# Strategic Planning for Organic Research Priorities

**Prepared by:**
Organic Agriculture Centre of Canada
Nova Scotia Agricultural College

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# Canadian Organic Science Conference Feb 23, 2012 - Strategic Planning for Organic Research Priorities

## Contents



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*Growing Forward*, a federal-provincial-territorial initiative.
Les Serres Nouvelles Cultures
Canadian Wheat Board
Les Serres Sagami 200, Inc.
Province of Ontario
Serres Jardins-Nature
Home Hardware
Les Fraises de l'île d'Orléans, Inc.
Les Serres Lefort, Inc.
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Les Productions Horticoles Demers
Les Serres Frank Zyromski, Inc.
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Canadian Seed Breeders Association
Grain Millers Canada
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Jardinerie Fortier
Province of Prince Edward Island
Anne's PEI Farm
L'Abri Vegetal SENC
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## Executive Summary

A strategic planning session to identify research priorities for the second Organic Science Cluster was held at the Canadian Organic Science Conference on February 23, 2012 in Winnipeg (Manitoba). Four general topics were discussed in six breakout groups: livestock, field crops (2), horticulture (2), and mixed farming systems. As a first step, research opportunities along with possible questions and research objectives to address them were defined for each sector. Barriers and ways to overcome them were also identified. Groups were then asked to identify five priority research questions. Participants in the session were asked to rate and comment on the priority research questions presented.

A general consensus in the discussions was that extension, education and communication should be addressed in the second Organic Science Cluster. A majority of the participants felt that technology and information transfer should be included in projects within the cluster. Along that line, a suggestion was made to have, for each project, a plan for disseminating information and ways to create links between researchers and farmers.

A mainstream objective is to improve productivity, marketability and profitability within the organic value chain (including producers, suppliers and retailers). Systems level research involving integrated interdisciplinary approaches was viewed as a priority. Such a systemic approach could be applied to work on biodiversity, economic evaluation and life cycle assessment.

Animal welfare, including adapted housing systems, alternative bedding as well as disease prevention and treatment, was a priority for livestock. Participants also felt that food quality and derived benefits from livestock products should be quantified to increase marketing potential.

Participants in the field crops and horticulture groups concluded that improving efficiency in weed and nutrient management should be research priorities. Crop breeding, optimizing biodiversity and plant-microbe interactions are also of interest for research in that sector. A need for pest and pathogen control, especially through preventive methods, was expressed by participants. Season extension and energy use efficiency were also acknowledged as being potential innovative research questions.

Research objectives specific to the mixed systems sector included crop and animal breeding (including multi-species grazing) and an economic assessment of the sector (including processing, distribution and profitability). The importance of understanding the barriers linked with mixed production systems was also emphasized.

In addition to the five priority questions, each group was adamant that there were many other research questions that were also important and should be addressed. In a sector and country with such diversity, prioritizing research that will directly have impact on stakeholders is a tremendous challenge.

## Priority Research Questions and Their Ratings (10 high)

| Subsector | Q# | Questions/Comments | Economic | Environ-mental | Social | Overall |
|---|---|---|---|---|---|---|
| Livestock | 1 | What natural health substances are most effective under Canadian farm conditions? How are they most effectively administered? Identify most prevalent disease problem & potential treatments for further evaluation. | 7.1 | 5.6 | 5.1 | 5.9 |
| Livestock | 2 | Development of a multi-pronged approach for mastitis treatment for organic dairy producers. Begin with a literature review to identify products with the most potential, then move on to research station testing and on-farm testing. | 8.2 | 5.5 | 5.8 | 6.5 |
| Livestock | 3 | Quantification of food quality benefits of organic livestock products through food science. | 8.0 | 5.8 | 7.7 | 7.2 |
| Livestock | 4 | Bedding alternatives: Examine alternative uses of straw and alternative sources of bedding materials for organic livestock. | 6.7 | 6.2 | 4.9 | 6.0 |
| Livestock | 5 | Effect of housing system with a focus with the possibilities for cows to perform natural behaviours on animal condition & performance. | 5.9 | 6.1 | 6.3 | 6.1 |
| Field Crops 1 | 1 | Soil fertility/quality/testing: reliable consistent information; develop soil tests for N, P availability in organic; identifying the nutrient supplying ability of farm soils and correlate to yield potential. Develop interpretation parameters for soil tests; existing tests (conventional) do not provide this information; develop health check-up test; | 7.2 | 7.5 | 5.0 | 6.6 |
| Field Crops 1 | 2 | Equipment: identify and test more efficacious (European) farm scale tools for weed management, green manure incorporation that are not being used that could be adapted? | 7.5 | 6.8 | 5.0 | 6.5 |
| Field Crops 1 | 3 | Seed: Access to non-IP GMO products and varieties that are adaptable to organic agric. systems; develop management strategies that are cultivar specific | 7.5 | 6.7 | 6.6 | 7.0 |
| Field Crops 1 | 4 | Weeds: Canada thistle/quackgrass perennial weed management; when are existing tools most effective? Are there other existing tools that are more effective? | 8.2 | 6.8 | 5.1 | 6.7 |
| Field Crops 1 | 5 | Lifecycle analysis; biodiversity: Are organic production systems more energy efficient and environmentally sustainable? | 7.0 | 8.1 | 7.6 | 7.5 |

| | | | | | | |
|---|---|---|---|---|---|---|
| Field Crops 2 | 1 | Crop breeding including perennial grains - variety evaluation under organic rotations | 7.6 | 7.3 | 5.4 | 6.8 |
| Field Crops 2 | 2 | Can we develop biotechnologies to improve plant-microbe interactions specific to organic systems? | 7.5 | 7.4 | 5.2 | 6.7 |
| Field Crops 2 | 3 | Optimizing biodiversity and ecological services (at field, farm and landscape scales) generated by fields and field margins under organic management. | 6.7 | 8.9 | 7.4 | 7.7 |
| Field Crops 2 | 4 | Strategies and practices for effective management of weeds in organic cropping systems | 8.0 | 6.8 | 5.3 | 6.7 |
| Field Crops 2 | 5 | Strategies and practices for effective nutrient management (replenishment and improving uptake) | 7.9 | 8.2 | 6.3 | 7.5 |
| Horticulture 1 | 1 | Develop new methods/technologies to mitigate perennial weeds and seed rain in vegetable production e.g. automation | 8.0 | 6.4 | 5.3 | 6.6 |
| Horticulture 1 | 2 | Developing new methodologies, indicators and assessment tools to manage nutrients in organic horticultural crops | 7.4 | 7.5 | 5.0 | 6.6 |
| Horticulture 1 | 3 | Assessing the soil health of tillage practices in vegetable crops | 7.1 | 7.6 | 5.3 | 6.7 |
| Horticulture 1 | 4 | To determine the efficacy of physical and organically allowable chemical and biological controls for new emerging pests, e.g. spotted wing drosophila and brown marmorated stink bug | 7.9 | 6.5 | 5.3 | 6.6 |
| Horticulture 1 | 5 | Developing novel methods of extension, education and grower to grower knowledge transfer | 7.6 | 6.2 | 8.3 | 7.4 |
| Horticulture 2 | 1 | Increase understanding of biological activity in soil that affects disease and weed suppressiveness and mineralization of nutrients | 7.7 | 7.7 | 5.5 | 7.0 |
| Horticulture 2 | 2 | Develop new bio-pesticides and bio-controls for organic horticultural crops | 7.7 | 7.0 | 5.5 | 6.8 |
| Horticulture 2 | 3 | To use green energy to increase energy use efficiency | 7.7 | 8.3 | 6.6 | 7.5 |
| Horticulture 2 | 4 | Development of protected organic production systems for season extension and to increase crop diversity | 7.8 | 6.7 | 6.2 | 6.9 |
| Horticulture 2 | 5 | Develop organic solutions to control postharvest pathogens and product degradation in fruits and vegetables | 8.1 | 6.1 | 6.1 | 6.8 |
| Mixed Farming | 1 | How to design an efficient and economical system for processing and distribution of organic plant and animal products. | 8.1 | 6.5 | 7.0 | 7.2 |
| Mixed Farming | 2 | Identifying and developing crop and animal species, breeds and varieties that are well suited to organic systems in similar bio-regions. To link manure types (green and brown) to the crop varieties. | 7.7 | 7.0 | 5.9 | 6.8 |
| Mixed Farming | 3 | Assessing the opportunities and barriers to profitability of organic mixed farming | 7.9 | 6.3 | 7.4 | 7.2 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | systems, including startup and transition. | | | | |
| Mixed Farming | 4 | How do nutrients, water and energy cycle within organic farms and watersheds and what is the impact of net exporting from the watershed? | 7.0 | 8.6 | 7.0 | 7.6 |
| Mixed Farming | 5 | Integrating multi -species grazing within organic cropping systems to the best advantage of both crops and livestock in order to optimize profits, soil quality and nutrient cycling. | 7.7 | 8.0 | 6.4 | 7.4 |

