organic SCIENCE CLUSTER 4

Meet The Scientists

Organic Science Cluster 4: Advancing the Sustainability of Canadian Agriculture

Managed by the Organic Federation of Canada (OFC) in collaboration with the Organic Agriculture Centre of Canada (OACC) at Dalhousie University, Organic Science Cluster 4 (OSC4) spans five years (2023-2028) and includes 14 research activities led by Canadian scientists committed to improving the sustainability of organic farming systems.

OACC consultations with organic sector stakeholders identified research priorities and guided selection of the OSC4 research activities. OSC4 brings together close to 50 researchers across 10 universities and 13 research centres working towards innovation and organic best practices in field crops, horticulture, pest management, livestock and environment.

FIELD CROPS

Activity 5 — Long-term C and N_2O monitoring, and climate-smart management of organic grain production systems

Dr. Martin Entz
University of Manitoba

Dr. Martin Entz is comparing nitrous oxide emissions and soil carbon in side-by-side long-term organic and conventional production systems including wheat, oats and flax. He is also testing annual and perennial legume management systems to determine best practices to reduce nitrous oxide emissions and increase nitrogen use efficiency.

Partners: Grain Millers, Jarislowsky Foundation, Mario Tenuta, Prairie Oat Growers Association (POGA), Western Grains Research Foundation (WGRF)

Activity 7 — Optimizing the environmental and agronomic co-benefits of recycled phosphorus inputs for organic field crops

Dr. Joanne Thiessen Martens
University of Manitoba

Dr. Henry Wilson
AAFC Brandon

Dr. Joanne Thiessen Martens and Dr. Henry Wilson are exploring the potential for diverting nutrient-rich waste products into recycled phosphorus inputs for organic field crop production in the Canadian Prairies. Finding safe and effective high-phosphorus fertilizers will boost the productivity and long-term resilience of the organic sector.

Partners: EnviroClean, Manitoba Crop Alliance, Manitoba Forage & Grassland Association, Manitoba Organic Alliance, Manitoba Organic Development Fund, Organic Alberta, Ostara Nutrient Recovery Technologies Incorporated, SaskOrganics, Western Grains Research Foundation (WGRF)

HORTICULTURE

Dr. Liette Vasseur
Brock University

Activity 8 — Promoting an integrative landscape approach in vineyards for greater resilience in the face of climatic and environmental changes

Dr. Liette Vasseur is using a landscape approach to examine how increased use of native plant species in vineyards and perimeters can enhance ecosystem services. She and her team will monitor soil health, water infiltration, climate regulation, and weed and pest pressure to assess the impact of enhanced biodiversity on productivity and resilience. These strategies could help meet the demand for wine products with a smaller environmental footprint.

Partners: Brock University, Ontario Ministry of Agriculture, Food and Rural Affairs (OMAFRA), Mitacs, Organic Council of Ontario (OCO), Promiscuo Wines & Rosehall Garden Vineyard, Southbrook Vineyard, Tawse Family Vineyard

Dr. Martine Dorais
Université Laval

Activity 12 — Plant-based fertilizers, biochar and intercropping to improve the sustainability and resilience of organic greenhouse agroecosystems

Dr. Martine Dorais and her team are examining plant-based fertilizers, biochar and intercropping as alternative amendments and crop management strategies in organic greenhouse agroecosystems. They aim to improve nutrient use efficiency, soil health, carbon sequestration and crop productivity while minimizing greenhouse gas emissions.

Partners: Abri Végétal, Climax Conseils, Club Savoir Serre, Eco-Luzerne, Gen V, INAB/CETAB+, Natural Sciences and Engineering Research Council of Canada (NSERC), Université Laval

Dr. Sean Smukler
University of British Columbia

Activity 13 — Regenerative climate resilient organic vegetables

Dr. Sean Smukler and his team are quantifying soil health, carbon sequestration and greenhouse gas emissions for various organic vegetable production practices including crop rotation, targeted compost application, “beyond 4R” nutrient management, cover cropping and conservation tillage. Their goal is to identify climate-friendly practices with improved nutrient use and management efficiencies and to develop strategies to promote on-farm adoption of these practices.

