



Meet with the scientists of the Organic Science Cluster 3

The Organic Science Cluster 3 Project (2018-2023) includes 27 research activities that are grouped under five themes: Field crops, horticulture, pest management, livestock and environment. The Science Coordination is under the responsibility of Dr. Andy Hammermeister, the director of the Organic Agriculture Centre of Canada (OACC), at Dalhousie University. That is activity no 1.



Dr. Andrew Hammermeister
OACC, Dalhousie University

Field Crops



Xueming Yang
AAFC Harrow



Istvan Rajcan
University of Guelph



Steve Shirtliffe
University
of Saskatchewan



Martin Entz
University of Manitoba



Jennifer Mitchell Fetch
AAFC Brandon

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| 2 | Development of breeding strategies for organic soybean production systems in Canada. Istvan Rajcan, University of Guelph | Field Farms Marketing Ltd, Organic Council of Ontario, Manitoba Pulse and Soybean Growers, Grain Farmers of Ontario, Western Grains Research Foundation |
| <p>The main objective of Dr. Istvan Rajcan is to build knowledge on how to efficiently develop, through plant breeding, new soybean cultivars for organic (O) growers to maximize competitiveness, efficiency and volume of production. For the first time in Canada, a detailed description of comparative performance of soybean cultivars grown on O vs. non-O production systems over several years and locations will be made available to the O agriculture sector.</p> | | |
| 3 | Evaluation of farmer-selected wheat, oat and potato genotypes under organic production in eastern and western Canada. Martin Entz, University of Manitoba | Western Grains Research Foundation, Organic Alberta, USC Canada - Bauta Family Initiative Canada, ACORN |
| <p>Between 2011 and 2017, over 50 farmers across Canada were involved in selection of wheat, oats and potato crosses on their own organic farms. Dr. Entz's objective is to test these farmer-selected lines under a range of organic growing conditions in order to evaluate the genetic improvement in these crops and their adaptation to the unique conditions of organic production. His work will contribute to a deeper understanding of the role of farmers in variety development for organic production and evaluates a new model for crop breeding in Canada.</p> | | |
| 4 | Efficacy of using cover crops in 2 of the 3 growing seasons on nitrogen supply in an organic soybean-winter wheat-corn rotation. Xueming Yang, AAFC Harrow | Grain Farmers of Ontario |
| <p>Dr. Yang wants to develop a new rotation system for organically managed cropping systems in Southern Ontario, so to create year-round cropping. This rotation will include two seasons of winter-hardy legume cover crops in organically managed soybean-wheat-corn rotation which can supply corn and wheat with sufficient amounts of nitrogen (fixed by legumes) and thereby maintain / improve soil fertility/health. The proposed rotation would provide growing crops in both the summer growing period as well as in the late fall and early spring periods.</p> | | |
| 5 | Organic oat breeding / oat cultivars specifically developed for organic production systems in Canada. Jennifer Mitchell Fetch, AAFC Brandon | Grain Millers Inc, Nature's Path, Prairie Oat Growers Association |
| <p>Organic oat growers, processors and consumers continue to ask for cultivars developed for their unique systems and needs. Dr. Mitchell Fetch's objective is to develop milling quality oat cultivars suitable for organic production in western Canada, and potentially across Canada</p> | | |



Myriam Fernandez
AAFC Swift Current



Raja Ragupathy
AAFC Lethbridge



Jamie Larsen
AAFC Harrow



Reynald Lemke
AAFC Saskatoon



Bobbi Helgason
University of Saskatchewan



Julie-Anne Wilkinson
CETAB+

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| 6 | <p>Breeding of winter cereals to benefit no-till organic production systems. Raja Ragupathy, AAFC Lethbridge Jamie Larsen, AAC Harrow</p> | <p>Western Grains Research Foundation, FP Genetics, SeCan, Saskatchewan Winter Cereals Development Commission, Duban Farms Ltd, Organic Alberta</p> |
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Frequent soil disturbance is one of the key tools for farmers to manage weeds in organic production systems.

The activity will focus on the development of improved open-pollinated fall (winter) rye and winter triticale cultivars suitable for roller crimping in no-till organic production systems

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| 7 | <p>Optimizing yield and resilience of organically grown milling oat. Steve Shirliffe, University of Saskatchewan</p> | <p>Western Grains Research Foundation</p> |
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Milling quality oats are a mainstay of organic crop production in western Canada and currently occupy 21% of organic prairie field crop area. High quality organic oat is in demand for use in products such as cereals and energy bars. The activity led by Dr. Shirliffe will target the development of an organic oat production system that optimizes yield, resilience and profits.