# Comments on Priority Research Questions

## Topic 1: Livestock

**Research Question/Objective 1: What natural health substances are most effective under Canadian farm conditions? How are they most effectively administered? Identify most prevalent disease problems & potential treatments for further evaluation.**

- Focus is on treatment as opposed to PREVENTION; what practices can we implement to PREVENT the disease? (i.e. rotational grazing instead of in barn)
- Diseases and treatments - I would add for small scale operators, this is a good risk management tool for outbreaks/introduced diseases
- Not based on reducing or eliminating inputs
- Natural health substances
- Livestock health (natural)
- Very important because antibiotic use (even just occasionally) presents a bad image
- Animal health as environmental benefit
- Prefer to see systems to avoid having to treat diseases and pests
- Disease may vary depends on conditions. The current situation being studied?
- Improve credibility of Organic methods
- TOO GENERAL - need to be more specific
- Natural health substances
- Natural health substances
- Animal welfare issue is hard to measure with these criteria, but are integrated in social and economic
- I don't know enough about this topic to rate it
- Effective natural health substances
- Very important
- Powerfill is an Alberta animal health company that might be a partner
- Natural health substances suppliers should have to do that research, not us
- Companies promoting their products should be required to provide ≥ 50% of cost in cash
- Lots of GE in livestock inputs - needs research for alternatives

**Research Question/Objective 2: Development of a multi-pronged approach for mastitis treatment for organic dairy producers. Begin with a literature review to identify products with the most potential, then move on to research station testing and on-farm testing.**

- Again, also please consider prevention in addition to treatment
- Mastitis - economic driver for farmers. Very important. Social?
- Prevention approach would be better
- Mastitis
- Mastitis
- Mastitis
- Animal health as environmental benefit
- Again would like to see nutrition and living conditions reviewed as well
- Excellent potential for short term research (relatively) with greet results/benefits
- ?

- And animal welfare benefit
- Mastitis
- Animal welfare
- Mastitis treatments
- I don't know enough about this topic to rate it
- Mastitis treatments - very important issue
- Reduced antibiotic use/less resistance developed
- Focus research on prevention of mastitis, not treatment testing
- I don't know enough about this subject to rate it

**Research Question/Objective 3: Quantification of food quality benefits of organic livestock products through food science.**

- √ √ √
- Fatty acids - good market potential for branding; good public image
- Very important for public perception
- Could increase the instances of organic farms, hence help environment
- Very useful if the research is positive
- Food quality benefits
- Food quality
- Very necessary
- Will health benefits vary among differing organic systems?
- Huge marketing potential. Increase awareness of link between Animal Health and Human Health
- Awesome potential to quantify organic health benefits
- Relevant as research projects? "Pure" science projects - long term benefits
- Food benefits
- Animal welfare
- Quantification and food quality
- Great!!! Marketing advantages
- Very important! Needed for policy development and future investments

**Research Question/Objective 4: Bedding alternatives: Examine alternative uses of straw and alternative sources of bedding materials for organic livestock.**

- Bedding alternatives - a great idea; especially in BC where livestock is integrated in Hort. System.
- Not a priority area: with limited funds, the focus should be on health etc.
- Bedding alternatives
- Bedding alternatives
- Good one
- How to recycle this alternative bedding?
- Possibility for new species of plants to be grown for bedding
- Grow own straw/size match - land to livestock
- Bedding alternatives
- Animal welfare
- Bedding alternatives
- I don't know enough about this topic to rate it
- Bedding alternatives

- Suggest sorghum grass; tall grass
- I don't know enough about this subject to rate it

**<u>Research Question/Objective 5:</u> Effect of housing system with a focus with the possibilities for cows to perform natural behaviors on animal condition & performance.**

- I hope with a focus on organic standards in regard to access to pasture
- Housing system - cow specific? Other livestock?
- Not a priority area: should focus more on how they should be outside more
- Sounds very expensive and space inefficient. But I like it.
- Is this specific to organic or all producers?
- Dairy housing
- Housing system
- Cows
- Look at multiple species and housing - not just dairy
- And animal welfare
- Quite a bit of research has been done on this with pigs
- Relevant also for poultry/pork
- Good economics
- Relevant also for poultry/pork
- Most easily marketed
- Housing conditions
- Effects of housing systems
- Animal welfare issue is hard to measure with these criteria, but are integrated in social and economic
- Good idea, very important. Animal welfare is very important
- Cow housing system
- Need to inform new policy to open up restrictions of industry
- Why focus only on dairy production? What about hogs….
- Also, pork and poultry
- Important with respect to organic standards but not economic

## Topic 2: Field Crops 1

**Research Question/Objective 1: Soil fertility/quality/testing: reliable consistent information; develop soil tests for N, P availability in organic; identifying the nutrient supplying ability of farm soils and correlate to yield potential. Develop interpretation parameters for soil tests; existing tests (conventional) do not provide this information; develop health check-up test.**

- Soil fertility - basis of organic system and philosophy
- Very important considering conventional tests do not appropriately reflect organic soil quality
- I don't really know what the question was
- I think role of micronutrients is undervalued; also important for environmental protection
- Soil fertility and quality
- Soil test
- Long term (and short term) benefits to sustainability
- Better soil test is crucial
- Economics: good for producers
- Soil tests and measuring soil properties
- Soil testing
- Soil testing
- Too long…. Objective no clear
- This research is needed
- Check water soluble test with A & L testing
- Is there one question in here? Needs to be shortened.
- Agree. This is a widespread issue

**Research Question/Objective 2: Equipment: identify and test more efficacious (European) farm scale tools for weed management, green manure incorporation that are not being used that could be adapted?**

- Small/new equipment from other industries - great idea!
- Equipment
- Big impact for small fruit and veggies as well
- Tools
- Social opportunity for international collaborations
- Social benefit = content workers
- Information exchange between world (not only Europe)
- Environmental benefit by ability to work around rather than through wetlands etc.
- Most easily marketed to conventional
- Equipment
- Current tools
- Question is probably too broad.
- Equipment testing
- Great!!! Marketing advantages
- Better weed control would increase conventional agriculture's acceptance of organic and may interest farmers into converting
- Yes!
- Easy sell

**Research Question/Objective 3: Seed: Access to non-IP GMO products and varieties that are adaptable to organic agricultural systems; develop management strategies that are cultivar specific.**

- √ √ √
- Seed accessibility - preservation of varieties and access is critical; * good social PR - seed is a hot button topic with V. Shiva's books/films - could be an interesting PR campaign to promote Canadian organic agriculture
- Too broad an objective, should be more specific
- Regional specific cultivars are needed
- Seeds
- Seed
- Not necessarily an issue in all regions! Most producers can keep their seed.
- Critical for sustained food production!
- Seed growers a must, (conventional soon - non GMO)
- Seed
- Seed developed supply management
- Seed access - important for maintenance of diversity
- Seed issues/access crucial!

**Research Question/Objective 4: Weeds: Canada thistle/quackgrass perennial weed management; when are existing tools most effective? Are there other existing tools that are more effective?**

- Perennial weeds: thistle and quack grass… Yes!!
- Important but not a priority
- Canada thistle
- Environmental impact depends on method developed
- Weeds - perennials
- Weeds
- This is great and needed
- Weeds - perennials
- Weeds
- Canada thistle/ quack grass
- Weed control - overarching problem for organic agriculture
- Very specific, but very important!
- Needs to be incorporated into a systems approach
- Literature review could be enough
- Very needed across the Prairies!

