskatoon, SK
28	**ASPIRATIONS OF ACHIEVEMENT - DO DEMOGRAPHIC FACTORS DETERMINE WHO SUCCEEDS IN YOUR CLASSROOM?** Christian J. Willenborg*; University of Saskatchewan, Saskatoon, SK

	Instructors and administrators typically are concerned with student success because it is an important metric used for the assessment of learning and instructor effectiveness. Many factors collectively influence student success in the academy, yet we are often unaware of how these factors impact the success of students in our own classroom. Identifying and understanding the factors that negatively impact student performance in your classroom is essential to developing strategies to improve academic success. In this session I will report on a study conducted to assess the demographic factors associated with the success of third and fourth year agriculture students. The study was based on data collected from students (n=274) who completed two courses (PL SC 345 and AGRN 375) between 2013 and 2015 at the University of Saskatchewan. Factors with a major impact on student performance included gender, major, classification/year of study, and absenteeism. However, it is unclear why some factors impacted performance and thus, the results of this study highlight the need for well-designed classroom surveys. Nevertheless, this study will help course instructors by providing practical information that can aid them in their pursuit of student excellence in upper-year courses.
29	**PLANT COMMUNITY ASSEMBLY**. Clarence Swanton*; University of Guelph, Guelph, ON Community assembly is a branch of ecology that looks at how communities are assembled as they follow trajectories through time. A trajectory is controlled by biotic and abiotic constraints (filters) that act at multiple scales. From a total species pool, environmental and dispersal constraints control which species enter an ecological species pool. Within this pool, internal dynamics determine which of these species becomes part of the extant community. Environmental filters act by removing species that lack specific traits. Thus, traits are filtered, and with them, species. In this presentation, I will present the basic ecological theory of community assembly and address how it can be used in conjunction with a trait-based approach to understand and possibly predict how weed community structure changes in response to imposed filters such as tillage or crop rotation.
30	**CONTROL OF GLYPHOSATE RESISTANT CANADA FLEABANE IN CORN/SOYBEAN/WHEAT ROTATION.** Peter H. Sikkema*, Nader Soltani; University of Guelph, Ridgetown, ON Glyphosate-resistant (GR) *Conyza canadensis* (Canada fleabane) was first reported in Ontario, Canada in 2010 when it was found on 8 farms in one county. Over four years it has spread to 25 counties over a distance of greater than 800 km. Multiple resistant (Group 2 and 9) *Conyza canadensis* has been documented on more than 10% of affected farms. *Conyza canadensis* is an extremely competitive weed and lack of control in corn, soybean and wheat can lead to significant yield losses. More than 50 field experiments were conducted during 2011-2015 to determine the best herbicide options (among registered herbicides in Ontario) for the control of GR *Conyza canadensis* in corn, soybean and wheat. All experiments were arranged in a completely randomized block design with four replications. Among corn preplant herbicides evaluated, dicamba, dicamba/atrazine, mesotrione+atrazine and saflufenacil/dimethenamid-P 88, 94, 89 and 91% control of GR *Conyza Canadensis*, respectively. Among corn POST herbicides evaluated, dicamba, diflufenzopyr/dicamba, dicamba/atrazine and bromoxynil+atrazine provided 96, 91, 96 and 91% control of GR *Conyza Canadensis*,

	respectively. The best herbicide option for enhanced burndown of GR *Conyza Canadensis* in soybean was glyphosate plus saflufancil which provided 77% control. In winter wheat, 2,4-D, dicamba, dicamba/MPCA, dicamba/MPCA/mecoprop-P, clopyralid and pyrasulfotole/bromoxynil provided 89, 91, 94, 92, 96 and 92% control of GR *Conyza Canadensis*, respectively. Based on these results, an integrated weed management program which employs a three crop rotation and multiple herbicide modes-of-action can be used for commercially acceptable control GR *Conyza Canadensis* in corn, soybean and winter wheat.
31	**THE FIGHT AGAINST HERBICIDE RESISTANCE: ENLISTING NEW TECHNOLOGIES TO FACILITATE THE ADOPTION OF INTEGRATED WEED MANAGEMENT.** François J. Tardif*; University of Guelph, Guelph, ON Integrated Weed Management (IWM) involves the use of various approaches to manage weeds. This is done in order to reduce the environmental impact of a single weed control measure and to prevent management issues such as herbicide resistance. In modern agriculture this means reducing reliance on herbicides as the sole weed control method. In order to be adopted by practitioners, IWM approaches need to be efficient while causing as little disruption as possible. Various new technologies may have different impact on the adoption of IWM and resistance prevention. For example, herbicide resistant crops confer many immediate benefits to growers that make adopting IWM less appealing. However, the widening access to information technologies and robotics may facilitate growers' adoption of integrated practices.
32	**MANAGEMENT OF GLYPHOSATE RESISTANT CANADA FLEABANE AND COMMON RAGWEED WITH ARYLEX™ ACTIVE PLUS BROADSTRIKE RC HERBICIDES IN EASTERN CANADA.** Jamshid Ashigh*[1], Rory Degenhardt[2], Laura R. Smith[3], Andrew W. MacRae[4]; [1]Dow AgroSciences Canada Inc., London, ON, [2]Dow AgroSciences, Edmonton, AB, [3]Dow AgroSciences, Winnipeg, MB, [4]Dow AgroSciences Canada Inc., Winnipeg, MB Arylex™ active (halauxifen-methyl), a new active ingredient from Dow AgroSciences, is a synthetic auxin herbicide from the new "arylpicolinate" chemical class. The co-pack of Arylex plus Broadstrike™ RC (flumetsulam) is being registered for pre-plant burndown in corn and soybean for the control of glyphosate-resistant Canada fleabane (*Conyza canadensis), common ragweed* (*Ambrosia artemisiifolia*) and other problematic broadleaf weeds. Field research was conducted in 2015 and 2016 at several locations across Eastern Canada to determine the efficacy and crop safety of pre-plant application of Arylex plus Broadstrike RC in soybean and corn. The combination of Arylex at 5 g ae/ha plus Broadstrike RC applied at 50 and 70 g ai/ha plus glyphosate at 1120 g ae/ha demonstrated effective control of glyphosate-resistant Canada fleabane and common ragweed. Crop injury was evaluated in dedicated weed-free crop tolerance trials. Soybean and corn can be safely planted 14 days after Arylex application. Arylex plus Broadstrike RC will provide growers with two effective modes of action for pre-plant control of many difficult to control broadleaf weeds, including glyphosate-resistant biotypes. ™Trademark of the Dow Chemical Company ("Dow") or an affiliated company of Dow.

