

2nd biennial

Our Food, Our Future.

Research that Feeds Newfoundland and Labrador



*Innovative Agricultural
Research*

Building Partnerships

*Identifying Knowledge
Gaps*

- Proceedings -

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Acknowledgements

The organizing committee would like to thank the following organizations and individuals for their commitment to making the Our Food, Our Future – Research that Feeds Newfoundland and Labrador symposium a success

Partners

- Department of Natural Resources, Forestry and Agrifoods Agency, Production and Market Development Division
- Grenfell Campus, Memorial University of Newfoundland

Funding Provided by

- Federal-Provincial Growing Forward 2 Program
- Department of Business, Tourism, Culture and Rural Development
- Atlantic Canada Opportunities Agency (ACOA)
- Research and Development Corporation (RDC)

Special thanks to

Dr. Greg Wood, Dr. Antony Card, Keith Deering, Dave Jennings, Heather Randell, Crystal Anderson-Baggs, Jennifer Haverstock, Ashley Mullins, Tyler Parlee, Tara Morgan, and Dr. Adrian Unc for their input and support.



Preface



The Our Farms, Our Food, Our Future – Provincial Agrifoods Strategy provided the context for the first of its kind symposium “ Our Food, Our Future – Growing the Agricultural Industry in Newfoundland and Labrador” held in Corner Brook on November 23rd 2012. Due to the success of this event it was decided that a biennial event would be established. The Our Food, Our Future – Research that Feeds Newfoundland and Labrador was the second of the biennial series which was held on November 5th and 6th, 2014 in Corner Brook.

Research and innovation is the catalyst for future growth of the agricultural industry in this province, and the momentum for research is evident. Recently, MUN-Grenfell Campus announced it's newly established Boreal Ecosystem Research Institute (BERI) and the hiring of 5 new associate professor positions with expertise in agronomy, soil science, economics and hydrology as well as the completion of a state of the art research laboratory. These advancements, together with the partnerships formed with industry, governments and other academic institutions have strengthened agricultural research capacity in Newfoundland and Labrador (NL).

These proceedings are a reflection of the diversity of the research that has been and is currently being conducted in the province and it highlights the partnerships and research capacity that now exist in the province to lead agricultural research in the future. We would like to thank all the conference delegates who attended and those who shared their work. We were pleased to welcome delegates from the BERI (MUN), Agriculture and Agri-Food Canada, Agrifoods Development Branch – Forestry and Agrifoods Agency, Memorial University of Newfoundland, Dalhousie Agriculture Campus, Acadia University, University of Guelph, the NL agricultural industry, and various guest speakers whom brought many years' experience in researching topics such as herd health, greenhouse technologies, nutraceuticals, disease management, soil and bee health. On the evening of November 5th we were pleased to have Mr. Clayton Forsey, Parliamentary Secretary to the Minister Responsible for the Forestry and Agrifoods Agency who brought greetings on behalf of the Minister. As well that evening we welcomed Dr. Renne Van Acker, Associate Dean, External Relations, Guelph University whose keynote presentation “The Value and Value Chain of Agricultural Research” clearly identified the need and value of agricultural research as it relates to industry growth and diversification.

The symposium was very well attended with over 120 people registered representing industry, government, academia, NGO's and university students. There was tremendous interest from the media with three Western Star articles, a CBC radio interview and a speech given by the Minister Responsible for the Forestry and Agrifoods Agency in the House of Assembly.

Our Food, Our Future.

Research that Feeds Newfoundland and Labrador

Agenda/ November 4-6, 2014

Day 1 - November 5th

- 8:30** | Welcome
Keith Deering, Assistant Deputy Minister – Agrifoods Development Branch, Department of Natural Resources
Greetings – Grenfell Campus, MUN and Newfoundland and Labrador Federation of Agriculture
- 9:00** | **Dr. Adrian Unc**
Current Status of Agricultural Research in Newfoundland and Labrador: A Review of the Literature
- 9:30** | **Sabrina Ellsworth**
The Provincial Agriculture Research and Development Program - Update
- 9:40** | **Sandy Todd**
New and Ongoing Research at the Atlantic Cool Climate Crop Research Centre
- 9:50** | **Dr. Antony Card**
Boreal Ecosystem Research Initiative – Update
- Climate Change – Challenges, Opportunities and Adaptation*
- 10:00** | **Dr. Norm Catto**
Impacts of Climate Change and Variation on Food in NL
- 10:30** | **Networking Break & Poster Session**
- Greenhouse Technologies and Opportunities*
- 11:00** | **Dr. Mumtaz Cheema**
Hydroponic Greenhouse Vegetable Production Technologies; Opportunities and Options in Newfoundland and Labrador

- 11:30** | **Alex Turkewitsch**
Light and Lighting Considerations in Maritime Temperate Production Greenhouses

>>> Lunch 12:00 – Poster Viewing

Value Added Production and Processing

- 1:00** | **Dr. Vasantha Rupasinghe**
Cytoprotective and Neuroprotective Properties of Canadian Partridgeberry
- 1:30** | **Lionel Rodrigues**
Rodrigues Winery & Distillery - Sedna Nutra