**Research Question/Objective 5: Lifecycle analysis; biodiversity in mixed farming systems: Are organic production systems more energy efficient and environmentally sustainable?**

- Benefit: to inform POLICY and whole farm land assessment values
- Again very very broad question, must be distilled
- Life cycle analysis: benchmarking - great idea
- System studies
- Benefit to all
- Lifecycle analysis
- Why would hunter groups participate?
- Life cycle analysis

- LCA can vary from farm to farm; it is hard to generalize
- Life cycle analysis
- Could have significant $ impact if energy efficiency
- Life cycle
- Lifecycle analysis - useful for all organic agriculture
- Objective too broad
- Should be under a marketing group - will market and production issues be separated?
- Organic Research Stations.

## Topic 3: Field Crops 2

**Research Question/Objective 1: Crop breeding including perennial grains - variety evaluation under organic rotations.**

- Awareness of ex. research – GOOD
- Perennial grains - good idea
- Must determine time span and have goals (time limits)
- Crop breeding
- Vital for long term sustainability
- CWB likely not realistic partner
- Variety evaluation under organic rotation
- Crop breeding - applies to all of organic agriculture
- Especially perennial grains!
- Do humans need to eat grains? Develop perennial systems instead of only focusing on perennial grains…
- Very important despite low scores for Env. and Social

**Research Question/Objective 2: Can we develop biotechnologies to improve plant-microbe interactions specific to organic systems?**

- Careful about using the term "biotech"; but might help get big $
- Plant microbe interactions - great topic
- Nature has enough material - input based systems
- Excellent "out of the box" project area.
- Biotechnologies
- Biotechnologies… reword?
- Plant - microbe interactions - applies to all organic agriculture systems
- Biotechnology
- Research needed
- Not focused

**Research Question/Objective 3: Optimizing biodiversity and ecological services (at field, farm and landscape scales) generated by fields and field margins under organic management. (Ecological goods and services at multiple trophic levels; barrier strips; proper crop species, creating resilience in organic systems, role of biodiversity)**

- Need to also quantify economic value of biodiversity - green accounting.
- Buffer zones and biodiversity. What is the impact of social goods provided; stewardship of green space etc.
- Much needed in Canada
- Biodiversity
- Great way to boost diverse ecosystem and sustainability
- Landscape
- Excellent question!
- Optimizing biodiversity and ecological services
- I like the buffer strips thing very much - "eco-buffers'
- Great and novel research!!!

**Research Question/Objective 4: Strategies and practices for effective management of weeds in organic cropping systems.**

- ?
- Equipment
- Weed management
- Extending the season is very important.
- Weed management
- Weed management - applies to all organic agriculture systems

**Research Question/Objective 5: Strategies and practices for effective nutrient management (replenishment and improving uptake).**

- There is so much on this already (*the social component*) - although I like the idea of using human waste nutrients!
- Nutrient management - good idea with urban nutrients! Could really apply to areas with big cities and in BC
- Nutrient management
- *Very important for long term sustainability; impacts far beyond organic sector
- Innovative. Cycling and recycling nutrients - urban settings
- Applying manure according to Nitrogen concentration vs. Phosphorus concentration? C:N:P?
- Nutrient management
- Needs consideration!
- Nutrient management - important for all

## Topic 4: Horticulture 1

**Research Question/Objective 1: Develop new methods/technologies to mitigate perennial weeds and seed rain in vegetable production e.g. automation.**

- √ √ √
- Weeds?
- Skip robots but test and adopt existing European/Asian mechanical weed control equipment
- Not a priority
- Perennial weeds and seed rain
- Methods
- Less hand weeding = decreased management costs
- Very cool roboticization.
- Perennial weeds
- New methods
- Social benefit - improved image
- *Environment:* Depends on species
- I stepped out and missed this
- Perennial weeds - overarching problem for organic agriculture
- Very important
- Yes, I agree that we need to focus on perennial weeds; we know how to deal with summer annual weeds.

**Research Question/Objective 2: Developing new methodologies, indicators and assessment tools to manage nutrients in organic horticultural crops.**

- Nutrient management - improve efficiency; mineralization!
- Should be more specific
- Good for environmental protection, reduce inputs, increase yield and reduce disease
- Horticultural nutrient management
- Nutrient management
- How often is a grower willing to test their soil (for each crop??)?
- Indicators of specific nutrients?
- Nutrient tools
- Develop indicators and assessment tools
- I stepped out and missed this
- Soil nutrient management - overarching issue

**Research Question/Objective 3: Assessing the soil health of tillage practices in vegetable crops.**

- √ √ √ like the "bigger question" this stemmed from
- Soil health/tillage
- This assumes tillage is bad, so benefits may not be realized
- SWD and MBSB pests are NOW in Canada (BC, Québec, ON)
- Tillage and soil health
- Soil health
- Soil biology will have to be monitored with chemistry, OM, etc.
- And breeding

- Soil should be tested to at least 60cm, if not >1m
- Soil fertility applies to all agriculture
- Tillage health
- Soil health
- Soil tillage
- Great to validate/invalidate the use of frequent tillage in organics

**Research Question/Objective 4: To determine the efficacy of physical and organically allowable chemical and biological controls for new emerging pests, e.g. spotted wing drosophila and brown marmorated stink bug.**

- IPM for introduced insects - fruit quality issue!
- Prevention is good
- Low environmental rating as this research may not take a systems approach
- Pest control
- New plots
- This will be hard to accomplish as pest populations change (i.e.. adapt or migrate)
- Determine pest problems
- I stepped out and missed this
- Emerging pests - applicable to whole value chain
- Why isn't the product supplier doing this research instead of us? They should have to prove that their products work

**Research Question/Objective 5: Developing novel methods of extension, education and grower to grower, grower to researcher knowledge transfer.**

- √ √ √ like focus on new farmers
- Extension - very important - not sure of fit into Research Cluster. (*The economic component*): for farmers, especially new entrants into agriculture
- Important but such work is usually done by NGO's and other grassroots organizations
- Shelf life of produce
- Extension/education
- Methods
- Very important to have information available
- This is something that would be more beneficial to grain crop producers than vegetable producers since grain producers currently have very little resources compared to vegetable producers.
- Very important to disseminate information better
- Ambitious, but not impossible (begin!)
- The need to share knowledge among the public is growing
- New farmers and social media. Efficiency, whole farm and whole systems integrate economic evaluation and extension strategies.
- Methods grower to grower
- Methods for knowledge transfer
- Should do this in all sectors
- Being done a lot in Québec and really successful!
- Needs to be posed as a question. Is extension to organic producers done differently to organic producers? Not talking about the material but how it is done.

## Topic 5: Horticulture 2

**Research Question/Objective 1: To increase understanding of biological activity in soil that affects disease and weed suppressiveness and mineralization of nutrients with in the soil.**

- Soil bio activity - disease, weeds and mineralization
- Soil biology
- Weed whisperer seeing what is lacking or too much (in the soil) for the weeds to overtake the wanted crop
- Decreased environmental footprint!
- Beneficial I hope
- Biological activity
- Soil biology activity - important for all
- Very interesting but long-term outcomes
- Not focused, low score because lack of focus

**Research Question/Objective 2: Develop new bio-pesticides and biological controls for organic horticultural crops.**

- Include also good growing techniques/physical controls
- Biopesticides and biocontrols - clean and high quality produce
- Prevention, prevention, prevention - private companies can do this
- Biocontrol
- Need research into environmental impact of biocontrol
- Natural Repellants
- If effective, conventional would pick up
- Investigate things that already exist
- Biological control for horticultural crops
- New biopesticides and biological controls - important for all
- Good, focused

**Research Question/Objective 3: To use green energy to increase the energy use efficiency.**

- Green Economy
- Energy
- Really important for the North
- To use green energy
- Especially greenhouse systems.
- Would increase organic "marketability"
- Most innovative topic given of all objectives

**Research Question/Objective 4: Development of protected organic production systems for season extension and to increase crop diversity.**

- Season extension; new products
- Very vague objective
- Season extension
- If extending season, require additional energy for lighting and heating: is this environmentally "friendly"/feasible?
- Climate change… energy use?