33	**DO CULTIVAR AND SAFLUFENACIL APPLICATION TIMING INFLUENCE DEVELOPMENT, GROWTH RESPONSE AND YIELD OF SUCCULENT PEA?** Darren E. Robinson*[1], Kristen E. McNaughton[2]; [1]University of Guelph-Ridgetown, Ridgetown, ON, [2]University of Guelph - Ridgetown Campus, Ridgetown, ON Management of herbicide-resistant weeds such as Group 2-resistant eastern black nightshade (*Solanum ptycanthum* Dun.) and common lambsquarters (*Chenopodium album* L.) is a significant challenge for processing pea growers in Ontario. Saflufenacil/dimethenamid-p is a pre-formulated tank mix that will control both of these species, and combines to alternate modes-of-action that control Group 2-resistant weeds. Trials were conducted from 2012 to 2016 to test for tolerance of eight pea cultivars ('Ricco', 'PAO 826', 'Lil Mo', 'Salerno', 'Tyne', Spring', 'Reliance', and 'Sweet Savour') to preemergence (PRE) applications of saflufenacil/dimethenamid-P (Integrity®) at rates of 247 and 494 g ai ha^{-1}. Pea tenderness at harvest was rated using a tenderometer and final yield adjusted based on tenderometer readings. Visible injury was less than 10% in all pea cultivars at both rates of saflufenacil/dimethenamid-P. Pea tenderness ratings were all similar to the untreated check, an indication that pea maturity was not negatively affected. Finally, pea yield in all cultivars was similar to the untreated check. In addition to the cultivar sensitivity research, trials were conducted from 2009 to 2012 to determine processing pea response to pre-plant incorporated (PPI) and PRE applications of saflufenacil/dimethenamid-P at rates of 247 and 494 g ai ha^{-1}. An untreated control was included for comparison. Visible injury, pea tenderness at harvest and final yield were determined as in the previous trials. There were no differences in visible injury, pea tenderometer readings or adjusted final yield among any of the treatments. Processing pea cultivars currently in being grown have a high degree of tolerance to saflufenacil/dimethenamid-P at the rates tested when the herbicide is applied PPI or PRE. Registration of this herbicide would provide processing pea growers with an excellent herbicide option for control of Group 2-resistant weeds.
34	**SEED BANK CHARACTERISTICS, SEEDLING EMERGENCE, FLOWERING BIOLOGY, AND SUSCEPTIBILITY OF HAIR FESCUE (*FESTUCA FILIFORMIS*) TO HERBICIDES IN WILD BLUEBERRY.** Scott N. White*[1], Qiming Lyu[2]; [1]Dalhousie University Faculty of Agriculture, Truro, NS, [2]Dalhousie University, Truro, NS Seed bank characteristics, seedling emergence, flowering biology, and susceptibility of hair fescue (*Festuca filiformis* Pourret) to herbicides in wild blueberry. Hair fescue is a common perennial grass weed in wild blueberry fields that impedes harvest and reduces yields. Experiments were initiated in fall 2014 to investigate 1) the presence, depth, and persistence of fescue seed banks in wild blueberry fields, 2) the dormancy status of fresh fescue seeds, 3) the temporal patterns of seedling recruitment in established fescue populations, 4) the flowering biology of fescue grasses, and 5) susceptibility of fescue seedlings to registered herbicides. Fescues formed seed banks in wild blueberry fields and comprised 10 ± 8 to 46 ± 8% of the germinable seed bank at two field sites. Seed density exceeded 30,000 seeds m^{-2} at each site, with the majority of seeds (>90%) located on the soil surface. Fresh fescue seeds lacked dormancy, with germination rates of 97 ± 1 and 53 ± 2% in light and dark conditions, respectively. Seedling recruitment occurred in both spring and fall of the non-bearing and bearing year, and seedlings required vernalization to confer flowering competency. Seedlings were not controlled by tribenuron-methyl. Foramsulfuron, nicosulfuron/rimsulfuron, and

glyphosate caused significant injury to seedlings, but did not cause high mortality (<30%). Flumioxazin and glufosinate applied alone caused significant injury and mortality of treated seedlings (>70%), but caused 100% mortality when applied as a tank mixture. Terbacil also caused 100% mortality. Terbacil and glufosinate are recommended for control of seedlings emerging in spring and the tank mixture of flumioxazin and glufosinate are recommended for control of seedlings emerging in the fall. Knowledge of fescue seed bank characteristics, seedling recruitment timing, flowering biology, and herbicide susceptibility should allow growers to effectively manage perennial fescue grasses in wild blueberry.

35 **COMMUNITY DYNAMICS AND MANAGEMENT OF INVASIVE PERENNIAL GRASSES USING MOWING AND PREVENTION OF GRAZING IN GARRY OAK MEADOWS OVER 7 YEARS**. David R. Clements*[1], Joy Marconato[1], Emily K. Gonzales[2]; [1]Trinity Western University, Langley, BC, [2]Parks Canada, Vancouver, BC