Integrated Pest Management

- 2:00** | **Dr. Kirk Hillier**
Development of Trapping Systems for Pest Management
- 2:30** | **Rachael Cheverie**
Vegetable Disease Management
- 3:00** | **Networking Break & Poster Session**

Soil Health and Nutrient Cycling

3:30 | **Dr. Joinel Abedin**

Soil Amendment with Biochar for the Improvement of Soil Fertility and Crop Production

4:00 | **Amy Sangster**

Beyond N, P and K. The Real Dirt on Managing Soil for Optimal Crop Production

4:30 | Wrap up and closing for the day

Keith Deering

Wednesday November 5

7:00 pm Banquet

Clayton Forsey - Parliamentary Secretary to the Minister Responsible for Forestry and Agrifoods

Keynote - Dr. Rene Van Acker - The Value and Value Chain of Agricultural Research

Day 2 - November 6th

7:30 | Full Breakfast in Pepsi Studio

8:30

8:30 | Opening

Keith Deering

Addressing Hot Topic Industry Challenges

9:00 | **Daniel Borges**

Honey Bee Colony Mortality: Investigating Causes and Potential Solutions

9:30 | **Harold House**

Alternative Bedding for the Livestock Industries

Farm Economics, Marketing and Commercialization

10:00 | **Dr. Catherine Keske**

Home Grown: Trends in Agricultural Economics and Small Scale Agricultural Production

10:30 | *Networking Break & Poster Session*

11:00 | **Dr. Barbra Neis**

Growing Agri-Safety Research Capacity in Newfoundland and Labrador: The Need, the Opportunity and a Strategy

11:15 | **Blaine Hussey**

Agricultural Marketing and Consumer Trends

Agrifood Production

11:30 | **Dr. Vanessa Kavanagh**

Viability of Winter Wheat and Spring Barley Cultivation for Animal Feed Production in Insular Newfoundland

11:50 | **Karen Kennedy**

Wine Grape Varietal Trial

>>> Lunch 12:10

**Continued on following page*

1:30 | Dr. Dawn Bignell

Characterization of Plant Pathogenic *Streptomyces* spp. causing Common Scab Disease in Newfoundland

1:50 | Dr. Raymond Thomas

Potential Considerations for Soybean Production in Newfoundland and Labrador

Animal Health

2:10 | Dr. Hugh Whitney

Animal Disease Research in Newfoundland and Labrador

2:30 | Dr. Kapil Tahlan

Examination of Pathogenic Bacteria Associated with Dairy Farms Across Newfoundland

2:50 | *Networking Break & Poster Session*

3:15 | Panel Session

Identifying Research Gaps and Opportunities

4:15 | Wrap up and closing

Dave Jennings

Dr. Antony Card

Where possible, food for breaks and meals were sourced from local NL farmers

Introduction

These proceedings are based on the “Our Food, Our Future – Research that Feeds Newfoundland and Labrador” symposium that brought together scientists, farmer-innovators, and interested members of the public for a progress report on sustainable agriculture research efforts across Newfoundland and Labrador. The symposium, which was held on November 5th and 6th, 2014, in Corner Brook, was sponsored by the Federal-Provincial cost shared Growing Forward 2 Program, the Department of Business, Culture, Tourism and Rural Development, Atlantic Canada Opportunities Agency, Research and Development Corporation, Agrifoods Development Branch and Grenfell Campus, Memorial University.

This two day symposium provided the opportunity for academic leaders, producers and agricultural experts from various institutions to come together and highlight current agricultural research within the Province, as well as to identify opportunities to help strengthen agricultural production and lead the province toward an innovative, profitable and sustainable agricultural industry.

Symposium presentation topics included: climate change, greenhouse technologies and opportunities, value-added production and processing, integrated pest management, soil health and nutrient cycling, honey bee mortality, alternative bedding for livestock, farm economics, marketing and commercialization, agrifood production and animal health. Guest speakers included researchers from: Agriculture and Agrifood Canada, Forestry and Agrifoods Agency – Agrifoods Development Branch, Memorial University, Perennia, Labrador Institute, Acadia University, Dalhousie – Agriculture Campus, University of Guelph, all of which recognize the opportunities for growth in Newfoundland and Labrador and who have a keen interest in conducting research in the province.

A panel session consisting of Keith Deering, Dr. Adrian Unc, Harold House, Dr. Hugh Whitney and Dr. Catherine Keske provided opportunity for questions and discussions around the knowledge gaps and opportunities in agricultural research here in NL. In addition, poster sessions provided information sharing and networking opportunities for attendees.

The keynote address was given by Dr. Rene Van Acker from the University of Guelph. His talk focused on research as a key driver for economic growth in Canada and the value of agricultural research as it relates to industry growth and diversification.