- Really important for the North
- Increase crop duration
- Another, interesting/novel topic

**Research Question/Objective 5: To develop organic solutions to control postharvest pathogens and product breakdown to maintain fruit and vegetable quality and reduce losses.**

- Sounds like more inputs and more "commercialization" of organic products…. Maybe not a bad thing?
- Post harvest
- Perhaps also look at healthier systems to increase shelf life
- Good economics
- Postharvest pathogen controls
- Interesting, what pathogens?

## Topic 6: Mixed Farming Systems

**Research Question/Objective 1: How to design an efficient and economical system for processing and distribution of organic plant and animal products.**

- This is very broad, but possible research questions could be pulled out
- Processing - access for small, remote producers could be improved
- Shouldn't be a research priority. Again, NGO's and grassroots organizations do such activities
- Good for emergent farmers
- Processing and distribution
- Efficient distribution
- System of plant animal distribution
- Processing of organic animal and plant products
- Less government restriction
- Goodness YES!
- Not focused

**Research Question/Objective 2: Identifying and developing crop and animal species, breeds and varieties that are well suited to organic systems in similar Bio-regions. To link manure types (green and brown) to the crop varieties.**

- This is very broad, but possible research questions could be pulled out
- Breeds - climate change
- Must use caution for applicability of this research. Shouldn't become a 20 years breeding project
- Species, breeds, varieties
- Incorporation versus no till green manure (volitization of no till)
- Identify varieties to bio-regions
- Crop varieties and animal breeds - applies to all organic sectors
- Links to crop breeding/selection in previous group

**Research Question/Objective 3: Assessing the opportunities and barriers to profitability of organic mixed farming systems, including startup and transition.**

- I like the first step/focus on assessing barriers
- Profitability /economic assessment - improved diversity on farm
- Grassroots and NGO's and Government agencies should be doing this
- Definitely needed
- Profitability
- Levy - NAFTA/WTO?
- Barriers to transition
- Assessing opportunities and barriers to mixed farming

**Research Question/Objective 4: How do nutrients, water and energy cycle within organic farms and watersheds and what is the impact of net exporting from the watershed?**

- Important to consider whole water-shed & inter-farm synergies
- Cycles on the farm
- Watershed cycling
- Increase visibility of organic industry
- This research is done already, quite a lot. Make sure a proper literature review is conducted!
- Interesting question; very broad.
- How do nutrients and water and energy cycle
- Nutrient and water and energy cycling - applies to all organic agriculture
- Broad question, but very relevant and important
- Don't agree at all with asking Shell/Cargill for $
- Not focused

**Research Question/Objective 5: Integrating multi -species grazing within organic cropping systems to the best advantage of both crops and livestock in order to optimize profits, soil quality and nutrient cycling.**

- Important to understand barriers to adoption on the farm
- Multispecies grazing - PR opportunity to sell "idyllic farm" idea; Levy on organic foods is on interesting idea, but what are free trade implications?
- I was distracted on this one.
- Organic farms cannot be sustainable without livestock
- Grazing
- Multispecies grazing
- Good for NUE
- CH4 emissions vs. CO2 flux NEP
- Multi-species grazing
- Integrate multispecies grazing
- Good, focused

## Participants' Additional Comments to the Steering Committee

**Participant #1** **Niki Strutynski** nikistrutynski@hotmail.com

I would like to reiterate the importance of attracting and supporting new farmers, in particular with access to capital and land. These are the people who will be applying the results of this research for years to come. For this reason, I would like to see more research into the barriers to new farmers as well as land-use and economic policy that can help to overcome these barriers. This question is large and applies to all the breakout groups/topic areas, but it is critical to the future of farming and should be kept in mind when we do all our research: because what is the point of doing all this research if there is no one in the field to apply it?

Thanks! Great conference and cluster meeting process!

**Participant #2** **Anonymous**

Thank you for the opportunity to contribute ideas to the research plan. As both a farmer and a master's student, I feel that it is critical to take the excellent work being done through the Science Clusters and to provide extension and on-farm support for our farmers. Perhaps the extension doesn't need to be as formal as a government person – although there is a need to have continuity and leadership for such a program… perhaps a "train the trainer" model could be implemented to encourage the exchange of ideas between farmers and scientists and could also be used to provide a framework for mentorship for new entrants into organic agriculture. Inviting producers to attend these planning sessions is an excellent idea!

Research - biofumigants/ biocontrol: support needed for the commercialization of novel products or techniques, so that these tools can be delivered to producers for their use. This needs to happen in a timely manner. Support could be in the form of advice/expertise in the registration of these products, testing programs on farms – assistance with set up of these trials and reduced "red tape" around permits etc. to allow for improved turn-around times from research to commercialization.

**Participant #3** **Anonymous**

Farmers markets are a growing part of our food system. Unfortunately, there are few opportunities for young people to receive training in the profession of organic market vegetable farming in Canada. I think we need to research existing programs in Europe etc. and develop an apprenticeship program for a Canadian market vegetable farmer; not necessarily exclusive to organic growers but with a definite organic emphasis. The program could include curricular templates, technologies and infrastructure suggestions that Canadian colleges could add to their programs.

**Participants #4, 5 and 6** **No comment**

**Participant #7** **Céline Boutin** CELINE.BOUTIN@EC.GC.CA

Many ecologically oriented questions were mentioned, but did not make it in the priority list. Most work considered is at the field level, little is considering agroecosystems and more holistic aspects. Organic farming is about the environment. However at present, considerations are at the field level and agronomic levels; probably because they are more pressing. Nevertheless, good conference and very inspiring.

**Participant #8** **No comment**

**Participant #9** **Conner Wear** connerwear@gmail.com

A lot of the discussion seemed very "prairie-centric".

At times I felt like we were rushed into getting specific answers when a general question would have been more appropriate and could have had more specific questions pulled out later by researchers.

**Participant #10** **Greg Rekken** rekken@gmail.com

I believe a systems approach is essential for most of the suggested research areas to be relevant to the organic ideology/philosophy. While extension may not be a research objective, without dissemination of research findings, the research is pointless. I believe a criteria of the funding applications should be to have a plan for dissemination of the research findings and indicators for measuring success.

A great conference!! Thank you for making it happen!

**Participant #11** **No comment**

**Participant #12** **Anonymous**

There has repeatedly been identified a need for stronger networks/connections between producers, researchers and extensionists. Creating/strengthening these links should be a key component of each research project.

**Participant #13** **Anonymous**

Information transfer is critical for growth of the organic sector. The efforts put in by the scientific group are minimized when the information is not shared.

The method of transferring the information also needs to be evaluated. Just putting the scientific information on a website may not be the best way to transfer information.

**Participant #14** **Anonymous**

There is a lack of communication of information from research to producers that are not involved in specific studies. This is difficult.

We need promotion of organic as a healthier option for people, land and water. This requires studies of health benefits. Can work with the Department of Health and environmental groups.

With climate change, information from BC may also be useful in Eastern Canada so all information needs to be shared.

**Participant #15 Theresa Schumelas** tschumelas@rogers.com

Social science questions – such as effectiveness of and innovation in extension or issues around re-connecting consumers and producers – are critical to the development of the organic system in Canada. Yes, we've been told this is not the place to address and include those types of research questions. Unfortunately, without addressing these, the impact and uptake of the agronomic research questions will be lessened. Research is not trickling down now.

It seems the research selection process is biased toward large farms – who already are well-networked and well connected. These are: 1. A minority of the farms and 2. The farms that already have access to the resources.

Shouldn't one of our criteria for selection be the number of farms and farmers that will benefit?

Note: I'm basing these comments on input from a series of 100 interviews with farmers just completed in Ontario.

**Participant #16 Cristina Micali** cmicali@gmail.com

- Technology transfer!
- Information transfer
- Science translated into practical protocols for farmers. e.g. major reviews of scientific information
- Web-based interface for agricultural practice advice/protocols

**Participants #17 and 18 No comment**

**Participant #19 Lo ïc Dewavrin** fermlong@videotron.ca

Don't forget the other brilliant ideas!