Invasive perennial grasses degrade vulnerable Garry Oak ecosystems in the North American Pacific Northwest. *Anthoxanthum odoratum* is one of the most abundant invasive grasses forming monocultures in meadows once dominated mainly by perennial herbs in spring. Two main reasons for the success of *A. odoratum* are its tenacity as a perennial and lack of vulnerability to grazing. Previous research on the same site showed that a combination of mowing and grazing prevention had potential to shift community composition resulting in reduced dominance of non-native grasses in this system. The previous research utilized 1 x 1 m plots over 3 years; we scaled up the approach to utilize 5 x 5 m plots over 7 years. Our hypothesis was that the long-term mowing, in the absence of grazing, will reduce the impact of *A. odoratum* on Garry Oak ecosystem communities. In 2009, 24 5x5 m experimental plots were established at TWU's Crow's Nest Ecological Research Area (CNERA) on Salt Spring Island, BC using four treatments: 1. grazed/unmowed, 2. grazed/mowed, 3. ungrazed/unmowed, and 4. ungrazed/mowed. A yearly census was completed of the vegetation in the plots, followed by a single mowing in the fall for mowed treatments. In June 2016, all plant species were sampled within two 0.5 x 0.5 quadrats in each of the 24 plots. We harvested plants at ground level, identified to species, and stored them in paper bags. Plants were dried in a drying oven for 48 hours at 70°C and weighed to a precision of 0.01 g. Trends in percent cover over the 7 years showed a decline in non-native perennial grasses (NNPG) with mowing but no concomitant increase in native perennial forbs (NPF) emblematic of the ecosystem. Furthermore, at the end of 7 years, the dry weight of NNPG in ungrazed/mowed plots was still highest among the 3 largest plant functional categories, illustrating the inadequacy of a single mowing in the fall to control NNPG, especially *A. odoratum*. There was about 75% less NNPG biomass in the grazed/mowed plots than in the ungrazed/mowed plots, but non-native annual grasses (NNAG), especially *Cynosurus echinatus*, formed a large portion of the dry mass in these plots. The lack of NPF regeneration on the site illustrates another issue related to dominance of NPG: lack of native propagules. Thus a holistic restoration effort would require extensive planting of native vegetation.

36 **PLANT COMPETITION AND THE CONCEPT OF AN ENERGY IMBALANCE.** Clarence Swanton*[1], Sasan Amirsadeghi[1], Andrew G. McKenzie-Gopsill[2], Eric R. Page[3]; [1]University of Guelph, Guelph, ON, [2]Agriculture and Agri-Food Canada, Charlottetown, PE, [3]Agriculture and Agri-Food Canada, Harrow, ON

	Plant competition is thought to occur primarily for limited resources of light, water and nutrients. This approach to understanding mechanisms of plant competition, however, is inadequate when it comes to understanding how crop yield potential is modified by the presence of early emerging weeds. Recent discoveries have highlighted how the presence of neighbouring weed seedlings can alter crop allometry and cellular homeostasis. Such changes create an energy imbalance within the crop seedling that invariably alters crop growth, development and yield potential. The definition of plant competition should be expanded to include the initial phase of the creation of an energy imbalance which occurs well in advance of direct competition for resources.
37	**A CHRONO-GEOGRAPHICAL ASSESSMENT OF GLYPHOSATE RESISTANCE IN CANADIAN POPULATIONS OF *CONYZA CANADENSIS* L..** Eric R. Page*[1], Chris Grainger[2], Istvan Rajcan[2], Martin Laforest[3], Robert E. Nurse[4]; [1]Agriculture and Agri-Food Canada, Harrow, ON, [2]University of Guelph, Guelph, ON, [3]Agriculture and Agri-Food Canada, Saint-Jean-sur-Richelieu, QC, [4]Agriculture Canada, Harrow, ON In the decade since the introduction of herbicide tolerant (HT) crops, an increasing number of weed species have been identified with resistance to the non-selective herbicides utilized in these systems. In the USA, there are now 14 weed species with confirmed resistance to the widely utilized herbicide, glyphosate. Similarly in Canada, there are 5 weed species that exhibit glyphosate resistance (GR); two of which were documented in the last year alone. While it is often assumed that these cases of GR have developed in parallel in both countries, there are other mechanisms through which these populations may have developed resistance, including pollen mediated gene transfer or long-distance dispersal of propagules. One of the species that has developed GR in both countries, *Conyza canadensis*, has dispersal range of up to 500 km and thus could in theory move herbicide resistant traits across borders. The objective of this research was to examine the origins and chronogeographic spread of GR *C. canadensis* populations in Canada. New and historic populations of *C. canadensis* collected throughout the province of Ontario and from the bordering states of the USA. These populations spanned the period during which herbicide tolerant crops were introduced in Ontario. DNA was extracted and twenty microsatellite markers were used to characterize the relatedness of these populations. Results indicate that the development of GR in Canadian populations of *C. canadensis* appears to be unrelated to GR populations from the USA. Interestingly, glyphosate susceptible (GS) Canadian populations that predate the introduction of HT crops are more closely related to GR populations from the USA than current Canadian GR populations. These results suggest that the mechanisms of resistance in Canadian populations of GR *C. canadensis* may not necessarily mirror those of their counterparts from the USA.
38	**SUITABILITY OF WESTERN CANADIAN WEEDS FOR HARVEST WEED SEED CONTROL.** Breanne D. Tidemann*[1], Linda M. Hall[2], K. Neil Harker[1], Hugh J. Beckie[3], Eric N. Johnson[4], F. Craig Stevenson[5]; [1]Agriculture and Agri-Food Canada, Lacombe, AB, [2]University of Alberta, Edmonton, AB, [3]Agriculture and Agri-Food Canada, Saskatoon, SK, [4]University of Saskatchewan, Saskatoon, SK, [5]Private Consultant, Saskatoon, SK Harvest weed seed control (HWSC) is a weed management paradigm that targets weed seeds otherwise dispersed by harvesters and destroys those seeds following threshing. While there is interest in the use of these methods, it was not known whether problem weeds in western