Partners: British Columbia Agricultural Climate Adaptation Research Network (BC ACARN), British Columbia Ministry of Agriculture and Food, Delta Farmland and Wildlife Trust, Green Fire Farm, OPEN-TEAM (Open Technology Ecosystem for Agricultural Management), Organic British Columbia, Royal Bank of Canada Tech for Nature, University of British Columbia

Dr. Loren Rieseberg
University of British Columbia

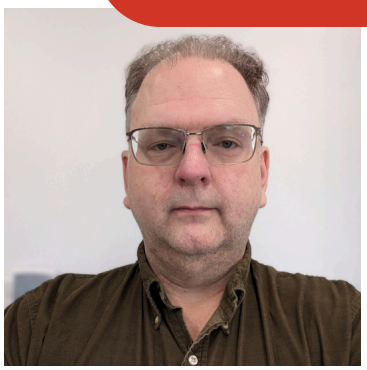
Activity 14 — Canadian organic vegetable improvement: Integrating genomics, ecophysiology and farmer participation for climate adaptation

Dr. Loren Rieseberg and his team are working with a collaborative network of farmers and researchers (established through the Canadian Organic Vegetable Improvement Project - CANOVI) to increase the quality, quantity, and diversity of favorably adapted carrot and salad greens seed varieties. Their goal is to better understand how crops adapt to different environments and to strengthen the existing grower network by identifying priorities and barriers.

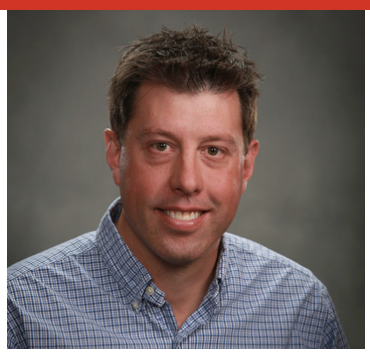
Partners: SeedChange, University of British Columbia

PEST MANAGEMENT

Activity 4 — Agronomy and weed management for organic dry bean production



Dr. Robert Nurse
AAFC Harrow



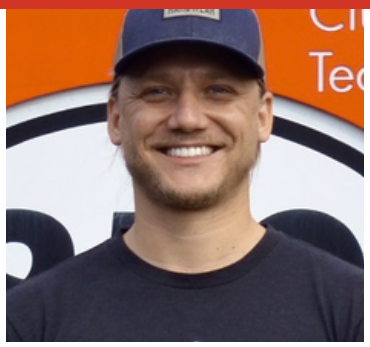
Dr. Jamie Larsen
AAFC Harrow

Dr. Robert Nurse and Dr. Jamie Larsen are working to identify Integrated Pest Management (IPM) strategies to support the expansion of the organic dry bean sector. They will evaluate the effectiveness of weed management using roller crimped rye and electricity, optimizing early season crop vigour and competitiveness, and developing pest resistant cultivars.

Partners: Ecological Farmers of Ontario, Harrow Organic Farms Ltd., Ontario Bean Growers, Organic Council of Ontario (OCO)

Activity 10 — Cost-effective integrated management of cranberry insect pests using organic methods

Dr. Éric Lucas
Université du Québec à Montréal (UQAM), Laboratoire de Lutte Biologique



Didier Labarre
Cranberry Research and Innovation Centre (CRIC)

Dr. Éric Lucas and Didier Labarre are evaluating the performance and cost-effectiveness of innovative Integrated Pest Management (IPM) strategies for organic cranberry production. Strategies include spray delivery of parasitic Trichogramma wasp pupae, pheromone mating disruptors, use of Herbivory Induced Plant Volatiles to attract predators and parasitoids, and application of select strains of viruses and bacteria.