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| 8 | <p>The right balance: management strategies for plugging organic soil health constraints and moving forward. Reynald Lemke, AAFC Saskatoon Bobbi Helgason, University of Saskatchewan</p> | <p>Orval G. Caldwell and H. Ruth Gardner Caldwell Fellowship in Sustainable Agriculture/Agroecology, Organic Agriculture Fund Private Endowment, Western Grains Research Foundation, Leffers Brothers Ltd, City of Saskatoon, University of Saskatchewan, SaskWheat Development Commission</p> |
| <p>Dr. Reynald Lemke will address biotic and abiotic stresses that present serious challenges to the thriving prairie organic crop sector. His team will aim to calibrate soil C inputs to N and P turnover and maximize pest suppression. A balanced “ration” of C, N and P will support healthy agricultural soils using principles applicable to both organic and conventional production systems.</p> | | |
| 9 | <p>Diversified cropping strategies to improve sustainability of organic crop production in the Brown soil zone. Myriam Fernandez, AAFC Swift Current</p> | <p>Western Grains Research Foundation, Grain Millers Inc, Imperial Seeds, Cody Straza, Blair Metke</p> |
| <p>Dr. Fernandez will investigate if diversified cropping systems that include cover crop mixtures or continuous relay cropping can improve the productivity and sustainability of organic systems in the Brown soils of western Canada and beyond.</p> | | |
| 10 | <p>Agronomic performance, resilience and baking quality of wheat cultivar mixtures adapted to organic management in Eastern Canada. Julie Anne Wilkinson / Andre Comeau, Centre d’expertise et de transfert en agriculture biologique et de proximité (CETAB+)</p> | <p>La Milanaise</p> |
| <p>The activity led by Julie Anne Wilkinson will</p> <ul style="list-style-type: none"> - Combine varieties with interesting agronomic traits for weed control, lodging, insect and disease resistance; - Assess baking quality of wheat varieties grown in mixtures; - Formulate one or more variety mixtures adapted to the diverse climatic conditions of Eastern Canada. | | |

Horticulture



Martine Dorais
Université Laval



Sean Smukler
University of British Columbia



Caroline Côté
IRDA



Liette Vasseur
Brock University



Hannah Wittman and Alexandra Lyon
University of British Columbia

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| 11 | <p>Participatory variety trialing and breeding for commercial organic vegetable growers and seed producers in Canada. Hannah Wittman, Alexandra Lyon, University of British Columbia</p> | <p>USC Canada - Bauta Family Initiative, University of Toronto, University of British Columbia</p> |
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The activity led by Dr. Wittman will characterize and develop varieties that excel in regional organic farming systems. A collaborative varietal development research network consisting of organic farmers, university researchers, and industry stakeholders will 1) evaluate existing commercial varieties and breeding lines of select vegetable crops 2) collect crop functional trait data that will be used to assess crop performance in organic systems; and 3) implement an on-farm participatory plant breeding program to create new breeding populations and finished varieties of three crops (cabbage, bell pepper and either tomato or squash).

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| 12 | <p>Development of an organically managed baby greens production system: a multidisciplinary approach. Caroline Côté, Institut de recherche et de développement en agroenvironnement (IRDA)</p> | <p>Vert Nature</p> |
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The general objective of the project is to develop an organically managed baby greens production system. It will optimize false seedbed operations, evaluate weeding operations including potential organic herbicides, evaluate trap crops on flea beetle populations and crop damages, the use of bioinsecticides and predators on thrips populations and cropping systems on baby greens yields.

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| 13 | Organic vertical farming vs. smart use of greenhouses. Martine Dorais, Université Laval | L'Abri végétal, Inno 3B, Premier Tech |
| <p>The general objective of Martine Dorais' study is to develop a smarter use of light, energy and natural resources to produce organic vegetables year-round, thereby reducing ecological footprints and increasing food and nutritional security, sustainability and farm competitiveness/profitability. This will be achieved by developing an organic accredited cropping system using Inno-3B's proprietary closed production technology, and by the intensification of organic greenhouse production via the use of LED lighting.</p> | | |
| 14 | Improving organic vegetable farm sustainability through enhanced nutrient management planning. Sean Smukler, University of British Columbia | Anonymous |
| <p>The project led by Sean Smukler will increase the capacity of organic vegetable farmers to efficiently utilize nutrients and thus increase the economic and environmental performance of their farming system. It will identify improved nutrient management strategies for enhanced production, environmental and economic outcomes, refine models for estimating plant available nitrogen and develop an online tool for effective organic nutrient management planning.</p> | | |
| 15 | Unique cover crops, rootstocks, and irrigation techniques for Canadian vineyards. Liette Vasseur & Andrew Reynolds, Brock University; Mehdi Sharifi, AAFC Summerland | BC Wine Grape Council, Heather Laundry's Vineyard, Southbrook Vineyards, Brock University |
| <p>The project aims to develop and test the feasibility and impact novel strategies, including combinations of cover crops, rootstocks, and irrigation, for enhancing vineyard soil health and thus grape production and quality in two major wine growing regions of Canada (British Columbia (BC) and Ontario (ON)). The ultimate goal is to enhance the resilience of this agroecosystem in the face of climate change and greater use of horticulturally sustainable practices.</p> | | |
| 16 | Physical control of pests and increasing the harvesting season via an innovative high tunnel adapted to organic berry farming, rain shelter and insect-proof nets. Martine Dorais, Université Laval | Fraises de l'Île d'Orléans, Les Industries Harnois Inc, Dubois Agrinovation |
| <p>Dr. Martine Dorais' objective is to improve crop productivity, fruit quality, and profitability of Canadian berry farms by 1) Designing and validating for organic ever-bearing raspberry a new generation of high tunnels with an automatic retractable roof, new covering materials and insect barrier to increase/extend the growing season by two months and minimize insect pest populations compared to commercially existing high tunnels, and 2) Investigating the efficacy and profitability of rain shelters and insect-proof nets supported by lightweight in organic summer – and/or ever-bearing raspberry production structures.</p> | | |