Welcoming Address

Keith Deering, Assistant Deputy Minister, Agrifoods Development Branch

Mr. Deering set the stage for the day by elucidating the role that agriculture research plays in addressing the concerns of food security. *“Food security is an extremely important issue for Newfoundlanders and Labradorians and this discussion will provide a valuable opportunity for both researchers and policy makers to hear about the most current agriculture research that is being done in Newfoundland and Labrador. Even more important, the discussion will provide a platform for all of us to discuss where priority investments should be made in agriculture research over the medium to long term.*

This year’s symposium is the second “Our Food, Our Future” symposium. The first symposium was held here in Corner Brook 2 years ago and was attended by 102 delegates. In fact, registration in the last symposium had to be limited because of space requirements at the venue where it was held. We are proud to report that we have over 120 delegates registered for this symposium and I would expect that this will increase again when we hold the next symposium 2 years from now.

The issue of food security is critically important to everyone. While our Confederation with Canada has brought many benefits to Newfoundland and Labrador, including the benefits associated with being connected to sophisticated transportation and supply chain networks, our reliance on those networks has also conditioned us to become reliant on food choices that have to be imported from outside our provincial boundaries. As a result, not only does a vast majority of our current food requirements have to be shipped into Newfoundland and Labrador from outside the province, there have been significant reductions in the numbers of farms, reductions in farm population, increases in the average age of farmers and less new entrants becoming involved in farming. At the same time, populations have increased, food consumption has obviously increased, pressures for alternative land uses on arable landbase have increased, labour expenses have increased and the general cost of producing food has become significantly higher in recent years. Looking forward, global population increases will require a significant increase in food production output by 2050. In a warming climate, I think it is safe to say that we will have to find ways to build in more resilience to extreme weather events into our food production systems. In forecasting our own food requirements beyond 2015, we now need to be very aware of what is happening in the rest of the world.

In the face of these challenges, there will also be significant opportunities for us. If Canada is to become the bread basket of the world, Newfoundland and Labrador will have a significant role to play in that growth, and agriculture research will be critically important. We will have to find ways to increase agriculture production on the landbase that we currently occupy. We will have to increase our primary agriculture footprint while at the same time meeting the increasing expectations for sustainability from our consumers. In order to remain competitive, we will have to develop and implement leading edge food processing systems that ensure the highest level of food safety standards. Again, research will be critically important in allowing us to seize these opportunities.

The previous symposium included excellent presentations on the subjects of grain production, alternative crop production as well as animal disease research in Newfoundland and Labrador. The panel discussion provided an opportunity for a very provocative exchange of ideas on short and medium term research priorities. Through the partnerships that were forged at that symposium, together we were able to make considerable progress on the research ideas that were generated at that meeting. Some of this research has already changed the direction that our agriculture sector is headed in”.

Mr. Deering concluded his welcome address by emphasizing the goal of the two symposiums thus far, which were *“to identify even more knowledge gaps and research priorities and create even more collaborative partnerships to help fill those gaps”.*

Greetings from Grenfell Campus, Memorial University of Newfoundland

Dr. Antony Card, Associate Vice-President Research

Dr. Card brought greetings on behalf of Grenfell Campus, Memorial University. He started by stating the purpose of the symposium affirming that this symposium's purpose was to discuss issues that affect us all, not just as players in the agrifood industry, but as consumers of agrifood products. He continued by elucidating that Memorial University is committed to being a leader in research and development in the agricultural field.

Summary of Panel Discussion



Invited panel members included: Keith Deering, Dr. Adrian Unc, Dr. Hugh Whitney, Harold House, and Dr. Catherine Keske. The aim of the panel session was to provide opportunity for the audience to participate in discussion and to obtain a clearer understanding of current research capacity and opportunities.

The question was raised from the audience, "What is your first impression of agriculture here in NL?" Given that the majority of the panel was new to the province or visiting, it was interesting to hear their perspective on agriculture here in NL. Dr. Adrian Unc started the discussion by saying that the industry here is extremely small, and that there is not a long history of production. There seems to be a disconnect between what is done and what is reported. It appears that we have been trying to solve problems as they appear. Dr. Keske, who had only been in the province for a few short weeks at the time of this symposium said that we have challenging environmental conditions, not unique but the details are different. She said that food security is achievable. This was the first time that Mr. House had been to Newfoundland. He started by saying that the opportunities are tremendous. The fact that we are clearing land here is unheard of in Ontario. He said that this is an exciting time to be a researcher and a producer in NL.

A question from the audience asked if there should be other people in this room that were not? It was suggested that the Environmental Policy Institute from MUN, Grenfell Campus be included in the future. Also, Mr. Deering said that there were discussions taking place on provincial and federal levels about food security and population growth as it relates to agricultural production in rural communities.

There was a lot of discussion around new entrants and encouraging young people to farm. It was noted that most young people are moving towards trades and that there needs to be some incentive or apprentice program to encourage young people to pursue agriculture as a career choice. Mr. Deering said that there are Government programs in place, but there just isn't enough interest. In general there was a consensus that there needs to be programs that help with startup costs, and that current Government programs need to be made more available to interested people who want to become farmers. It was suggested that we may need to look outside the province for collaborations and for future farmers.

Funding for research was also discussed. It was noted that it is easy to come up with the research questions but funding the research becomes a problem. There was a discussion around collaborations and contribution to research. It was reiterated that a Provincial Agricultural Research Strategy is required in order to seek out additional funds for research and to build future collaborations.