Partners: Anatis bioprotection, Atocas Somerset SENC, Canneberges du Roy, Canneberges Sakota, Cranberry Research and Innovation Centre (CRIC), Ferme des 4 épinettes, Group Tournade Rouge, H2O innovation, Ministère de l'Agriculture, des Pêcheries et de l'Alimentation (MAPAQ), Trécé, Université du Québec à Montréal (UQAM)

Activity 11 — Development of an integrated, organic weed management strategy in cranberries

Dr. Yosra Menchari
Université Laval

Dr. Yosra Menchari is exploring weed management tools and techniques to support the expansion of Canada's organic cranberry sector. Current organic cranberry weed management relies heavily on time-consuming and costly manual weeding. Dr. Menchari and her team will evaluate an integrated approach including electrical weeding, bio-herbicides, gibberellic acid, and select cranberry cultivars for cranberry productivity and profitability.

Partners: Atocas St-Joseph, Canneberges Sakota, Club Environnemental et Technique Atocas Québec (CETAQ), Exploitation forestière SHGL, La cannebergiere SENC (Group Tournade Rouge), Quebec Cranberry Growers Association (APCQ), Valley Corp. inc.

Activity 15 — Modelling cutworm infestations in Canada in a context of climate change for optimal control methods

Dr. Maxime Lefebvre
Research and Development Institute for the agri-environment inc. (IRDA)

Dr. Maxime Lefebvre and his team are working to increase capacity to forecast the movement and abundance of cutworm species by studying how biotic and abiotic factors impact population dynamics. Resulting predictive models will be used to help optimize cutworm control methods in organic vegetable production under different climate scenarios.

Partners: Centre de recherche sur les grains (CÉROM), Institut de recherche et de développement en agroenvironnement (IRDA), L'Association des producteurs maraîchers du Québec (APMQ), Les Producteurs de grains du Québec (PGQ), Les Producteurs de légumes de transformation du Québec (PLTQ), Ministère de l'Agriculture, des Pêcheries et de l'Alimentation (MAPAQ), New Brunswick Department of Agriculture, Aquaculture and Fisheries, Nortera, Ontario Ministry of Agriculture, Food and Rural Affairs (OMAFRA), Ouranos

LIVESTOCK

Activity 16 — Strategies to enhance pasture system resilience and greenhouse gas mitigation potential in organic dairy production

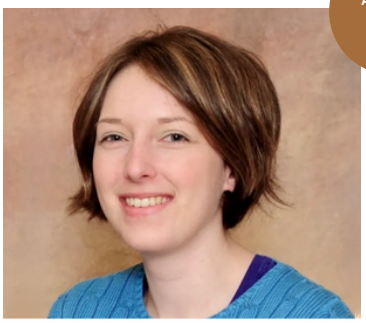
Dr. Caroline Halde
Université Laval

Dr. Marie-Noëlle Thivierge
AAFC Quebec

Dr. Caroline Halde and Dr. Marie-Noëlle Thivierge are investigating practices on commercial organic dairy farms and research facilities to assess soil health, carbon storage, and plant resilience in relation to pasture management. They will test promising forage mixtures for agronomic performance, resilience to climate disturbance and capacity to mitigate greenhouse gas emissions. They will also evaluate the effect of different forage mixtures on lactating dairy cows in terms of nitrogen use efficiency and enteric methane emissions.

Partners: Agroenvirolab, Dairy Farmers of Ontario, Lactanet, Le Syndicat des producteurs de lait biologique du Québec (SPLBQ), Novalait, Organic Council of Ontario (OCO)

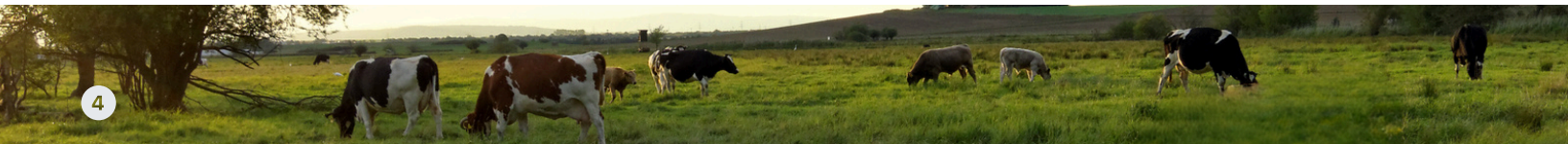
Activity 17 — Investigation of mucosal immunity to gastrointestinal nematodes in Ontario goats



Dr. Emma Borkowski
University of Guelph

Dr. Emma Borkowski is investigating the potential of identifying animals capable of mounting a superior immune response to gastrointestinal nematodes (GIN) by screening for GIN antibody in goat saliva. If successful, this approach could improve herd health and grazing potential through selection of animals carrying immunological GIN resistance.

