



Meet the Scientists

The Organic Federation of Canada (OFC) in collaboration with the Organic Agriculture Centre of Canada (OACC) at Dalhousie University are pleased to introduce **Organic Science Cluster 3 (OSC3): Connecting Environmental Sustainability with the Science of Organic Production.**

OSC3 is supported by the AgricScience Program under Agriculture and Agri-Food Canada's Canadian Agricultural Partnership (an investment by federal, provincial, and territorial governments) and over 70 partners from the agricultural community.



SCIENCE COORDINATION & COMMUNICATION



The OSC3 project includes 27 research activities under five themes: field crops, horticulture, pest management, livestock and environment. The coordination of the science among these activities within OSC3 is under the responsibility of Dr. Andy Hammermeister (Director of the OACC, left), Margaret Graves (Program Manager with OACC, center), and Nicole Boudreau (Coordinator with OFC, right). The OSC3 program also includes a Science Communication plan that distributes and promotes the results of OSC3 research results to stakeholders who can use it across Canada. The Science Communications plan is managed jointly by the team above with the support of Emma Geldart (Communications Officer with OACC).

FIELD CROPS



2

Development of breeding strategies for organic soybean production systems in Canada.

Istvan Rajcan, University of Guelph

Dr. Rajcan's objective is to build knowledge on developing new soybean cultivars using plant breeding for organic growers. New cultivars would maximize competitiveness, efficiency and volume of production. For the first time in Canada, Dr. Rajcan will carry out a detailed comparison of soybean cultivars grown on organic versus non-organic production systems, over several years and locations.

Partners: Field Farms Marketing Ltd, Organic Council of Ontario, Manitoba Pulse and Soybean Growers, Grain Farmers of Ontario, Western Grains Research Foundation



3 Evaluation of farmer-selected wheat, oat and potato genotypes under organic production in eastern and western Canada.

Martin Entz, University of Manitoba

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 evaluate a new model for crop breeding in Canada.

Partners: Western Grains Research Foundation, Organic Alberta, USC Canada - Bauta Family Initiative Canada, ACORN



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

Dr. Yang wants to develop a new, year-round rotation system for organically managed crops in Southern Ontario. 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 or improve soil fertility and health. The proposed rotation would provide growing crops in the summer growing period, as well as in the late fall and early spring.

Partner: Grain Farmers of Ontario



5 Organic oat breeding / oat cultivars specifically developed for organic production systems in Canada.

Jennifer Mitchell Fetch, AAFC Brandon

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.

Partners: Grain Millers Inc, Nature's Path, Prairie Oat Growers Association



6 Breeding of winter cereals to benefit no-till organic production systems.

*Raja Ragupathy (left), AAFC Lethbridge
Jamie Larsen (right), AAC Harrow*

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.

Partners: Western Grains Research Foundation, FP Genetics, SeCan, Saskatchewan Winter Cereals Development Commission, Duban Farms Ltd, Organic Alberta



7 Optimizing yield and resilience of organically grown milling oat.

Steve Shirtliffe, University of Saskatchewan

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. Shirtliffe, will target the development of an organic oat production system that optimizes yield, resilience and profits.

Partner: Western Grains Research Foundation



8 The right balance: management strategies for plugging organic soil health constraints and moving forward.

*Reynald Lemke (left), AAFC Saskatoon
Bobbi Helgason (right), University of Saskatchewan*

Dr. Lemke and Dr. Helgason will address biotic and abiotic stresses that present serious challenges to the thriving prairie organic crop sector. His team will aim to calibrate soil carbon inputs to nitrogen and phosphorus turnover and maximize pest suppression. A balanced "ration" of carbon, nitrogen and phosphorus will support healthy agricultural soils using principles applicable to both organic and conventional production systems.

Partners: 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



9 Diversified cropping strategies to improve sustainability of organic crop production in the Brown soil zone.constraints and moving forward.