Outcomes

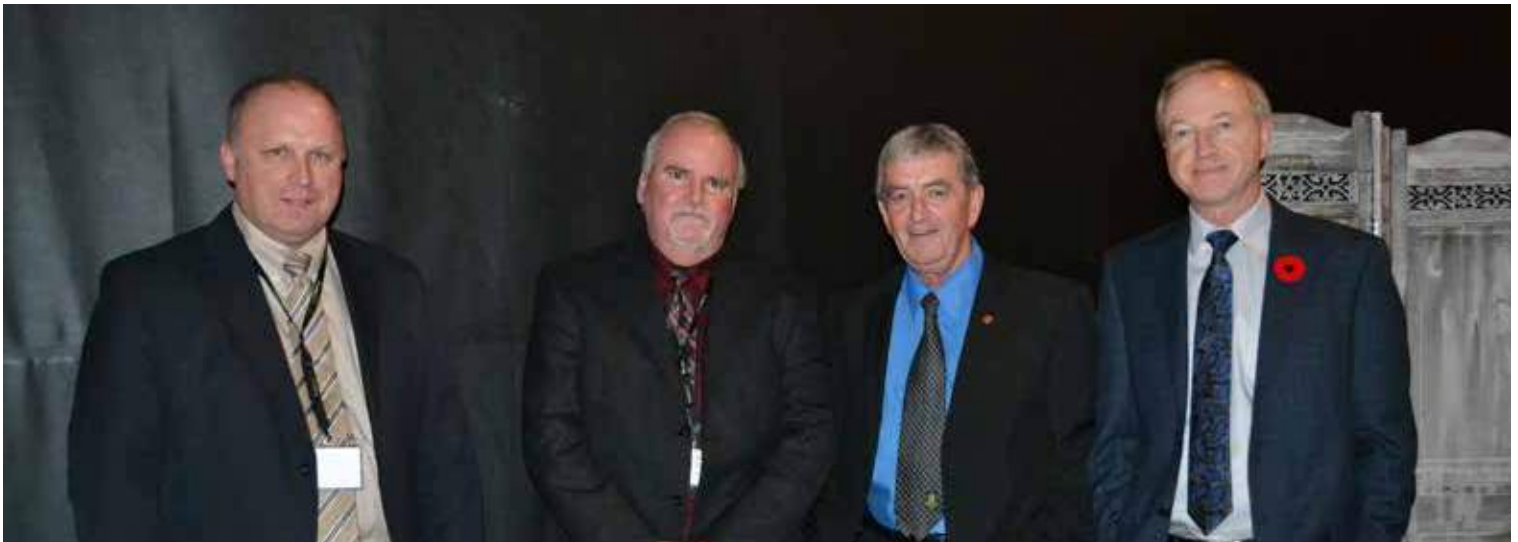
The encouraging science that was presented followed by the subsequent discussions at this event can be summarized into three main outcomes:

First and foremost, the agriculture industry in Newfoundland and Labrador is unique. Newfoundland and Labrador is still clearing land for agricultural expansion, whereas the rest of Canada and around the world have focused their efforts on soil reclamation and have very little opportunity for expansion. Another important fact to mention is the extended length of the cropping season which we have witnessed over the past few decades that has positioned Newfoundland and Labrador as a potential laboratory for novel, globally significant, agricultural research. An interesting example of how NL can lead research on the global stage is with our provincial honey bees. Given that the most damaging honeybee parasites have not reached the Province and that pesticide use is significantly lower than in larger agricultural regions, the local honeybee population is of interest to the global community as a model population for vector control.



Secondly, the agriculture research in this province is gaining momentum. The partnerships that have been created are invaluable. The newly established BERI laboratory, and both Provincial and Federal governments now have the expertise in place to advance agricultural research to the next level. The capacity that has been built will allow us to continue innovative research on improved production practices, crop and livestock diversification, soil, water and land management, environmental sustainability, and plant and animal health just to name a few priority areas. Research priority setting is ever evolving and will continue to involve direction and consultation with industry. Collaborative research will be the driving force to move the agricultural industry of Newfoundland and Labrador to a more profitable, competitive and sustainable industry.

Lastly, agricultural research in this province has made a significant positive impact on many industry sectors. Examples of local research success highlighted at this symposium that have moved the industry forward were: advancements in livestock feeds (grain and soybean); commercialization potential of wine grapes; biochar as a soil amendment; plant and animal disease identification, etc. While we have seen advancements in the agricultural industry due to research, there remains to be an issue of getting the message out to the public. A search of relevant scientific literature, carried out by Dr. Adrian Unc, shows that while universities lead agricultural research globally, here in NL most publications are based on research funded by the Canadian federal government through Agriculture and Agri-Food Canada. The same research survey has shown limited scope of dissemination of research results with main foci on tundra, plastic mulch, corn heat units, and various berry crops. It is thus clear that expansion of research must be effectively translated into transfer of research and knowledge to the agricultural industry and any other users. Research is only valuable if disseminated and applied. More widely accessible information dissemination mechanisms need to be available to ensure that any research conducted is published and circulated to the wider audience.