	Canada retained their seeds until harvest at a height suitable for collection and processing by HWSC. A study was conducted at three sites over two years to determine if retention and height criteria were met by wild oat (*Avena fatua*), false cleavers (*Galium spurium*) and volunteer canola (*Brassica napus*) grown in 1x and 2x seeding rates of wheat and fababean. Wild oat consistently shed seeds early, with up to 85% seed loss by the time of wheat swathing and continued losses up to the time of wheat and fababean direct harvests. However, the majority of retained seeds were >45 cm above ground level, suitable for collection. Cleavers seed retention was highly variable by site-year, but generally greater than wild oat. The majority of seed was retained >15 cm above ground level and would be considered collectable. Canola was highly retained, with >95% retention in most cases and nearly all seed retained >15 cm above the ground. The suitability ranking of the species for management with HWSC was canola > cleavers > wild oat.
39	**A NEIGHBOUR'S LIGHT WILL STRESS YOU OUT.** Andrew G. McKenzie-Gopsill*[1], Sasan Amirsadeghi[2], Hugh Earl[2], Lewis Lukens[2], Elizabeth Lee[2], Clarence Swanton[2]; [1]Agriculture and Agri-Food Canada, Charlottetown, PE, [2]University of Guelph, Guelph, ON Neighbouring weeds compromise light quality and severely impact early development of soybean in the absence of direct resource competition with a lasting effect on yield potential via unknown mechanisms. To gain insight into these mechanisms, we characterised early physiological responses of soybean to neighbouring weeds using a biological weedy system that generates a consistent far-red-enriched light environment and excludes direct resource competition. Neighbouring weeds significantly decreased superoxide dismutase activity in unifoliate leaves, while *in situ* staining did not reveal an increase in relative steady-state level of superoxide. This was accompanied by increased levels of leaf hydrogen peroxide (H_2O_2) without a significant impact on lipid peroxidation as well as oxidised ascorbate suggesting increased production of singlet oxygen ($^1O_2$). This notion was supported by increased ratios of the photosensitizer protochlorophyllide to both chlorophyllide *a*, and total chlorophyll in the dark as well as enhanced sensitivity to cell death by a $^1O_2$-generating compound in the light. Increased levels of leaf H_2O_2 coincided with decreased activity of a redox sensitive Calvin cycle enzyme and dramatic changes in photosynthesis, carbon partitioning and biomass allocation with a persistent decline in leaf sucrose level and biomass production at later developmental stages. We propose that in addition to well characterised role of far-red light in detecting neighbour proximity, it is also a signal of oxidative stress which activates several stress responses that impact carbon partitioning, growth and biomass production.
40	**RESIDUAL WEED POPOULATION SHIFTS IN MANITOBA 1978-2016.** Julia Y. Leeson*[1], Jeanette Gaultier[2], Laryssa Grenkow[3]; [1]Agriculture and Agri-Food Canada, Saskatoon, SK, [2]Manitoba Agriculture, Carman, MB, [3]Manitoba Pulse & Soybean Growers, Carman, MB The comparison of the relative abundance of weeds in Manitoba in 2016 with results from previous provincial surveys enables the identification of recent shifts in species ranks, life form density and relative abundance. In 2016, a total of 659 fields of canola, spring wheat, soybean, corn, barley, oat, flax and sunflower were surveyed. These fields were selected using a stratified random sampling procedure based on ecodistricts. In each field, weeds were counted in 20 quadrats (50 by 50 cm) in late summer. Weed data are summarized using a relative

abundance index based on frequency, field uniformity and density. Green foxtail (*Setaria viridis* (L.) P. Beauv.) was the most abundant weed, wild buckwheat (*Fallopia convolvulus* (L.) Á.Löve) ranked second, barnyard grass species (*Echinochloa* spp.) ranked third and wild oats (*Avena fatua* L.) ranked fourth. The results from the 2016 survey are compared to results from surveys of 631 fields in 2002, 452 fields in 1997, 501 fields in 1986 and 1424 fields in 1978-1981. Nine species have been ranked amongst the top 20 most abundant species in each survey. Ten species have declined ten or more ranks since the 1970s. Nine of these species continued to decline in 2016: bluebur (*Lappula squarrosa* (Retz.) Dumort.), Russian thistle (*Salsola tragus* L.), flax (*Linum usitatissimum* L.), barley (*Hordeum vulgare* L.), dog mustard (*Erucastrum gallicum* (Willd.) O.E. Schultz), quack grass (*Elymus repens* (L.) Gould), stinkweed (*Thlaspi arvense* L), wild mustard (*Sinapis arvensis* L.), hemp-nettle (*Galeopsis tetrahit* L.). Perennial sow-thistle (*Sonchus arvensis* L.) declined in the 2002 survey, but did not decrease any further in the 2016 survey. Spiny annual sow-thistle (*Sonchus asper* (L.) Hill) has increased the most since the 1970s, most notably from 1997 to 2002; however, it declined slightly from 2002 to 2016. Yellow foxtail (*Setaria pumila* (Poir.) Roem. & Schult.) has been steadily increasing since the 1970s, and appeared in the top twenty for the first time in 2016. Broad-leaved plantain (*Plantago major* L.) and biennial wormwood (*Artemisia biennis* Willd.) also appeared in the top 20 in the most recent survey. Other species that have increased since the 1970s include: canola (*Brassica napus* L.), dandelion (*Taraxacum officinale* F. H. Wigg.), false cleavers (*Galium spurium L.*), round-leaved mallow (*Malva pusilla* Sm.), wheat (*Triticum* spp.), chickweed (*Stellaria media* (L.) Vill.) and barnyard grass species. The relative abundance of annual grasses was lowest in the 2016 survey, while relative abundances of perennials and facultative winter annuals were the highest on record. The densities of annual grass and annual broad-leaved weeds were the lowest ever recorded while the densities of perennials and facultative winter annuals were slightly higher in 2016 than in 2002.