**Participants #20, 21 and 22 No comment**

**Participant #23 Allison Squires** allison@uplandorganics.ca

It is so important to consider how research will be applied on the farm. Some of the ideas presented would not necessarily be adopted on the farm due to the economic restrictions farmers face. Producers on a large scale (i.e. grain or cash crop production) face different challenges than smaller-scale (i.e. vegetable) farm operations. Large acre (>1000 acre) farms cannot apply a lot of the research currently done on small farm plots. It is vital to conduct an economic assessment along with each project. There

is no point in conducting research if farmers cannot apply it. Please remember this issue of scale. On farm testing at these larger scales would address a lot of these issues.

**Participant #24** **Erin Nelson** enelson@uoguelph.ca

Need for networking, consumer education, creative extension strategies, marketing opportunities, etc. were identified as key issues, but the social science research questions/objectives were generally left out of the final list, and that seems to be the kind of research that could most effectively address those issues. (I'm a social scientist, so realize my personal bias/interest is reflected here, but there seemed to be broad consensus re: the importance of social and economic issues in the organic sector, soothe absence of social and economic research objectives seems to be a gap. I realize also this may be a problem with the structure of the science cluster program itself – not your fault!).

A few quick/undeveloped ideas on this topic:

- Assess impact of various extension and training strategies/methods (e.g. video, social networking, apprenticeships…)
- Social network analysis of Canadian organic sector (show linkages – who are most closely connected, how are connections working, gaps/isolated actors…)
- Identify best practices in (consumer) environmental education (to increase demand for organics)
- Evaluate potential applicability of …

**Participant #25** **Kim Schneider** kschne01@uoguelph.ca

My personal view on top research topics:

1. Crop rotations in organic systems (effects on soil biology, weed control, insect biology, NUE)
2. Maintaining nutrient balance and closing the loop, especially phosphorus - (from sewage sludge)
3. How to increase nutrient use efficiency (NUE), with focus on soil biology/plant microbe interactions
4. Crop varieties for organic conditions and in light of climate change
5. How can biodiversity be increased on organic farms (in field i.e. intercropping/field etc.
6. ...
7. Decreasing nutrients/OM from composting

- How can we best extract/use nutrients, especially P from sewage sludge?
- Are there acceptable ways to modify/improve solubility of phosphate rock? (organic acids/biosolubilization)
- Study interactions of AMF/rhizobium/crop in terms of nutrient efficiency of N and P
- Role of perennial legumes in fertility building

**Participant #26** **No comment**

**Participant #27** **Tim Livingstone** strawberryhf@gmail.com

Ways to disseminate information would be great to reach busy farmers.

It has been a privilege to be a part! Thanks to those who funded our plane tickets and the rooms etc.!

**Participant #28** **Jean Duvel** jean.duval@cetab.org

- Establish a statistical and meta-analysis strategy overarching cluster's projects
- Integrate economic evaluation into projects
- Integrate extension activities and objectives into projects

**Participant #29** **Anonymous**

It is important to include some extension work in the new projects from the Organic Science Cluster as well as economic aspects in relation to the priorities which are going to be included. The study of the ecosystem services coming from organic farms – farm level, regional/landscape should be emphasized and put into perspective for different cropping systems (field, horticulture, mixed farming systems, etc…)

**Participant #30** **Ted Zettel** zettel@organicmeadow.com

1. First stage is to develop a network of farmers, extension people, and researchers to guide the formation of questions, the research methods and finally the transfer of results back to the farm
2. Small geographically focused studies may be better than national scope projects

**Participant #31** **Christine George** cgeorg03@uoguelph.ca

It seems what theme (ideas that kept coming up) revolved around diversity, not just crop, livestock, but also biosystem diversity. Canada's biodiversity is vast, posing a challenge to researchers and farmers.

Key to this group's research plans is the need to share with farmers and growers.

This has been a great session! Without dialogue and sharing, what point does research hold?

**Participant #32** **Yuki Audette** yaudette@uoguelph.ca

Development of better assessment of soil test at organic agriculture is important.

We should know the difference between "assumption" and "fact" i.e. crop yield has not changed (Fact); phosphorus is deficient in the soil (Assumption)

Exchange information/knowledge among a diversity of people. Need to cooperate with biologists/chemists/engineers/farmers/social scientists

**Participant #33** **Anonymous**

Extension is important. Needs to be addressed but outside of the "research objectives" of the cluster.

**Participants #34 and 35** **No comment**

**Participant #36** **Anonymous**

- Organic Research Stations
- Whole farm systems
- Soil cycling/testing
- Organic matter mineralization

**Participant #37** **Joanne J. Johnson** jjj@northwestel.net

We talked a lot about incorporating more animals into organic production. We don't seem to have enough suggested projects in this area. It would be good to develop more of these projects. E.g. grazing on perennial forages to stimulate growth. Not only fertilizing but grazing itself.

**Participant #38** **Anonymous**

There is a need to develop centres of expertise in each organic production to have teams of advisors in organic. There should be pressure for research of funding for such centres.

**Participants #39** **No comment**

**Participant #40** **Anonymous**

Please don't forget the ideas that aren't highlighted here. Many can be incorporated in methodology and extension, education, etc.

**Participant #41** **Ghislain Jutras** ghislainjutras@hotmail.com

- Technical economic references/index
- Research ON farms (real farms)
- Network with organic research sectors in other countries (not only Europe, also Asia…). Network and work! Gathering the forces
- HRRT: High residue reduced tillage systems

Recommendation for the working groups: Using a mind mapping software instead of Excel. It is more visual and there is less time lost to organize the ideas during the work session.

**Participant #42** **Cinthya Leyva Mancilla** cinthya.leyvamancilla@mail.mcgill.ca

I found it interesting how much emphasis there was on the importance of communication between farmers, consumers and researchers yet how it has such trouble in getting funding and considered "research" material.

I am very happy and honoured to have participated in this workshop. It gives me insight into how the organic science is advanced in Canada and how my project was created.

**Participant #43** **Anonymous**

1. Climate neutral production/ energy saving/ LCA at the cluster level
2. Robust plant material
3. Food quality in terms of health components and gustatory attributes
4. International research collaboration with well known research group in organic
5. Recycling nutrients and water to reach "0" emission.

Need for an Advisory Committee on methodologies in the cluster management. There are issues with the statistics used in many of the cluster's research reports (sub-optimal stats, outdated procedures) and lack of valuation of data bases that can be used at a later time by other means (meta-analysis approaches) and need for database warehousing.

**Participant #44 Andrew Marshall** amarsh10@uoguelph.ca aggiedipper@hotmail.com

Anyone involved with organic milk or meat could be enlisted I'm sure to promote, educate, and elucidate/quantify organic health benefits in food.

People are uneducated and somewhat ignorant as to the health effects of the foods they have available. There is much conflicting science and perception in this area. Education of the public is the way in which organics will take market share from conventional production.

**Participant #45 Anonymous**

The need for extension was very strong in a lot of the groups, however these could not be included as they did not fit into a research objective. However the lack of extension is very critical. The research needs to get to those who need it.

**Participant #46 Elsa Vasseur** evasseur@alfredc.ouguelph.ca

LIVESTOCK: it is noticeable that only 1 Animal (Dairy) Scientist was present. Inputs from animal scientists from each discipline need to be gathered to decide priorities for Livestock.

- Emphasis needs to be put on nutrition and its link with cow condition. Especially grazing management (behavior, nutrition, economics)
- Network of extension farms – to facilitate on-farm experimentation and improve extension
- Research work needs to be done on young stock in organic systems

Mixed Farming Systems – Any animal scientist in the group? Same remark here as for livestock.

**Participants #47, 48, and 49 No comment**

**Participant #50 Anonymous**

Cow, pork and poultry: Organic Research Stations

- Extension
- Consumer education

**Participant #51** **Stefan Regnier** Stefanakastuffy@yahoo.com

Studies driven towards the true effects and impact of monocropping. Monocropping though it adds efficiency to harvest and yield, can create all the problems that we seem to have difficulty solving. E.g. disease, pests and weed management.