Next Steps

The Our Food, Our Future – Research that Feeds Newfoundland and Labrador symposium provided a wealth of knowledge which will help in priority setting for future research. With the assistance of the Agricultural Research Advisory Committee, the Production and Market Development Division and BERI will continue to develop the Provincial Agricultural Research Strategy. As it was outlined from the past two symposia, in order to address food security issues and move to a more diversified, profitable agricultural industry, more financial resources are required. This strategy, along with formal collaborations between governments and academia will aid in the quest of securing more resources for agricultural research in NL.



Speaker Profiles and Presentation Abstracts



> *Dr. Rene Van Acker*

Associate Dean (external), Ontario Agricultural College,
University of Guelph (vanacker@uoguelph.ca)

Dr. Rene Van Acker is Professor and Associate Dean (external) of the Ontario Agricultural College (OAC) at the University of Guelph and was previously chair of the department of Plant Agriculture. Prior to his appointments at The University of Guelph, Rene was a professor of weed science and crop management at the University of Manitoba. As Associate Dean external in OAC, Rene is responsible for helping to initiate and coordinate fundraising in the college and manage

communications and partnerships with and across the college. He also works with the Associate Dean academic in OAC to initiate and coordinate student recruitment projects and he is the lead for OAC on initiatives to gauge demand in the food and agriculture sector for graduates from OAC programs. Rene holds BSc and MSc degrees from the University of Guelph and a PhD from the University of Reading in the UK.

Presentation Title

The Value and Value Chain of Agricultural Research

Abstract

The agriculture and food sector in Canada is now being recognized as not only a consistent growth sector but also as a resilient economic engine that is critical to the Canadian economy. Research is a key driver of growth in any economic sector and this is true in agriculture and food as well. There is a long tradition of agricultural research in Canada focused primarily on innovation and knowledge needs inside the farm gate. Increasingly there is a need and recognition that more needs to be done across the landscape of the entire agriculture and food sector. It is also increasingly being recognized that research brings value not only in the discovery and innovation but also in its contribution to training of highly qualified personnel. Using examples from western Canada and from Ontario I will make the case for the value of research in agriculture and food and comment on new models and new directions that will suit opportunities for Canada.



Speaker Profiles and Presentation Abstracts

> **Dr. Adrian Unc**

Associate Professor, Grenfell Campus, Memorial University of Newfoundland (aunc@grenfell.mun.ca)

Dr. Adrian Unc has training in Agronomy (BSc, Romania), Soil Science (MSc and PhD, Univ. of Guelph, Canada), and Molecular Biology & Microbiology (Postdoctoral, Univ. of Ottawa, Canada).

And has carried out research in Canada, USA, Jordan and Israel for private and public granting agencies (provincial, state, federal, and international governmental agencies).

His main interests are in the area of environmental microbiology as relevant to and rural and urban economic and environmental sustainability of managed biological systems that include fertility and health of agriculture and rangelands, and soil-plant relationships.

He has chaired advisory committees for 10 graduate students (MSc and PhD level) and was an external advisor for other graduate students in agriculture, engineering and biology in Canada, USA, Romania, Mexico, and Iran.

Presentation Title

Current Status of Agricultural Research in Newfoundland and Labrador; A Review of the Literature.

Abstract

Agricultural research in Newfoundland and Labrador has been carried out by federal and provincial research agencies and often by researchers affiliated with extra provincial institutions. The development of future research programs on a coherent basis requires an understanding of the publicly available research results.

Such an exercise in revising scientific literature and other publicly available documents will be presented. This will permit an evaluation of the visibility of past and current agricultural research carried out in Newfoundland and Labrador. A summary of current knowledge, specifically obtained within, or aimed at, the province will be offered.



> **Sabrina Ellsworth, M.Sc, P.Ag**

Manager, Agricultural Research, Department of Natural Resources (sabrinaellsworth@gov.nl.ca)

Sabrina Ellsworth was born and raised in Corner Brook, NL. She received her Bachelor of Science in Agriculture with a major in Animal Science from the Nova Scotia Agricultural College (Dalhousie University, Faculty of Agriculture) in 2002 and a Master of Science (Environmental Science) in 2005 from the same institution. She has since worked with the Nova Scotia Department of Agriculture, Atlantic Swine Research Partnership and Nova Scotia Soil and Crop Improvement Association as program coordinator with the Greenhouse Gas Mitigation and Shelterbelt Programs. Since returning to Newfoundland in 2008, Sabrina has held several progressive positions within the Agrifoods Development Branch and the Department of Environment and Conservation; Alternative Feeds Coordinator, Crop Specialist, Soil Fertility Specialist, Manager of the Institute of Biodiversity, Ecosystem Science and Sustainability and now for the last 2 years, Manager of Agricultural Research with the Department of Natural Resources.



Presentation Title

The Provincial Agriculture Research and Development Program - Update

Speaker Profiles and Presentation Abstracts

Abstract

The Provincial Agricultural Research and Development Program is building innovation capacity which will enhance an environment of self-reliance, growth, and diversification in the agricultural industry in Newfoundland and Labrador. Innovation means industry change, improvement and progress. Through a strong research and development program that is supported by the Province of Newfoundland and Labrador, the NL agriculture industry will meet challenges head-on and aggressively adopt the opportunities that are ever present.