41 **SOYBEAN INJURY FROM DICAMBA AND 2,4-D TANK CONTAMINATION.** Nader Soltani*[1], Robert E. Nurse[2], Peter H. Sikkema[1]; [1]University of Guelph, Ridgetown, ON, [2]Agriculture Canada, Harrow, ON

The anticipated availability of dicamba- and 2,4-D-resistant crops will increase the potential for crop injury to non-dicamba or 2,4-D-resistant soybean due to dicamba or 2,4-D spray tank contamination. A total of sixteen field trials (8 separate trials with each herbicide) were conducted in a completely randomized block design with four replications in Ontario, Canada during 2012-2014 to determine the response of non-dicamba and 2,4-D -resistant soybean to dicamba or 2,4-D spray tank contamination of 0.25, 0.5, 1.0 2.5, 5, 10 and 20% v/v tank contamination applied postemergence (POST) at the V2-3 (2-3 trifoliate) or R1 (1st flower) stage. Dicamba applied at R1 caused 23, 28, 36, 40, 48, 61 and 73% visible injury in soybean at 0.75, 1.5, 3, 6, 15, 30 and 60 g a.e. ha^{-1}, respectively. The predicted dose of dicamba to reduce soybean seed yield 1, 5, 10, 20 or 50% was 1.1, 5.8, 11.8, 25.2 and >60 g a.e. ha^{-1} when applied at V2-3 and <0.75, 1.0, 2.0, 4.3 and 11.5 g a.e. ha^{-1} when applied at R1, respectively. There was no difference in soybean injury between V2-3 and R1 stages from 2,4-D spray tank contamination. There was a significant drop in seed yield at 84 and 168 g a.e. ha^{-1} contamination doses; however, there was no significant differences for any the yield components including soybean pods per plant, seeds per pod, seeds per plant and 100 seed weight. The predicted dose of 2,4-D to reduce soybean seed yield 1, 5, 10, 20 or 50% was 4.5, 22, 46, 97 and >168 g a.e. ha^{-1}. Results show that dicamba spray tank contamination of as little

	as 0.75 g a.e. ha^{-1} and 2,4-D spray tank contamination of 46 g a.e. ha^{-1} and higher can cause significant crop injury in non-resistant soybean when applied during vegetative or reproductive stages.
42	**EFFECT OF TIME OF DAY ON EFFICACY OF SAFLUFENACIL TO CONTROL GLYPHOSATE RESISTANT CANADA FLEABANE IN SOYBEAN**. Nader Soltani*, Chris Budd, Peter H. Sikkema; University of Guelph, Ridgetown, ON Control of glyphosate-resistant (GR) Canada fleabane in soybean with glyphosate (900 g a.i. ha^{-1}) plus saflufenacil (25 g a.i. ha^{-1}) has been variable. The objective of this research was to determine the effect of GR Canada fleabane height and density, and time of day (TOD) at application on saflufenacil plus glyphosate efficacy in soybean. All experiments were completed six times during a two-year period (2014, 2015) in fields previously confirmed with GR Canada fleabane. Applications from 09:00- 21:00 h provided optimal control of GR Canada fleabane 8 WAA. Soybean yield paralleled GR Canada fleabane control with the highest yield of 3.0 t ha^{-1} at 15:00 h, and the lowest yield of 2.4 t ha^{-1} at 06:00 h. The height and density of GR Canada fleabane at application had minimal effect on saflufenacil efficacy. Saflufenacil provided >99% control of GR Canada fleabane when applied to small plants and low densities; however, control decreased to 95% where the weed was >25 cm tall, and to 96% in densities >800 plants m^{-2} at 6 WAA due to some plant regrowth. TOD of application had a greater influence on GR Canada fleabane control with saflufenacil than height or density. To optimize control of GR Canada fleabane, saflufenacil should be applied during daytime hours to small plants at low densities. Optimizing GR Canada fleabane control minimizes weed seed return and weed interference.
43	**EVALUATING THE CRITICAL WEED FREE PERIOD OF *GLYCINE MAX* (L.) GROWN IN NARROW VS. WIDE ROW SPACING IN NORTHERN CLIMATES.** Jonathan D. Rosset*, Robert Gulden; University of Manitoba, Winnipeg, MB The development of short season soybean (*Glycine max* L.) has enabled producers in Manitoba and eastern Saskatchewan to widely adopt the crop for primary production. In the USA and Ontario, soybean production has contributed to the selection of a number of weed biotypes resistant to glyphosate. As part of a responsible, integrated weed management strategy, soybean production in northern climates must adopt good agronomic practices to reduce the selection pressure for herbicide resistant weeds. Soybean can be grown in wide or narrow rows, however, due to more rapid canopy closure, narrow row soybean is expected to be more competitive with weeds. This study evaluated the critical weed free period (CWFP), i.e., how long the crop needs to remain weed-free to avoid yield loss in response of weed interference, of soybean grown in 19 cm (narrow) or 76 cm (wide) row spacing at 3 locations across southern Manitoba. At R5-R6, biomass of soybean and weed species were determined and subjected to regression analysis to model the CWFP. Under high weed pressure, the CWFP was longer in wide-row soybean than narrow-row soybean. The differences between row spacing were less pronounced under lower weed pressure. Soybean yield data will be presented and discussed.