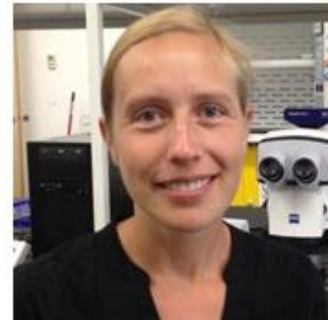
Pest Management



Caroline Provost
CRAM



Juli Carrillo
University of British Columbia



Annabelle Firlej
IRDA



Simon Lachance
University of Guelph



Manish Raizada
University of Guelph



Todd Kabaluk
AAFC Agassiz

17 **Optimizing tillage and competitive green manures for Canada thistle control.** Western Grains Research Foundation
Steve Shirliffe, University of Saskatchewan

With his team, Dr. Steve Shirliffe will develop an organic strategy to control Canada thistle. He will identify practices that reduce density and patch size of Canada thistle infestations, measure the cumulative effects of different management systems on Canada thistle density and patch size, and measure the impacts of Canada thistle management systems on soil quality.

18 **Potential of predatory bugs (*Nabis* and *Orius*) as biological control agents of the tarnished plant bug (*Lygus lineolaris*) in organic strawberry field.** Centre de recherche agroalimentaire de Mirabel, Institut national de recherche scientifique, Association des producteurs de fraises et framboises du Québec, UQAM
Caroline Provost, Centre de recherche agroalimentaire de Mirabel (CRAM)

The main objective of the project is to determine the potential of two predatory bugs, *Orius insidiosus* and *Nabis americanoferus*, as new potential biocontrol agents of the tarnished plant bug (TPB) *Lygus lineolaris*, and to optimize their role in organic strawberry fields.

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| 19 | <p>Saponins as inducers of host resistance for insect and disease management in organic greenhouse production. Simon Lachance, University of Guelph</p> | <p>Erievue Acres, Freeman Herbs, Ontario Greenhouse Vegetable Growers</p> |
| <p>Pest control treatments based on natural sources (e.g. biopesticides) have experienced remarkable growth globally, but very few are registered for Ontario greenhouse crops, or field-grown crops. The research led by Dr. Simon Lachance will investigate the efficacy of naturally occurring saponins as a preventative pest management practice inducing plant defense and as a protective insect repellent.</p> | | |
| 20 | <p>Ecological pest management for Spotted Wing Drosophila. Juli Carrillo, University of British Columbia, Annabelle Firlej, IRDA</p> | <p>Terramera, Carillo Lab, Association des producteurs de fraises et framboises du Québec, Université de Montréal, University of New-Brunswick, BC Blueberry Council, BC Strawberry Growers Association, Raspberry Industry development Council</p> |
| <p>Spotted Wing Drosophila (<i>Drosophila suzukii</i>, SWD) is a top priority for entomological and agricultural research programs because of the negative impact on global small fruit production. Dr. Carrillo's team will develop multiple, independent strategies for spotted wing drosophila pest management, with a focus on ecological and organic methods of control.</p> | | |
| 21 | <p>Managing wireworms in vegetable crops using novel tactics. Todd Kabaluk, AAFC Agassiz</p> | <p>Enterra Feed Corp., Red Soil Organics, Amara Farm, GWR Visser Farm, Fraser Valley Organic Producers Assoc., Lower Mainland Hort.Improv. Assoc., Mid-Island Farmers Institute, PEI Potato Board, PEI COPC, Snow Farms Ltd, Terralink-Biofert, ES Cropconsult Ltd, Eatmore Sprouts & Greens Ltd, Fraserland Organics, Grower's Supply Co. Ltd, West Coast Seeds, Simon Fraser University, Univ. of Applied Sciences, KPU</p> |
| <p>Wireworms are subterranean and seriously pestilent larvae of agricultural crops. Dr. Kabaluk will evaluate products and practices that maintain wireworms at levels acceptable for profitable production of smaller-scale horticultural food crops, such as modeling wireworm feeding activity and relating it to optimal planting and harvest times and assessing cultural and mechanical practices for managing wireworm populations.</p> | | |
| 22 | <p>Biological control and management of Fusarium head blight and associated diseases in organic grain production. Manish Raizada / Myriam Fernandez, University of Guelph / AAFC Swift Current</p> | <p>Grain Farmers of Ontario, Alberta Wheat Commission, Saskatchewan Wheat Development Commission, Prairie Heritage Seeds, Denis Brisebois, Martin Meinert, Dwayne Smith</p> |
| <p>The activity co-led by Dr. Raizada and Dr. Fernandez will (1) To determine the potential of safe probiotics and other biocontrol agents (BCAs) to combat root rot and kernel pathogens (focusing on Fusarium head blight, FHB) and maximize crop productivity and quality in organic cereal rotation systems; and (2) to identify crop production factors that promote or suppress the development of FHB and other important kernel diseases in organic cereal crops grown in SK.</p> | | |