Myriam Fernandez, AAFC Swift Current

Dr. Fernandez will investigate diversified cropping systems that include cover crop mixtures or continuous relay cropping. The goal is to improve the productivity and sustainability of organic systems in the Brown soils of western Canada and beyond.

Partners: Western Grains Research Foundation, Grain Millers Inc, Imperial Seeds, Cody Straza, Blair Metke



10 Agronomic performance, resilience and baking quality of wheat cultivar mixtures adapted to organic management in Eastern Canada.

*Julie Anne Wilkinson
André Comeau
Centre d'expertise et de transfert en agriculture biologique et de proximité (CETAB+)*

The activity, led by Dr. André Comeau and Julie Anne Wilkinson, will combine varieties with interesting agronomic traits for weed control, lodging, insect and disease resistance; assess baking quality of wheat varieties grown in mixtures; and formulate one or more variety mixtures adapted to the diverse climatic conditions of Eastern Canada.

Partner: La Milanaise

HORTICULTURE



11 Participatory variety trialing and breeding for commercial organic vegetable growers and seed producers in Canada.

Hannah Wittman (left)
Alexandra Lyon (right)
University of British Columbia

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).

Partners: USC Canada - Bauta Family Initiative, University of Toronto, University of British Columbia



12 Development of an organically managed baby greens production system: a multidisciplinary approach.

Caroline Côté, Institut de recherche et de développement en agroenvironnement (IRDA)

The 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 damage, evaluate the use of bioinsecticides and predators on pest populations and look at the effect of cropping systems on baby greens yield.

Partner: Vert Nature



13 Organic vertical farming vs. smart use of greenhouses.

Martine Dorais, Université Laval

The general objective of Dr. 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 improving food security, sustainability, farm competitiveness and 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.

Partners: L'Abri végétal, Inno 3B, Premier Tech



14 Improving organic vegetable farm sustainability through enhanced nutrient management planning.

Sean Smukler, University of British Columbia

Dr. Smukler aims to increase the capacity of organic vegetable farmers to efficiently utilize nutrients, thus increasing the economic and environmental performance of their farming systems. The research activity 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.

Partner: Anonymous



15 Unique cover crops, rootstocks, and irrigation techniques for Canadian vineyards.

Liette Vasseur (left), Brock University
Mehdi Sharifi (right), AAFC Summerland

The project aims to develop and test the feasibility and impact of novel strategies in two major wine growing regions of Canada (British Columbia and Ontario). Combinations of cover crops, rootstocks, and irrigation will be evaluated for enhancing vineyard soil health, and thus grape production and quality. The ultimate goal is to enhance the resilience of this agroecosystem in the face of climate change and increase the use of horticulturally sustainable practices.

Partners: BC Wine Grape Council, Heather Laundry's Vineyard, Southbrook Vineyards, Brock University



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

Dr. Dorais' objective is to improve crop productivity, fruit quality, and profitability of Canadian berry farms. She and her team will design and validate a new generation of high tunnels with an automatic retractable roof, new covering materials, and an insect barrier, to extend the growing season and minimize insect pests in organic raspberry. The activity will also investigate the efficacy and profitability of rain shelters and insect-proof nets in organic raspberry production structures.

Partners: Fraises de l'Île d'Orléans, Les Industries Harnois Inc, Dubois Agrinovation

PEST MANAGEMENT



17 Optimizing tillage and competitive green manures for Canada thistle control.

Steve Shirtliffe, University of Saskatchewan

With his team, Dr. Shirtliffe 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.

Partner: Western Grains Research Foundation



18 Potential of predatory bugs (Nabis and Orius) as biological control agents of the tarnished plant bug (Lygus lineolaris) in organic strawberry field.

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 americana*, as new potential biocontrol agents of the tarnished plant bug (TPB) *Lygus lineolaris*, and to optimize their role in organic strawberry fields.