44	**HOW MUCH SEED CAN UNCONTROLLED CANADA FLEABANE (*CONYZA CANADENSIS*) PLANTS PRODUCE IN SPRING WHEAT, CORN AND SOYBEAN?** Marie-Josee Simard*[1], Robert E. Nurse[2], Eric R. Page[3], Gaetan Bourgeois[1]; [1]Agriculture and Agri-Food Canada, Saint-Jean-sur-Richelieu, QC, [2]Agriculture Canada, Harrow, ON, [3]Agriculture and Agri-Food Canada, Harrow, ON Canada fleabane was one of the first species in North America to be confirmed as glyphosate resistant in 2001. Since then, countless glyphosate resistant populations have been discovered. Canada fleabane plants generally germinate in the fall, overwinter as rosettes and then produce seed but some seeds can germinate in the spring and generate mature plants during the same season. Our goal was to assess the seed production of Canada fleabane rosettes and spring germinated seedlings in spring wheat, soybean and corn. Trials were conducted at St-Jean-sur-Richelieu, QC in 2014 and 2015. Three adjacent fields were planted with spring wheat, soybean or corn. Each field was divided into four blocks that included four plots (3 x 4 m^{-2}) and a target weed density of five weeds m^{-2} planted on the same date as the crop or when crop plants had two leaves. Plots were seeded with Canada fleabane seeds or planted with greenhouse grown rosettes. The experiment also included up to twelve weekly weed collection dates (subplots, 1 m^{-2}). In each subplot, four weeds were individually bagged at flowering (using mesh bags) until collection. For each collection date, the number of seeds per plant was recorded. Results indicate that none of the 542 spring germinated seedlings flowered during the season in any crop. The seed production of rosettes was nil to low in spring wheat (only 4/386 rosettes produced seed, in 2015 only). In corn, average seed production varied from year to year [ca. 7 000 (2015) to 14 000 (2014) seeds $plant^{-1}$] but was not affected by planting date (therefore rosette size). In soybean, none of the later planted rosettes produced seeds but early planted rosettes produced an average of ca. 7 000 (2014) to 31 000 (2015) seeds $plant^{-1}$.
45	**ACETYL-COA CARBOXYLASE OVEREXPRESSION IN HERBICIDE RESISTANT CRABGRASS (*DIGITARIA SANGUINALIS*).** Martin Laforest*[1], Rob E. Nurse[2], Eric R. Page[2], Marie-Josee Simard[3]; [1]Agriculturea dn Agri-Food Canada, Saint-Jean-sur-Richelieu, QC, [2]Agriculture and Agri-Food Canada, Harrow, ON, [3]Agriculture and Agri-Food Canada, Saint-Jean-sur-Richelieu, QC Growers have to cope with increasing cases of herbicide resistant weeds. The development of genetic tests is helping the identification of resistance for specific species and is leveraging years of research to identify causal mutations reported in the literature. Whereas most of these studies describe target site mutations, other cases exist in nature where this molecular mechanism is not involved. The molecular descriptions of these cases are likely under-reported due to analytic challenges. A crabgrass biotype (*Digitaria sanguinalis*) from Southern Ontario tested positive for resistance to Acetyl-CoA Carboxylase (ACCase) inhibitors (WSSA group 1) herbicides (up to 4X the labelled rate) although none of the target site mutations previously known to confer resistance were detected. Our goal was to evaluate, using RNASeq, if any gene showed differential expression that could explain herbicide resistance. Both RNASeq results and confirmation by Reverse-Transcriptase Quantitative PCR (QRT-PCR) indicate an increase in the level of expression of the target gene involved in the production of ACCase. The number of transcripts was 3.4 to 9.3 times higher in the resistant biotype compared to the susceptible population. The high variability of ACCase transcript levels in the resistant plants could be indicative of a genomic architecture promoting higher expression. The

	QRT-PCR assay developed could serve as a diagnostic tool when ACCase inhibitor resistance is suspected.
46	**WHEN DO WILD OAT SEEDS BECOME VIABLE?** K. Neil Harker[1], Breanne D. Tidemann*[1], John T. O'Donovan[1], Chris Willenborg[2], Steve J. Shirtliffe[3], Eric N. Johnson[3], Larry Michielsen[1], Patty Reid[1]; [1]Agriculture and Agri-Food Canada, Lacombe, AB, [2]University Of Saskatchewan, Saskatoon, SK, [3]University of Saskatchewan, Saskatoon, SK Wild oat (*Avena fatua*) continues to be one of the most problematic weed species in western Canada due to high percentage of seed shatter, dormancy, large populations, and high frequencies of herbicide resistant populations. However, wild oat are known to extend their panicles above the crop canopy for crops such as wheat, and more predominantly for shorter crops such as lentil. The first year of a two year study was conducted in Lacombe, AB and Saskatoon, SK in lentil and wheat to determine when wild oat seeds become viable, based on weekly panicle clipping and removal. Panicle clipping for each crop began when the majority of panicles were visible above respective crop canopies. Preliminary results indicate that wild oat viability increases with time. However, while wild oat viability at the first of the panicle clipping timings in lentil was near zero, by the first panicle clipping in wheat viability was between 12 and 37%. Weed management techniques that aim to target the panicle must occur very quickly after wild oat panicle emergence above the crop canopy; later techniques will result in inputting of viable seed into the seedbank.
47	**CHEMICAL AND PHYSICAL MANAGEMENT OF WILD PARSNIP: A COMMUNITY, EXTENSION, RESEARCH PARTNERSHIP.** Mackenzie A. Lespérance*[1], Peter J. Smith[2], François J. Tardif[2]; [1]OMAFRA, Harrow, ON, [2]University of Guelph, Guelph, ON During the spring season of 2016, contacts were made between the Chippewas of Nawash Unceded First Nation on the Neyaashiinigmiing Reserve in Ontario, the University of Guelph and the Ontario Ministry of Agriculture, Food and Rural Affairs regarding the concerns of the community with the invasive weed wild parsnip (*Pastinaca sativa*). A program was devised which combined research to find effective solutions to the problem and education/training of local residents to ensure they can implement best management practices. Field trials took place in May 2016 and compared various herbicides and mechanical methods. Herbicides included professional products such as Truvist (aminocyclopyrachlor/chlorsulfuron), Milestone (aminopyralid), Clearview (aminopyralid/metsulfuron-methyl) and Roundup (glyphosate) as well as over-the-counter, ready-to-use (RTU) products containing glyphosate, acetic acid or short chain fatty acids. Physical practices were cutting, digging and burning. Clearview, Truvist and Roundup provided the most consistent control among professional products while Roundup-RTU was the only domestic product providing acceptable control. Digging plants provided complete control of mature parsnip while seedlings were best controlled with burning. A technology translation and transfer event was held to present research results and familiarize potential users to the best management practices for this weed.