The applied research being conducted by provincial government scientists is contributing significantly to: the introduction of new crop varieties, livestock, and crop management practices; the development of best management practices to enhance environmental sustainability on farms; improving competitiveness in the market place; and supporting knowledge transfer and outreach.



> *Sandy Todd P.Ag.*

Associate Director of Research, Development and Technology at the Agriculture and Agri-Food Canada (Sandy.Todd@AGR.GC.CA)

Sandy is the Associate Director of Research, Development and Technology at the Agriculture and Agri-Food Canada research centre in St. John's. The centre is known as the Atlantic Cool Climate Crop Research Centre and is one of Agriculture and Agri Food Canada's national network of 19 research centres. ACCCRC leads development of agriculture technology supporting the growth of primary production in boreal and northern regions, with a special emphasis on Newfoundland and Labrador. Scientists at the centre undertake research in 2 domains consistent with the mission of the Centre: Primary Production Agriculture support for horticultural crops (especially berries suitable for production in boreal/northern ecosystems) and agronomic research in forage and cereal crops in support of the regional dairy value chain; and Environmental Stewardship for improved performance of the agricultural production system in the fragile boreal/northern environment. The centre has linkages with the Agrifoods Development Branch of DNR, MUN and industry associations.

Prior to becoming director Sandy led research programs in the areas forages and cereals management, and best management practice for the use of liquid dairy manure in a timothy (grass) production system. Other areas of research experience include no-till reseeding of old forage fields on the Avalon Peninsula and the yield and winter hardiness of high sugar perennial ryegrass varieties bred in Wales.

Sandy is a member of the Newfoundland and Labrador Institute of Agrologists, and a past president of the Agricultural Institute of Canada.

Presentation Title

New and Ongoing Research at the Atlantic Cool Climate Crop Research Centre

Abstract

This presentation will provide information on Agriculture and Agri-Food Canada research for the unique boreal/northern environment found in Newfoundland and Labrador.



> *Dr. Norm Catto*

Professor, Memorial University (ncatto@mun.ca)

Professor of Geography, and graduate chair of Environmental Science, Memorial University. I have lived in St. John's since I joined Memorial University in July, 1989. My research and teaching interests include natural hazards and risk assessment; coastal landforms, erosion, and sea level change; and the impacts of climate and weather events on agriculture, transportation, infrastructure, fisheries, and communities. My work has included projects and investigations in environments in Europe, Russia, the Dominican Republic, Argentina, South Korea, and throughout Canada. I have written one textbook on Natural Hazards in Canada, and am currently finishing another focused on Canadian landforms and associated hazards.



Presentation Title

Impacts of Climate Change and Variation on Food in NL

Abstract

Ongoing and projected changes in climate present both opportunity and concerns. The opportunity to extend the growing season and change crops is balanced against increased frequency of extreme events, environmental impacts, transportation and distribution issues, and potential changes in pest spectrum and incidence of disease. Agriculture in many climatically-suitable regions of NL is limited by soil conditions and competing demands for suitable land.

Although change in annual average conditions is of concern, the problems posed by increased year-to-year variation and greater incidences of extreme events are probably more serious. Current scenarios predict an increased frequency of the number of hot days during the growing season, potential for late spring and early fall frosts, an increased number of consecutive dry days, and more intense precipitation events. A warmer growing season may increase the potential for forage production, but may result in overwintering stresses and greater winter kill. Water usage in food production, including berries, is a potential issue. Another potential effect is the impact of change on pollinating species.

Climate influences on transportation will directly impact food production and distribution. Greater frequency of freeze-thaw events is predicted for all of NL. Increasing easterly storm winds strength and surge activity pose a hazard to marine transportation. Weather-related delays to the ferry service result in substantial economic cost. Reduction in fog frequency and intensity can be anticipated, following trends ongoing since 1950. Although fog will remain a hazard, its significance is less than that of wave conditions and sea ice.

> *Dr. Kirk Hillier*

Professor, Acadia University (kirk.hillier@acadiu.ca)

Dr. Hillier is an alumni of Memorial University, he has completed a B.Sc. and Ph.D. in the same institution, where he studied the use of semiochemicals for pest monitoring in partridgeberries and cranberries. He subsequently engaged in postdoctoral studies at the University of Utah and was recruited as faculty by Acadia in 2007. He has also been a Visiting Scientist at the University of Hawaii, the Theodor Boveri Institut (Wurzburg, Germany), the Arizona Research Laboratories Division of Neurobiology, Tucson, AZ, he is an active collaborator with the Max Planck Institut für Chemische Ökologie (Jena, Germany).



Speaker Profiles and Presentation Abstracts

His lab's research program is directed towards a better understanding of insect olfactory processing and the relationship between odours and insect behaviour. Through the use of comparative evolutionary studies of insect olfaction, Team Hillier aims to develop novel techniques to manage some of the worst insect threats on the planet using alternatives to standard insecticide applications. In this way, basic evolutionary studies provide vital insight to the development of applied technology. We also maintain regional network of collaborators in applied aspects of entomology, including the chemical ecology and management of blueberry, apple, vegetable, vineyard and forest pests. Our laboratory includes the Chemical Analysis and Bioimaging Laboratory or CABL, for short. This facility provides a benchmark facility for insect neurophysiology and chemical ecology studies in Canada. Since its development in 2009, dozens of students and collaborators from around the globe have benefited from resources within this facility.