**Participant #52** **Ian Grossart** ian@grossart.ca

- Instead of always focusing on increasing yields, look at improving the nutrient content of what we are producing.
- Look back at research done between 1900 and 1950 at the universities and Ag Canada and see what is still relevant to us and what we could build on
- Need to involve medical community in setting priorities. Roles of food in human health. May need to work with Natural Doctors at the start as they have more training in nutrition and it's impacts on human health than MD's
- If what we are doing can improve human health and lower government health budgets, then it will be an easy sell to get research $

**Participant #53** **Anonymous**

Main priorities:

- Effective, efficient, economic and environment management
- Nutrients, especially P
- Weed management
- Crop species/cultivar – crop rotation
- Organic Research Stations

**Participant #54** **Anonymous**

Don't do any conventional/organic comparisons (especially field trials). Make organic the focus!

**Participant #55** **Anonymous**

- Good conference and ideas
- Maybe strategic session should have been at beginning to foster ideas that were no influenced by the excellent presentations.

**Participant #56** **Iris Vaisman** iris.vaisman@gmail.com

- I think we should do studies/surveys on how people make food choices, or review past studies. This way we can learn how to effectively promote organic food, increasing profitability for farmers and increasing adoption by farmers.
- Establish trials that are set up for interdisciplinary research i.e. one trial/experiment with many experts/grad students/researchers/farmers.

- More effort into understanding natural systems and ecological principles. Learning to farm by mimicking nature. I think this is absolutely essential for agricultural production beyond the next 50 years.

**Participants #57, 58, and 59** **No comment**

**Participant #60** **Joanne Thiessen Martens** **j_thiessen_martens@umanitoba.ca**

- It is important to get a balance between short-term ("urgent needs"), medium-term (systems), and long-term research ("visionary")
- Perhaps allocate a certain percentage of funding to each category?
- I like Brenda's idea she shared at the end of her summary
- Include extension component in all research

**Participant #61** **Anonymous**

- Ecological weed management: focus on weed seed, on post dispersal predation and weed seed bank reduction
- Agroecology and ecological engineering for weed management
- Biological control of the weed seed bank

**Participant #62** **Anonymous**

- Very well organized meeting today
- Very efficient work today
- High level conference over the last two days helped in doing this exercise today

**Participant #63** **Craig Cameron** **craig.cameron14@gmail.com**

Research that is able to be used by farmers in transition to organic would be incredibly helpful (this includes ideas presented). Ideas for other partners included on other page *(Powerfill, Different Breed Associations)*

**Participant #64** **Caroline Halde** **carolinehalde@gmail.com**

Research that should be avoided in my opinion:

- Comparison of conventional vs. organic systems. We need to focus on developing new tools and systems for organic production, not just compare one organic system to one conventional system
- Testing products (e.g. treatments for mastitis, biopesticides for organic apple production etc.) This should be done by the product supplier/distributor and not with public money (university and Agriculture Canada)

**Participant #65** **Anonymous**

Need more research on how Ca in soil or lime, what kind of lime and how much (300 lbs/yr) will affect soil health. Can also include gypsum.

**Participant #66 Anne Kirk** annepkirk@gmail.com

- We didn't talk about technology for precision seeding and cultivation in field crops, but as technology such as RTK increases in popularity in conventional agriculture there may be a place in organic. RTK and precision cultivation may lead towards reduced tillage organic grain cropping systems
- We need to focus on the long-term sustainability of organic systems. This will include a focus on 1. Soil health, 2. Consistent supply of OP and non-contaminated seeds, 3. Nutrient management. Focusing on organic pesticides and bio-control is a short-term approach to organic agriculture. It may not contribute to long-term sustainability. I would like to see a decreased reliance on inputs.
- As a part of this cluster, is it possible to have a group focused on agricultural policy change? (i.e. as Martin said, we could look into a new homestead act, a reduction in subsidies for large agriculture companies and increased government funding for organic, etc) A group could focus on what a new agricultural framework would look like.

**Participants #67, 68, 69, and 70 No comment**

**Participant #71 Anonymous**

Important to get check off commodities involved. Canada Council, Saskatchewan Canola, SPG, APG, Ontario Grain Growers, Alberta Beef, Saskatchewan Beef, Manitoba Cattle Producers, Dairy Producers, MPGA.

Let's have focused questions and work as teams across the country.

Annual meeting even by video/phone conference for researchers would be very good.

**Participant #72 Janine Gibson** janine@nlis.ca

I hope there will also be on line solicitation of input for these research priorities. I appreciated previous input in this manner. Good Luck!

# Morning Breakout Session - "Blue Sky" Group Exercise (Opportunities, barriers, other questions…)

**Question: What should be the research priorities for Canadian Organic Research over the next 5 years?**

## Livestock

| A. | Opportunities | Possible question or research objective to address the opportunity |
|---|---|---|
| | Organic does better than conventional in many aspects. But, in welfare & health it may not always be better. | Recommendations for stall design, how to encourage outdoor access & use of this access by the animals. Identify ways to help producers to meet the organic production requirements. |
| | Link between cow body condition & welfare. Do not use different breeds in organic production, need to maintain good body condition to keep the animals healthy while meeting organic production standards & meeting nutritional needs | |
| | Health benefits of organic livestock products | |
| | Feeding of corn (corn oil, an unsaturated fatty acid that can form a trans-fat) may elevate levels of trans fats. | Organic does not feed as much corn - are there lower levels of these trans fats in organic milk? |
| | Fatty acid composition of milk (short, medium, long chain) can vary by breed. | Do breeds commonly used in organic production have more favourable fatty acids? |
| | Is there a need for science in composting - optimize nutrient balance, etc? High management composting for specific characteristics. Do farmers want/use this information? | Studies to examine pathogen kill rate, weed survival, management to achieve a specific end product. Is the extension component in place/working for these questions? |
| | Establish a database of what is happening, where. Practices, inputs, management, etc. | Longterm benchmarking of organic production. |
| | Move research away from organic vs. conventional to look more at what are good holistic practices. | Identify examples of excellence, explore why this is the case. |

| B. | Barriers | Possible question or research objective to address the barrier |
|---|---|---|
| | A lot of organic beef is being produced on the Prairies that is finished on many different farms without consistent finishing practices, resulting in inconsistent product. | Optimal grain/grass mix for consistent & optimal end product. |
| | People do not know what health remedies are available & allowable for organic production | Development of compendium (with research to back it up) of products available & allowable for organic livestock production in Canada. |
| | Milking equipment can have effect on udder health. | Research on milking equipment, variables (layout, design & installation) and how these relate to udder health, specifically Somatic Cell Count (SCC) |
| | Difference between conventional & organic straw sources, effect of disease, especially in calves | |
| | Research to pinpoint age & body scoring of calves, what is the optimum and when - how to achieve the proper balance | Research to relate optimal body condition in calves & effect on health. When does it become a detriment to be fat? |
| | Research is often approached from a conventional perspective: looking for a magic bullet to one particular piece of the puzzle. But, organic is holistic | |
| | Further research on substances in common use in the industry. | Identify those that are used by farmers, recommended by extensionists, and used by veterinarians. Also need to pursue how these substances are regulated, if they are considered drugs, etc. |
| | More dialogue between farmers, extensionists & researchers. | |
| | Geographic specificity - variations in regions across Canada | Be conscious of this when designing experiments, implementing results. |
| | Correlation between sugar levels in forage, how this relates to cow health, herd health and nutrient content of milk. | |

| | |
|---|---|
| Mastitis in organic dairy production. Info is available on prevention, but cases do still occur. What can producers do in these cases? | Literature review done on any mastitis methods/products that have been explored to date around the world. Identify those with the best potential, and then test them in a trial. |
| Longevity of organic cows - 2 month difference in QC between organic & conventional calving age. | Evaluate management practices on farms that are doing well vs. those that are not. |
| Lack of access to veterinarians/lack of knowledge about organic production. | Identify key knowledge areas & include this information in vet training, vet lifelong learning programs & extension. Identify what organic producers need from their veterinarians and how extensionists also play a role in this interaction. |
| How does organic fit into the dairy codes of practice. In particular the audit system where there may be major differences in practices between conventional & organic systems. | Identify areas where organic practices may differ substantially & how they may meet the codes of practice, if need be. |
| Nutrition may not always be fulfilling for animals under organic production. | Identify ways that animal nutrition can be fulfilled using local systems. Increase nutrient efficiency of crop production, feed formulations, etc. |
| Mastitis treatment in organic dairy herds. Often due to human effects, unless clinical cases. | Can saline solution with an added organically allowable active ingredient be used to treat mastitis? |
| Mode of administration of organically allowable products. As well as residues that may appear in food products. | Identify research gaps in use/administration/dose of health products & alternative remedies |
| Encouraging use of outdoor runs in organic poultry production, particularly layers. | |
| Feather pecking & cannibalism in poultry. | Look at research being done in Europe (Hermanson) that focuses on effect of flock size on these behaviours - limit to flocks of 100 birds. |
| Minimizing/eliminating use of crates in pork production. | |