48	**WEED SEEDS ORDER, 2016 / L'ARRÊTÉ DE 2016 SUR LES GRAINES DE MAUVAISES HERBES.** Anita Gilmer, Canadian Food Inspection Agency The Weed Seeds Order (WSO) is a ministerial order made pursuant to subsection 4(2) of the Seeds Act and plays a critical role in the prevention of the introduction of new weed species into Canada by prohibiting or limiting the presence of weed species in seed sold, or imported into Canada. The WSO is the tool used to identify and categorize weed species for the purposes of the import and sale of seed as well as for grading purposes. The WSO includes six classifications of weed seeds that are differentiated by level of risk. The most restrictive class, Class 1 Prohibited Noxious weed seeds, prohibits any level of the listed species. For species listed in Classes 2 to 6, the number of weed seeds that are permitted in a seed sample of a crop kind are specified in various tables of Schedule I of the Seeds Regulations. The WSO was recently updated with Weed Seeds Order, 2016 coming into force on November 1, 2016. Prior to WSO, 2016, the last large review of the WSO was completed in 2005 and one species was reclassified from Class 1 Prohibited Noxious to Class 2 Primary Noxious in 2007. The updates to WSO, 2016 include the addition of new species of concern, the reclassification of listed species within the WSO to reflect their current geographic distribution and removal of species that are now considered crop kinds. The complete WSO, 2016 can be found at the following website: http://laws.justice.gc.ca/eng/regulations/SOR-2016-93/index.html
49	**PMRA UPDATE**. Michael Downs*; Pest Management Regulatory Agency, Ottawa, ON In Canada, dual property products are regulated by the Pest Management Regulatory Agency (PMRA), and the Canadian Food Inspection Agency (CFIA). These products function as both pesticides (as defined in the Pest Control Products Act), and either fertilizers or supplements (as defined in the Fertilizers Act). A working group has been formed between the two Agencies to develop guidance on the regulation of these types of products. To date, the working group has clarified regulatory authorities and is developing a process for dual registration such that a product could be registered under both the Pest Control Products Act and the Fertilizers Act, with both types of claims appearing on a single product label.
50	**NEW BRUNSWICK UPDATE.** Gavin L. Graham*; NBDAAF, Fredericton, NB ForestInfo.ca - We're a group of researchers, scientists, government and industry working together to share resources and information about Forest Renewal and Vegetation Management. Members of our team are working in the field, in the lab, and at our desks to research and implement the best available practices to ensure long-term sustainability of our shared forest resources. By using the most current data and technology, we're helping to shape Canadian forests both today and for the future. Information on the website covers harvesting; replanting and renewal; vegetation management; growing and development; plus frequently asked questions. New Brunswick specific forest management information is addressed.
51	**ALBERTA UPDATE.** Chris Neeser,
52	**CFIA UPDATE.** Wendy Asbil, Canadian Food Inspection Agency

53	**NOVA SCOTIA UPDATE.** Angela Hughes, Nova Scotia Department of Agriculture
54	**MANITOBA UPDATE.** Jeanette Gaultier*; Manitoba Agriculture
55	**ONTARIO UPDATE – WEED APPS AND POISONOUS PLANTS.** Mike Cowbrough and Mackenzie A. Lespérance, OMAFRA Poisonous plants such as wild parsnip, tansy ragwort and hoary alyssum have been impacting Ontarians recently and OMAFRA in partnership with the University of Guelph have been evaluating best management practices which will be presented. The mobile smartphone app "pestmanager" will be demonstrated. Pestmanager is a free tool available at www.pestmanager.ca that allows a user to identify, map and search control options for weeds, insects and diseases that affect cereals, corn and soybean

PRESENTERS

#	Title	Presenting Author	Type	Assigned Section
52	CFIA Update	Asbil, Wendy	Oral	Provincial and Regulatory Reports
15	The effect of mechanical weed control (rotary hoeing, harrowing and inter-row cultivation) and crop seeding rate on yield and weed suppression in organically grown pea and lentil.	Alba, Oleksandr	Oral	Graduate Student Presentation
32	Management of Glyphosate Resistant Canada Fleabane and Common Ragweed with Arylex™ Active Plus Broadstrike RC Herbicides in Eastern Canada	Ashigh, Jamshid	Oral	Soybean, Corn, and Edible Beans
23	Wild blueberry production and the history of weed management	Burgess, Peter	Oral	Wild Blueberry Production
1	Nicosulfuron as a suppressant in a living mulch of annual Ryegrass (*Lolium multiflorum* Lam.) in corn (*Zea mays* L.).	Cholette, Taïga	Oral	Graduate Student Presentation
35	Community dynamics and management of invasive perennial grasses using mowing and prevention of grazing in Garry oak meadows over 7 years	Clements, David R.	Oral	Weed Biology and Ecology / Invasive and Noxious Weeds
18	Pyraflufen-ethyl: a new PPO inhibitor herbicide for pre-emergent broadleaf weed control prior to cereals, pulses and oilseeds in Canada.	Collier, Graham R.	Oral	Cereals, Oilseeds and Pulses
55	Ontario Update – Weed Apps and Poisonous Plants	Cowbrough, Mike	Oral	Provincial and Regulatory Reports
10	The cost and control of linuron resistant pigweed in carrots.	de Boer, Tessa J.	Oral	Graduate Student Presentation
17	Cirpreme™ Control of Perennial and Hard-to-Kill Annual Weeds in Western Canadian Cereal Crops	Degenhardt, Rory	Oral	Cereals, Oilseeds and Pulses
49	PMRA Update	Downs, Michael	Oral	Provincial and Regulatory Reports
25	Innovations and the future of herbicide applications in wild blueberry	Esau, Travis	Oral	Wild Blueberry Production
4	Halosulfuron Interactions with Other Tomato Herbicides	Eyamie, Jordan E.	Oral	Graduate Student Presentation
2	Evaluation of Summer broadcast and Spot Herbicide Applications for Goldenrod Management in Wild Blueberry	Farooq, Muhammad Hammad	Oral	Graduate Student Presentation
54	Manitoba Update	Gaultier, Jeanette	Oral	Provincial and Regulatory Reports
14	Influencing seed fate in the soil seedbank: volunteer canola	Geddes, Charles M.	Oral	Graduate Student Presentation