Presentation Title

Development of Lures and Traps for Pest Management

> *K. Hillier¹, C. Little^{1,2}, L. Jabre^{1,4}, J. Saroli¹, P. Dixon³, D. Moreau⁴, C. Cutler⁵*

¹Acadia University

²Memorial University of Newfoundland

³Agriculture and AgriFood Canada, St. John's, NL

⁴Agriculture and AgriFood Canada, Kentville, NS

⁵Dalhousie University, Halifax, NS

Abstract

Detecting and quantifying pest populations in crops are challenges consistently faced by modern farms. The ability to accurately forecast pest densities, potential for damage and thresholds for treatment is a critical need throughout agriculture. Many sampling regimes, however, are labour intensive, inaccurate, and face challenges with cryptic insect pests and annual shifts in climate. A series of studies will be presented summarizing research and development of semiochemical trap and lure systems to provide efficient and accurate tools to forecast pest insect incidences across the agricultural spectrum, including berry crops, crucifers, and invasive species management. Finally, prospects for direct control using semiochemistry will also be presented. The overall goal of these research threads are to produce systems for integrated pest management which increase yields, while decreasing costs associated with pest management, including significant reductions in pesticide application.



> *Dr. Hugh Whitney*

Chief Veterinary Officer, Department of Natural Resources
(hughwhitney@gov.nl.ca)

Dr. Hugh Whitney has worked as the province's Chief Veterinary Officer since 1985 with responsibilities that include farm animal veterinary services, laboratory diagnostics, food safety control, animal welfare and animal disease surveillance, control and research. To support academic research Dr. Whitney has been an Adjunct Professor with Memorial University since 1999 co-supervising students at the honours, MSc and PhD levels. Dr. Whitney holds the degrees of BSc (Agriculture, McGill), DMV (Veterinary Medicine, Montreal), MSc (Veterinary Microbiology, Saskatchewan) and MA (History, Memorial).

Presentation Title

Animal Disease Research in Newfoundland and Labrador

Abstract

Animal disease research in this province is carried out for a number of reasons, to support the economic interest of the commercial agricultural industry, to protect public health, for public policy purposes, to encourage animal disease research that otherwise may not be done, to help keep the younger generation in the province and to assist in public education. This presentation will briefly review current animal disease research carried out in this province including such diseases as rabies, avian influenza, John's disease, and Lyme disease.

> *Dr. Kapil Tahlan*

Assistant Professor, Memorial University (ktahlan@mun.ca)

Kapil Tahlan obtained his Ph.D. in Microbiology and Biotechnology from the University of Alberta (Edmonton, Canada) in 2005, following which he was a Natural Sciences and Engineering Research Council of Canada postdoctoral fellow at the Department of Biochemistry and Biomedical Sciences at McMaster University (Hamilton, Canada). In 2007 he moved to the National Institutes of Health (Bethesda, USA) to work on tuberculosis. In 2010 he was appointed as an Assistant Professor in the Department of Biology at Memorial University. His current research group works on antibiotic production/resistance and specific bacterial pathogens of concern to human and veterinary medicine.



Presentation Title

Examination of Pathogenic Bacteria Associated with Dairy Farms from Newfoundland

Abstract

Mycobacterium avium subspecies *paratuberculosis* (MAP) and *Klebsiella pneumoniae* are pathogens of concern to the dairy industry as they cause Johne's disease and bovine mastitis, respectively. Johne's is a devastating disease and current practices require the culling of infected animals. There is also some controversy regarding the association of MAP and Crohn's disease in humans. MAP is an extremely slow growing bacterium and is hard to culture and manipulate in the laboratory. In addition, infected animals can spread MAP to other animals without showing any symptoms of active disease themselves. Mastitis caused by *Klebsiella* and other associated Gram negative bacteria is also responsible significant losses due to the animal being removed from the production line and reduced milk quality. Therefore, there is benefit in tracking these pathogenic bacteria to recommend practices to reduce their spread and prevalence, and to identify their source. Our lab has developed new technology to study the relatedness between MAP isolates within and between farms. We have also applied technology to follow *Klebsiella* and other bacteria associated with mastitis and in the process have identified a new and emerging pathogen. There is great value in conducting the described research as it helps to build local expertise, provides access to trained personnel and establishes internationally recognized research programs. In addition, publications arising from the work show that there is active local interest to monitor and prevent the described diseases, which helps to build reputations regarding quality and high standards.