| | |
|---|---|
| Minimizing/managing internal & external parasites in pork, especially those with outside access. | |
| Finishing practices for beef - effect on carcass quality. | |
| Use of breeds that fit with the organic system. | Identify breeds that are better suited to organic production than the commonly used breeds developed for conventional systems |
| There is a strong need for extension to link research with producers. | Link the research, on-farm experimentation, literature reviews in accessible language & format that can be applied on farm. |
| Bedding needs are difficult to meet in an economic fashion. Becoming increasingly difficult to source organic straw or straw that hasn't been sprayed in 60 days | Explore alternative bedding materials/methods. Ideas: Explore compost bed packs, appropriate management, perhaps at a small scale to begin with. Explore alternative bedding materials (e.g. gypsum) that can also be beneficial to the manure/compost that is produced, esp. liquid manures. How climate effects the management of these bedding materials (e.g. disease pressure) |
| Grazing & pasture management. | Fly control, mob grazing, sward length, enrichment of pasture, nutrition, multi-species pasturing, parasite control, etc. |
| Raising young, how these systems differ from conventional | |
| Free stall systems and how these can be managed, esp. for bedding & manure management. | |
| Explore reasons why farmers may convert back to conventional production, how to encourage transition. Barriers to transition. | This information may be available, but may need to be updated. |

## Overarching Topic Areas

**Alternative Health Care: Product efficacy and administration - specific natural treatments. Identify gaps in natural treatment knowledge.**

Quality of Food

**Rumen function**

Animal nutrition

Production

Health

Welfare

Database

Marketing

**Housing & Infrastructure**

**Feeding & Rations**

**Networks & Benchmarking**

## Field Crops 1

| A. | Opportunities | Possible question or research objective to address the opportunity |
|---|---|---|
| | Bring in investments for organic research, make goals for investments | |
| | Web interface for disease, contaminating seeds, fertility problems for networking information; farmer-farmer and on farm trials; increased access to research | Develop risk assessment tools and protocols for farmers to access regarding major problems like pathogens/fertilization; crop protection guide |
| | No-till, roller-crimper; on farm research and more diverse areas | |
| | Deficit of organic extension [e-organic] | |
| | Farmers get full value for check off fees that are already being paid | |
| | Full stakeholder engagement (farmers-researchers-AAFC scientists-consumers) | How do we inform other groups about the Cluster? Consumer education/awareness |
| | Test European technology in Canadian landscapes | Are European mechanical/technologies adaptable to Canadian agriculture? |
| | Need for different tests relating biodiversity to some tangible measurement of crop improvement | How can tests be developed that provide tangible information for making management decisions? |
| | Need for organic research farms | Develop network of organic research farms mimicking system level, livestock, crops, |
| | Human capacity building for organic research; fostering creative research | Develop creative research initiative that will be carried on |
| | | How do biodiversity differences develop organic agriculture in soil? |
| | E-learning for teaching and expansion of organic resources (academic and research) | |
| | Long-term weed trials | |
| | Row-spacing, seed density, | More research for organic varieties on spacing, seed density, (cultivar specific management) |
| | Nutritional value | |
| | Biocontrol | Leafy spurge biocontrol research |
| | PAMI (machinery testing) | |

| | | |
|---|---|---|
| | Muridea pest damaging production in hort crops | |
| | Organic pulse crop demand not being met | How can organic ag integrate soy/lentil/pulse crops into the system |
| | Social sciences; economic factors | |
| | Life cycle analysis across/ adaptable to organic farming and production systems; | |
| | Varietal blends (breeding) | |
| | Encouraging risk taking; organic on-farm research speeding up research; net working with crop insurance to mitigate burden of risks | |
| **B.** | **Barriers** | **Possible question or research objective to address the barrier** |
| | Soil nutrient tests, tissue nutrient tests, diagnosing fertility levels | How well do our soil/tissue nutrient tests work in organic systems? How accurately do CO2 measurements reflect soil nutrient dynamics and crop use? |
| | Local consumer economy not recognized as benefiting economic values due to closed system | How do we get inherent values of organic production expressed in policy? |
| | GMO in corn/soy/canola production; seed/cultivar scarcity for organic | How do we overcome seed/cultivar scarcity? (citizen breeding) How do we produce varieties for organic? |
| | Regulations around toxic pesticides | How can we effectively use organic chemical products (economic, timing)? |
| | Perennial weed control (Canada thistle, quack grass) | How can farmers control perennial weeds? |
| | High level of weed seed return from combines | |
| | "Natural" competing label | Develop branding |
| | Conventionalization of organic agriculture | |
| | Permitted substance list, scientific reason for not allowing phosphoric acid | |

## Field Crops 2

| A. | Opportunities | Possible question or research objective to address the opportunity |
|---|---|---|
| | Calcium/liming | Does application improve soil quality? What types are effective? |
| | Barrier strips, field margin areas, funding from envir. Grps | Biodiversity; What combinations of plants species? |
| | Possible new organic crops | |
| | Functional properties of plants | |
| | Phosphorus | |
| | Self sufficiency (biofuel production) | Are certain vegetable oils better than others? |
| | Water-use efficiency | |
| | Crop rotations | Cash return, weed control |
| | Efficacy of tillage for weed control | |
| | Organic crop breeding | Yield, resilience, AMF, nutrient uptake, heritage varieties |
| | System more resistant to climate change (resilience) | agronomic info at the farm level to look at resilient rotations |
| | Long-term studies | |
| | Companion crops; allelopathy; IPM | |
| | Amendments (possibilities for funding) | Do they increase soil fertility in the short/long-term? Yield benefits |
| | Developing processes for developing amendments, esp P | |
| | Commercial test including AMF | |
| | Consumer preferences | |
| | Different comparisons between organic and conventional | Consumers are not buying based on agronomic issues |
| | Biological control for weed management | |
| | Applying methods and innovation for equipment; opportunities for local production and exporting | |
| | Perennial grains | |

| B. | Barriers | Possible question or research objective to address the barrier |
|---|---|---|
| | Weeds | Weed management tools; comprehensive look at weed dynamics; seeding rates for cover crops |
| | Intercropping | Why hasn't it been adopted? |
| | Currently no reliable benchmark for stockless field crops | What is on organic farms? Is it working? Efficacy of organic management. Inputs, tillage, weed pressure, soil nutrient status, crop rotation/cover crops |
| | Continued funding for long-term studies; collaborations | |
| | Climate change | |
| | Short-term gain leads to long-term loss; soil mining | |
| | Breeding requires so many resources | |
| | Corporations (controlling seed banks) | |
| | GM alfalfa | |
| | Biosolids/urban nutrients | |
| | Transportation costs to farmers for importing nutrients | |
| | Regulations for amendments increase set-up costs | |
| | Difficult to apply amendments on large-scale | |