48	Weed Seeds Order, 2016 / L'Arrêté de 2016 sur les graines de mauvaises herbes	Gilmer, Anita	Poster	Provincial and Regulatory Reports
50	New Brunswick Update	Graham, Gavin L.	Oral	Provincial and Regulatory Reports
11	Management of Giant Hogweed with Selective Herbicides	Grguric, Meghan	Oral	Graduate Student Presentation
53	Nova Scotia Update	Hughes, Angela	Oral	Provincial and Regulatory Reports
27	Engaging students in research and discovery in the information age	Johnson, Eric N.	Oral	Teaching Weed Science
21	Evaluation of Harvest-Aid Herbicides as Desiccants in Lentil Production	Johnson, Eric N.	Oral	Cereals, Oilseeds and Pulses
45	Acetyl-CoA carboxylase overexpression in herbicide resistant crabgrass (*Digitaria sanguinalis*)	Laforest, Martin	Poster	Weed Biology and Ecology / Invasive and Noxious Weeds
40	Residual Weed Population Shifts in Manitoba 1978-2016	Leeson, Julia Y.	Poster	Cereals, Oilseeds and Pulses
47	Chemical and physical management of wild parsnip: a community, extension, research partnership.	Lespérance, Mackenzie A.	Poster	Weed Biology and Ecology / Invasive and Noxious Weeds
19	Paradigm™ Plus Simplicity™ Efficacy on White Cockle and Night Flowering Catchfly in Western Canadian Cereals	MacRae, Andrew W.	Oral	Cereals, Oilseeds and Pulses
3	Survey of herbicide resistance in common ragweed and wild oat in Quebec	Marsan-Pelletier, Félix	Oral	Graduate Student Presentation
39	A neighbour's light will stress you out	McKenzie-Gopsill, Andrew G.	Oral	Weed Biology and Ecology / Invasive and Noxious Weeds
5	Evaluation of Fall Herbicide Applications for Red Sorrel Management in Wild Blueberry.	Menapati, Rakesh K.	Oral	Graduate Student Presentation
51	Alberta Update	Neeser, Chris	Oral	Provincial and Regulatory Reports
37	A chrono-geographical assessment of glyphosate resistance in Canadian populations of *Conyza canadensis* L.	Page, Eric R.	Oral	Weed Biology and Ecology / Invasive and Noxious Weeds
8	Flax *(Linum usitatissimum)* Tolerance to PPO, HPPD, and VLCFA Inhibitors	Petruic, Moria	Oral	Graduate Student Presentation
12	Optimal Seeding Rates for Various Seed Size Classes of Faba bean (*Vicia faba)*	Pratchler, Jessica M.	Oral	Graduate Student Presentation
33	Do cultivar and saflufenacil application timing influence development, growth response and yield of succulent pea?	Robinson, Darren E.	Oral	Horticulture and Special Crops

43	Evaluating the Critical Weed Free Period of *Glycine max* (L.) Grown in Narrow vs. Wide Row Spacing in Northern Climates	Rosset, Jonathan D.	Poster	Soybean, Corn, and Edible Beans
6	Distribution and Control of Glyphosate-resistant Waterhemp (Amaranthus tuberculatus var. rudis) in Soybean (Glycine max) in Ontario	Schryver, Mike	Oral	Graduate Student Presentation
26	Case studies in the classroom	Sikkema, Peter H.	Oral	Teaching Weed Science
30	Control of glyphosate resistant Canada fleabane in corn/soybean/wheat rotation	Sikkema, Peter H.	Oral	Soybean, Corn, and Edible Beans
44	How much seed can uncontrolled Canada fleabane (*Conyza canadensis*) plants produce in spring wheat, corn and soybean?	Simard, Marie-Josee	Poster	Weed Biology and Ecology / Invasive and Noxious Weeds
16	Pixxaro™ for Annual Broadleaf Weed Control in Eastern Canada Cereal Crops	Smith, Laura R.	Oral	Cereals, Oilseeds and Pulses
42	Effect of time of day on efficacy of saflufenacil to control glyphosate resistant Canada fleabane in soybean	Soltani, Nader	Poster	Soybean, Corn, and Edible Beans
41	Soybean injury from dicamba and 2,4-D Tank contamination	Soltani, Nader	Poster	Soybean, Corn, and Edible Beans
29	Plant Community Assembly	Swanton, Clarence	Oral	Teaching Weed Science
36	Plant competition and the concept of an energy imbalance	Swanton, Clarence	Oral	Weed Biology and Ecology / Invasive and Noxious Weeds
20	Targeting weed seed production and dispersal to manage herbicide resistant weeds	Syrovy, Lena D.	Oral	Cereals, Oilseeds and Pulses
31	The Fight Against Herbicide Resistance: Enlisting New Technologies to Facilitate the Adoption of Integrated Weed Management.	Tardif, François J.	Oral	Soybean, Corn, and Edible Beans
38	Suitability of Western Canadian Weeds for Harvest Weed Seed Control	Tidemann, Breanne D.	Oral	Weed Biology and Ecology / Invasive and Noxious Weeds
46	When do Wild Oat Seeds Become Viable?	Tidemann, Breanne D.	Poster	Weed Biology and Ecology / Invasive and Noxious Weeds
22	Pre- or post-emergence management of glyphosate-resistant canola in glyphosate-resistant soybean crops	Tozzi, Eric	Oral	Cereals, Oilseeds and Pulses
9	Two-Pass Weed Management Strategies in Conventional and No-till Dicamba Resistant Soybean	Underwood, Matthew G.	Oral	Graduate Student Presentation
13	Foxtail barley (*Hordeum jubatum*) control requires residual herbicides	Vercaigne, Mathew	Oral	Graduate Student Presentation
24	Challenges and current weed research in wild blueberry	White, Scott N.	Oral	Wild Blueberry Production

34	Seed bank characteristics, seedling emergence, flowering biology, and susceptibility of hair fescue (*Festuca filiformis*) to herbicides in wild blueberry.	White, Scott N.	Oral	Horticulture and Special Crops
28	Aspirations of achievement - do demographic factors determine who succeeds in your classroom?	Willenborg, Christian J.	Oral	Teaching Weed Science
7	Evaluation of foramsulfuron for postemergence perennial grass management in wild blueberry (*Vaccinium augustifolium* Ait)	Zhang, Linshan	Oral	Graduate Student Presentation

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