Livestock



James Squires
University of Guelph



Moussa Diarra
AAFC Guelph

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| 24 | Optimization of berry by-products use in organic poultry production. Moussa Diarra, AAFC Guelph | Wild Blueberry Association of North America, Fruit d'or, Centre de recherche en sciences animales de Deschambault, Rosebank Farms |
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Organic poultry production standards require free range systems. However, the outdoor access could increase exposure to environmental pathogenic bacteria of poultry health and food safety concerns for which control remains challenging. Dr. Diarra and his team will optimize the benefits to broiler chicken's performance, health and production environment derived from the organic cranberry and low-bush blueberry pomaces.

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| 25 | Welfare friendly alternative to surgical castration for organic pigs. James Squires, University of Guelph | Canadian Center Swine Improvement |
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The activity led by Dr. Squires will identify and validate genetic selection as a sustainable and welfare friendly alternative to surgical castration in piglets of various breeds, including heritage breeds used in organic production systems.

Environment



Jason Gibbs
University of Manitoba



Peter Tyedmers
Dalhousie University



Henry Wilson
AAFC Brandon



Kimberly Schneider
AAFC Guelph



Derek Lynch
Dalhousie University

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| 26 | <p>The effects on soil biology, soil chemistry, and water quality of amending organically managed soils with struvite. Henry Wilson, AAFC Brandon Kimberly Schneider, University of Guelph</p> | <p>Ostara Nutrient Recovery Technologies Inc, Organic Food Council of Manitoba, Western Grains Research Foundation</p> |
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Organic grain and forage producers need to alleviate deficiency in a variety of soil types with low availability of soil phosphorus (P), while avoiding non-renewable P sources. The objective of the research is to evaluate grain and forage yields, soil health, arbuscular mycorrhizal root colonization, and runoff water quality following fertilization with high purity struvite produced by the Pearl® process to alleviate P deficiency in low P input grain and forage production systems.

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| 27 | <p>Soil health in organic tillage-based systems. Derek Lynch, Dalhousie University</p> | <p>Grower participants</p> |
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The activity led by Dr. Lynch will determine how to sustain soil organic C and improve soil health within intensive organic grain cropping systems. It will be conducted on twelve commercial organic grains farms and a replicated research trial in Quebec, will directly address a key issue for organic cropping systems of how tillage management, and including intensity of tillage use, influences the potential trade-offs between cash crop yields and maintenance of ecosystem services.

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| 28 | Increasing pollination, biological control and beneficial insect diversity farms using flowering habitats. Jason Gibbs, University of Manitoba | Western Grains Research Foundation, Grower participants |
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Beneficial insects provide ecosystem services that can improve the sustainability of crop production. The project will assess the benefits of flowering habitat enhancements on field margins for increasing beneficial insects, including pollinators and natural enemies, and pollination and biocontrol services in both organic and conventional farms.

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| 29 | Net life cycle greenhouse gas emissions of Canadian organic field crop production systems. Peter Tyedmers, Dalhousie University | Grower participants |
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Taken together, food systems contribute a large share of global greenhouse gas emissions. Given the scale and growth of organic field crop production in Canada (>300,000 ha in 2015), and the importance of their products in organic food and feed production, the activity led by Dr. Tyedmers will undertake robust, regionally-resolved analyses of the life cycle greenhouse gas (GHG) emissions characteristic of the 6+ major field crops typically grown in rotation.