## Horticulture 1

| A. | Opportunities | Possible question or research objective to address the opportunity |
|---|---|---|
| | Farm scale pest control trials | |
| | Pest biology studies | |
| | New pest control methods/products | |
| | Optimizing biological functions | |
| | Research into companion planting systems trials/mixed cropping | |
| | Marketing values associated w/ organic producers and practices | |
| | Mechanizing, computerizing, technology | |
| | Soil compaction problems-control traffic | |
| | Nutrient recycling | |
| | Import replacement-why are we not supplying our own markets e.g. carrots | |
| | Increasing scales of production-what are the barriers converting conventional to organic | |
| | Comparison of biodynamic and organic practices-trials | |
| | Barriers to transitioning from conventional to organic | |
| | Assessing environmental performance of organic sector-some practices might not be ecologically sound | |
| | Landscape influences on individual farms and crops related to scale | |
| | Generic farm models to address issues that serve the interest of many stakeholders | |
| | Current varieties developed for conventional industry-developing varieties suitable for organic systems | |
| | Monitoring tools for decision making-assessing soil health | |
| | Synergies with other clusters/ conventional industry (variety development) | |

| | | |
|---|---|---|
| | Economics of farming-production economics with innovation-integrate economics in projects | |
| **B.** | **Barriers** | **Possible question or research objective to address the barrier** |
| | Length of growing seasons-new crops | research/ trials using high tunnels for season extension |
| | Storage of crops-methods | |
| | Vending opportunities | |
| | Production | |
| | Storage of crops-methods | |
| | Marker | |
| | Development of better adaptive methodologies for statistics for organic research | |
| | Data storage-for future meta-analyses | |
| | Climate impacts on pests/pathogens, water management-adaptation | |
| | Conflict between ideology and production models-profitability? | |
| | Standards and science | |
| | Monoculture causing problems-pest issues etc. | |
| | How to make the small farm more efficient | |
| | New models of farm development-industrial vs. small farm | |
| | Marketing opportunities in institutions etc. using wellness as selling tool | |
| | Consumer education | |
| | Poor knowledge transfer of farming systems-farming schools-transfer between generations of farmers | |
| | Need good extension-fostering extension services | |
| | Systems based economic models | |

## Horticulture 2

| A. | Opportunities | Possible question or research objective to address the opportunity |
|---|---|---|
| | Identify health benefits from fruits and vegetables | Food safety |
| | Food safety | Food safety |
| | Proactive getting a head of climate change- varieties, water management, pest | Climate change |
| | Water management | Climate change/ regional and closed system |
| | Reduce dependence on inputs | Regional and closed system |
| | Nutrient management | Regional and closed system |
| | Value adding of our waste products | Regional and closed system |
| | Models and tools that are farmer friendly | Production tools/management |
| | Climate neutral production- lifecycle assessment of projects from the cluster | Life cycle assessment |
| | Communication and promotion to get more support from the public | Extension and communication |
| | Up-scaling small scale farms | Production tools/management |
| | Developing infrastructure | Production tools/infrastructure |
| | How to mechanize small scale techniques | Production tools/management |
| | Technical and economical references/index | Extension and communication/ technical and economical |
| | Impacts of social and environmental | Life cycle assessment |
| | Cultivation and yield in horticultural production | Production tools/management |
| | Evaluation of tools that are available for different scale operations | Production tools/management |
| | Recommend permanent bed and control traffic farming | Production tools/management |
| | Adapt berry fruit for under tunnel production | Season extension |
| | On farm energy production | Alternative energy |
| | Reduce energy and reliance on oil products- energy and environmentally sustainable methods | Alternative energy |
| | Weed and insects as indicators of production system indicators | Production tools/management, soil quality |
| | Varieties/cultivars for organic production | Production tools/management, season extension |
| | Diversity of regional seed supply chain | Production tools/ |

| | |
|---|---|
| Season extension for crop production | Season extension |
| Guide for season extension production for unheated systems | Season extension |
| Artificial lightening | Season extension |
| Integration of livestock back into horticulture and what livestock are best for integrating | Closed system |
| Creating benchmarks for hort production | Extension and communication |
| Using existing technology to record inputs, labour, etc. | Production tools/ extension |
| Agroecosystem management | Production tools |
| Postharvest management | Food safety |
| Ornamental organic crops- i.e. cut flowers | Technical and economic |
| Diversification of organic crops i.e. Christmas trees | Technical and economic |
| Develop a standard for ornamental crops | |
| Improving extension of research to farmers/ evaluating how to get the information to the farmers | Extension and communication |
| Effective biodegradable plastics | Production tools |
| Solarization and biofumigation -impacts on soil and microbial activity, disease, plants, | Production tools |
| Development of new biological pesticide products (biopesticides) | Production tools |

## Mixed Farming Systems

| A. | Opportunities | Possible question or research objective to address the opportunity |
|---|---|---|
| | Rotational grazing | |
| | Social, economic, and ecological synergies on a watershed | How can we create cooperative groups to market, share resources? |
| | Nutritional and medicinal properties of weeds | How can we create a 'pharmacy' for grazing animals? |
| | Using interdisciplinary research to influence policy | How can we affect government assistance, crop insurance policies etc using interdisciplinary research creating a policy climate that enables farmers? |
| **B.** | **Barriers** | **Possible question or research objective to address the barrier** |
| | Critical look at claims of GHG | How organic management systems can improve marketing, economic analysis |
| | Identify barriers of putting livestock on a 'crop farm' | What is the research required to facilitate integration: timeline, infrastructure, marketing a variety of crops, economies and variables of small scale farming. How do you manage the value chain and profitability on a small organic farm? (Year round grazing? Green manure grazing? Cropping - understanding weeds. |
| | Striation of ideas in research - creating research projects that include an interdisciplinary , integrated team | |
| | Equipment purchase | How can we make various equipment more accessible when a farmer wants to diversify |
| | Animal use | How can we support animals we are using in an oil based economy? |
| | Barriers - more complexity between animals and crops becomes a research barrier | |
| **C.** | **Additional** | |
| * | Utilizing niches in complementary manner | |
| * | Identifying and developing crop and animal species that are well suited to organic systems in local regions | |

* Grazing -bale grazing, rotational grazing and the association of nutrients involved
* How to connect farmers (including emerging farmers) with each other, researchers and policy makers on a social, economic and policy level.
* How do nutrients and energy cycle within a watershed and what is the impact if they are exported from the watershed
* Health of humans, plants, animals and soils through the relationship of the health of the ecological system and its components
* Study of the business and economics of an organic mixed farming system, including startup and transition
* What are the diagnostics of soil health and nutrient cycles
* Appropriate on farm technology for weeds, energy efficiency etc.
* Basic primary productivity
* Design of whole farm systems research for synergies
* Third party evaluation of input products
* Distribution and Processing
* The role of organic in ecological goods and services (improving water quality, biodiversity etc.) and how can that be translated into a growing sector.
* Biomimicry and permaculture

Weed whisperer

Relationships between insects, plants and animals

Integrating animals and crops at the organic watershed level

Interactions between livestock, manures, crop species and soil health

Market valuation of ecological services

Lifecycle analysis for energy efficiency within organic systems

Relationships between insects, plants and animals at field, farm and watershed level

Basic agronomy -annual and perennial plants integrating livestock

Creating biomimicry in farming - crops, livestock, hedgerows

Organic agriculture is modifying the land just enough to get the job done (adapting and working with the land and integrating non-crop habitats)

Understanding the processes of ecology prior to the advent of agriculture

Need for livestock and cropping

Reconditioning soil

THEMES: agronomy, ecological and biomimicry, environmental implications

Connection between fractals(repeating patterns), crop health and animal health

Unit land production rotating animals/different crops within the context of civil pasture

Variety of animals and crop rotations/understanding synergies and difficulties

Demonstration sites - organic permaculture - economically viable?

Biosecurity issues in organic livestock - barrier of organic regulations

Integrated system - nutrients need to be recycled - the role of fungi and composting (including humans in the ecosystem of the farming cycle - using human biosolids)

How to get organic food to market. How much unpaid/paid labour exists on organic farms?

How organic helps reduce healthcare costs

Studying nutrient content and density in food rather than yield

How do animals cycle nutrients within a landscape

What are the diagnostics of soil health and nutrient cycles

The impact of introduced species and livestock into our landscape/soil ecology

How to enhance phosphorus levels in the soil - creation and availability

Understanding organic matter mineralization and balance/timing in organic systems; carbon, nitrogen, and phosphorus being exported but not replaced

Net balance

What are the implications for nitrogen /pH

Third party testing of products that have unsubstantiated claims

Extension component built into every bit of research

Social study of diversification and specialization

Assistance during transition for farmers

Appropriate feed for chickens and pigs

New farmers - National Homestead Act

Interdisciplinary analysis of the effects of intensification

Land cost variables across the country

Which crops should be grown close to cities/which can be transported and thus grown further away

Adapting weed , soil, manure, climate research to local conditions

Develop soil and screening tests for organic systems

Crop system changes in transition of organic farmers

Market coordination along the value chain - Increasing small scale processors and appropriate distribution