Partners: Centre de recherche agroalimentaire de Mirabel, Institut national de recherche scientifique, Association des producteurs de fraises et framboises du Québec, UQAM

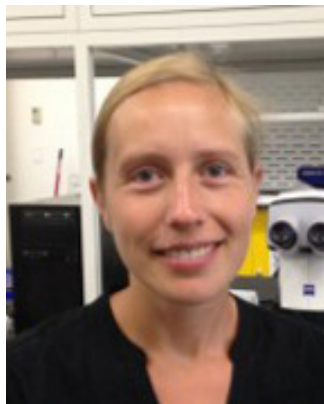


19 Saponins as inducers of host resistance for insect and disease management in organic greenhouse production.

Simon Lachance, University of Guelph

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.

Partners: Erievue Acres, Freeman Herbs, Ontario Greenhouse Vegetable Growers



20 Ecological pest management for Spotted Wing Drosophila.

Juli Carrillo, University of British Columbia
Annabelle Firlej, IRDA

Spotted Wing Drosophila (*Drosophila suzukii*, 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.

Partners: Terramera, British Columbia Blueberry Council, Raspberry Industry Development Council (BC), British Columbia Strawberry Growers Association, UBC Faculty of Land and Food Systems, Michael Smith Laboratories, Active AgriScience, Association des producteurs de fraises et de framboises du Québec, Université de Montréal, University of New Brunswick



21 Managing wireworms in vegetable crops

Todd Kabaluk, AAFC Agassiz

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.

Partners: 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



22 Biological control and management of Fusarium head blight and associated diseases in organic grain production.

Manish Raizada (left), University of Guelph
Myriam Fernandez (right), AAFC Swift Current

The activity, co-led by Dr. Raizada and Dr. Fernandez, will determine the potential of safe probiotics and other biocontrol agents to combat root rot and kernel pathogens (focusing on Fusarium head blight, FHB) and maximize crop productivity and quality in organic cereal rotation systems. The activity will also identify crop production factors that promote or suppress the development of FHB and other important kernel diseases in organic cereal crops grown in Saskatchewan.

Partners: Grain Farmers of Ontario, Alberta Wheat Commission, Saskatchewan Wheat Development Commission, Prairie Heritage Seeds, Denis Brisebois, Martin Meinert, Dwayne Smith

LIVESTOCK



24 Optimization of berry by-products use in organic poultry production.

Moussa Diarra, AAFC Guelph

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 food safety, using feed additives derived from organic cranberry and low-bush blueberry pomaces.

Partners: Wild Blueberry Association of North America, Fruit d'or, Centre de recherche en sciences animales de Deschambault, Rosebank Farms



25 Welfare friendly alternative to surgical castration for organic pigs.

James Squires, University of Guelph

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.

Partner: Canadian Center Swine Improvement

ENVIRONMENT



26 The effects on soil biology, soil chemistry, and water quality of amending organically managed soils with struvite.

Henry Wilson (left), AAFC Brandon
Kimberly Schneider (right), University of Guelph

Organic grain and forage producers need to alleviate deficiency in a variety of soil types with low availability of soil phosphorus, while avoiding non-renewable phosphorus 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 phosphorus deficiency in low phosphorus input grain and forage production systems.

Partners: Ostara Nutrient Recovery Technologies Inc, Organic Food Council of Manitoba, Western Grains Research Foundation



27 Soil health in organic tillage-based systems.

Derek Lynch, Dalhousie University

The activity, led by Dr. Lynch, will determine how to sustain soil organic carbon 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. The activity 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.

Partners: Grower participants



28

Increasing pollination, biological control and beneficial insect diversity farms using flowering habitats.

Jason Gibbs, University of Manitoba

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.

Partners: Western Grains Research Foundation, Grower participants



29

Net life cycle greenhouse gas emissions of Canadian organic field crop production systems.

Peter Tyedmers, Dalhousie University

Taken together, food systems contribute a large share of global greenhouse gas emissions. This includes the scale and growth of organic field crop production in Canada (>300,000 ha in 2015), and the importance of its products in organic food and feed production. Dr. Tyedmers will undertake robust, regionally-resolved analyses of the life cycle greenhouse gas emissions characteristic of the 6+ major field crops typically grown in rotation.

Partners: Grower participants