Partners: Canadian Meat Goat Association, Canadian National Goat Federation, Gay Lea, Livestock Research and Innovation Corporation, Merck Animal Health, Ontario Animal Health Network, Ontario Goat, Ontario Ministry of Agriculture, Food and Rural Affairs (OMAFRA), University of Guelph



ENVIRONMENT

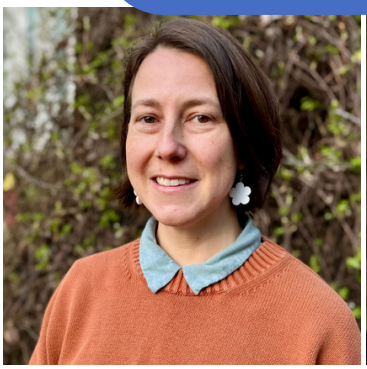
Activity 6 — Impact of reduced tillage and crop-livestock systems on greenhouse gas emissions and carbon sequestration

Dr. Hiroshi Kubota
AAFC Lacombe

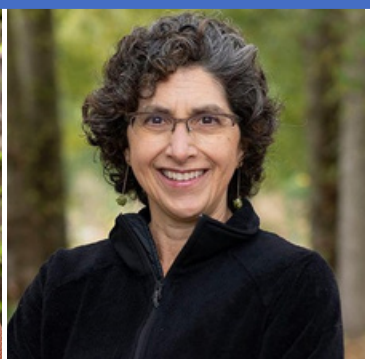
Dr. Hiroshi Kubota and his team are comparing nitrous oxide emissions and soil carbon in reduced tillage, standard tillage and integrated crop-livestock systems during the transitional period from conventional to organic production. Their research will examine soil quality indicators, nitrogen uptake and economics to identify best practices for both environmental and economic sustainability.

Partners: Farming Forward, Organic Alberta, Results Driven Agriculture Research (RDAR)

Activity 9 — Habitat amendments for multiple co-benefits in agroecosystems



Dr. Juli Carrillo
University of British Columbia

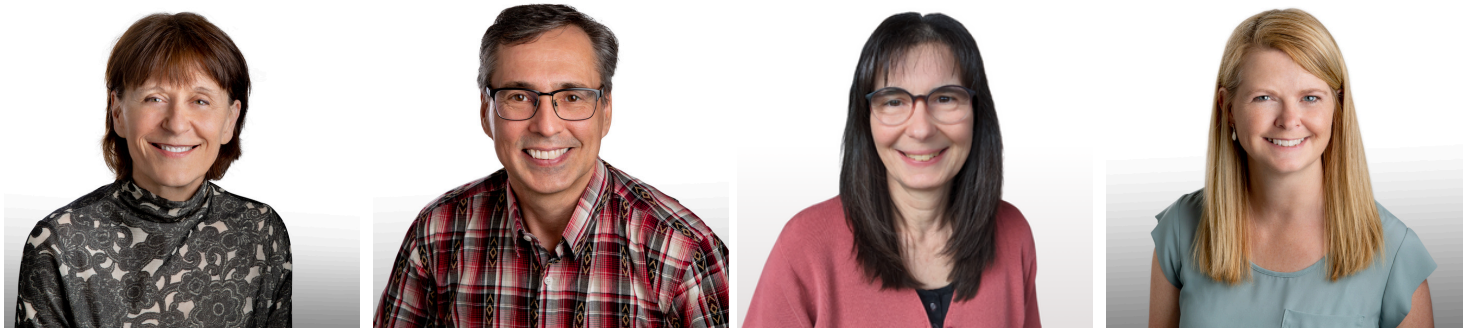


Dr. Claire Kremen
University of British Columbia

Dr. Juli Carrillo and Dr. Claire Kremen are exploring options for "ecological intensification" of the farm-scape. By supporting natural biological processes and ecosystem services like wild pollinators, predaceous insects and nutrient cycling, they aim to reduce the need for commercial inputs. This study focuses on perennial berry production, but results will be applicable to the broader agricultural community.

Partners: BC Blueberry Council, BC Raspberry Industry Development Council, BC Strawberry Grower's Association, Bioform, Natural Sciences and Engineering Research Council of Canada (NSERC)

Activities 1,2,3 — OSC4 SCIENCE COORDINATION, COMMUNICATION & IMPACT



Nicole Boudreau (left), Director of the Organic Federation of Canada (OFC). Dr. Andrew Hammermeister, Director of the Organic Agriculture Centre of Canada (OACC) and Scientific Director of the OSC4 program. Dr. Desirée Jans, Organic Science Project Coordinator and KTT lead, OFC. Rebecca Veenhuis, Program Administrator and Financial Claims Review lead, OACC.

ORGANIC SCIENCE CLUSTER 4 SUPPORTERS

With appreciation, we acknowledge the following funding partners for their contributions in support of Organic Science Cluster 4.

Industry Partners, Monetary Contributions

SeedChange
Novalait
Dairy Farmers of Ontario Milk Est. 1965
bioform TECHNOLOGIES
abri végétal Culture biologique en serre
GEN V
RDAR
Ontario Bean Growers
Manitoba Crop Alliance
WGRF Advancing Agriculture through Research
OSTARA CrystalGreen®
Canneberges Sakota
Promiscuo Field Blend Collection
OCO Organic Council of Ontario The Voice for Organics in Ontario
notre canneberge .com
apcq Association des Producteurs de Canneberges du Québec
SOUTHBROOK VINEYARDS
TAWSE WINERY
RBC Tech for Nature
PRODUCTEURS DE GRAINS DU QUÉBEC
MOA Manitoba Organic Alliance
BC blueberries Powered by nature.
british columbia raspberries
BRITISH COLUMBIA Strawberry GROWERS ASSOCIATION Fresh, Ripe and Ready
organic ALBERTA
CLIMAX CONSEILS Experts en production maraîchère sous serre
EFAO ECOLOGICAL FARMERS ASSOCIATION OF ONTARIO
h2o innovation
Club Savoir Serre
Eco-Luzerne
Enviroclean
GRAIN MILLERS
POGA
MERCK Animal Health
NORTERA
Farming Forward
PRODUCTEURS DE LÉGUMES DE TRANSFORMATION DU QUÉBEC
ANATIS BIOPROTECTION
MOA Manitoba Organic Alliance
Association des producteurs maraîchers du Québec

Industry Partners, In-kind Contributions

Government and Academia Contributions

Plus many individual farms

SCIENCE WITH IMPACT

Research in organic agriculture drives innovation and continuous improvement towards best practices in sustainable food production. Goals of OSC4 include validating and improving organic practices to reduce greenhouse gas emissions and increase soil carbon sequestration, designing systems to support soil health, biodiversity and water conservation, harnessing natural ecosystem services for fertility and pest management, and building more profitable and climate resilient farms. OSC4 brings together researchers, academia, producers, industry partners and NGO's working across commodities to strengthen the organic sector and to advance the sustainability of all Canadian agriculture.

organic SCIENCE CLUSTER 4

Visit the Organic Science Cluster 4 website to learn more about the organic research teams and activities taking place across Canada, as well as the generous funding partners who make this work possible.
Access articles, producer bulletins, podcasts, videos and more!
Subscribe to OSC4 Quarterly to stay up-to-date with the latest news.

ORGANIC-SCIENCE-CANADA.CA / SCIENCE-BIO-CANADA.CA

Organic Science Cluster 4 (OSC4) is supported by the AgriScience Program under the Sustainable Canadian Agricultural Partnership which provides funding for pre-commercial science activities and research that benefits the agriculture and agri-food sector and Canadians. Matching funding is provided by organic industry partners and others invested in strengthening the organic sector.