Speaker Profiles and Presentation Abstracts



> *Karen Kennedy, M.Sc., P.Ag.*

Fruit Crop Development Officer, Department of Natural Resources
(karenkennedy@gov.nl.ca)

Karen Kennedy is currently the Fruit Crop Development Officer for NL. She graduated with a B.Sc. from MUN in 2006 and a M.Sc.(Agriculture) from Dalhousie University (NSAC Campus) in 2009 where she specialized in weed control in lowbush blueberries fields. Karen's background in agriculture is multidisciplinary ranging from weed science to agronomy and small fruit production. She has worked with the Department of Agriculture in NS as a weed scientist conducting herbicide efficacy trials, and then moved back to NL to work for the AgriFoods Development Branch. When Karen first started with the AgriFoods Branch, she was the Alternative Feeds Coordinator, whereby she implemented the first winter wheat trials on the

Island for high moisture grain production. Karen is currently the Fruit Crop Development Officer where she is responsible for research and extension services on lowbush blueberries, strawberries, raspberries, apples, and most recently grapes. She is currently implementing experimental wine grape vineyards on the Island in collaboration with Jöst Vineyards of Nova Scotia.

Presentation Title

Wine Grape Varietal Trial

Abstract

Currently, there is zero commercial grape wine production existing in the agriculture industry in NL. This project was initiated to develop a grape wine industry in NL, and to assess which hybrid varieties will survive, grow, and mature, in various NL climates. Commercial grape wine varieties fall into three categories: European or vinifera, American or labruscan, and Hybrids, which are crosses between the two former categories. Hybrid grapes were developed to combine the hardiness and disease resistance of American species with the wine quality attributes of the European varieties, thus making them winter-hardy with excellent wine quality.

In 2013, the first experimental vineyard was constructed in Pynn's Brook, NL, 140 cold-hardy vines were planted; 11 red varieties and 5 white varieties. During the second year of this experiment, 164 vines were added to this site, for an additional 11 red varieties and 14 white varieties, totaling 304 vines. In year two of the experiment a second site at Brooklyn, NL was added. 26 cold-hardy varieties were planted, 11 red and 15 white for a total of 167 vines. The varieties planted in year two were similar at both sites.

Second-year vines were assessed for winter survival, timing of bloom, # shoots/cane, vegetative vigor, timing of fruit, and cluster size. One-year old vines were assessed for vegetative vigor. Preliminary analysis for the two-year old vines exhibited that Marechal Foch and V53-35 had the most vegetative vigor, with Marechal Foch being the first variety to flower and fruit. Observational analysis showed that vines in their first year of growth differed in vegetative vigor between sites, which was expressed through vine height.

> **Dr. Mumtaz Cheema**

Associate Professor-Agronomy , Grenfell Campus, Memorial University of Newfoundland (mcheema@grenfell.mun.ca)

Academic qualifications include BSc (Hons.) in agricultural sciences major agronomy, MSc (Hons.) agronomy, and then PhD, agronomy from University of Agriculture, Faisalabad, Pakistan. Started career as an agronomist, and thereafter joined faculty at University of Agriculture, Faisalabad, Pakistan, and worked on all academic and research positions as Lecturer, Assistant Professor, Associate Professor, and then Professor. Researched Integrated nutrient management practices, physiological role of exogenously applied compatible organic solutes (glycinebetaine, salicylic acid, calcium chloride, thiourea, polyamines and silicon) to induce stress tolerance (saline, drought, chilling and heat/temp stress) in cereals and enhancement of antioxidant defense system induced by hormones priming. Future research program will focus on nutrient management in cereals through biological nitrification inhibition (BNI), agronomic bio-fortification, and impact of climate change on crop productivity.



Presentation Title

Hydroponic Greenhouse Vegetable Production Technologies; Opportunities and Options in Newfoundland and Labrador

> **M. Cheema, R.Thomas , A. Unc, and C. McCall**

Boreal Ecosystem Research Initiative, Grenfell Campus, Memorial University, Corner Brook, NL (mcheema@grenfell.mun.ca)

Abstract

Newfoundland and Labrador faces an acute lack of locally produced vegetables, and consequently must import from mainland Canada or other countries. Provincial field vegetable production is not only limited to very few types (Rutabagas, turnips, carrots and cabbage), but also declined from 4.7% in 2006 to 4.3% in 2011. Low temperature, shallow soil, erratic summer rain and severe winter weather are the major obstacles in vegetables production. To meet vegetable food security and safety health standards, fresh and consistent supply of vegetables around the year might necessitate hydroponic greenhouse production systems. Tomatoes, cucumber and sweet peppers require specific temperature, light, humidity, nutrients, water, and CO₂ for growth and development, and high yields can only be guaranteed under controlled conditions. We're discussing here options and particularities for such production including a high level feasibility discussion.



Speaker Profiles and Presentation Abstracts

> *Dr. Vanessa Kavanagh*

Alternative Feeds Coordinator, Department of Natural Resources
(vanessakavanagh@gov.nl.ca)

Dr. Vanessa Kavanagh is from Corner Brook, NL and received her Bachelor of Science with an advanced double major in biology and history from Dalhousie University in Halifax, NS in 2003. In 2007, she completed her MSc in biology at Saint Mary's University in Halifax, NS and assisted in the development of the first soybean inoculants specifically for western Canadian soils. She obtained her PhD in plant sciences in 2012 from the University of Alberta in Edmonton, AB where she assessed the environmental biosafety of transgenic triticale - concentrating on pollen mediated gene flow. She joined Forestry and Agrifoods – Production and Market Development branch in April 2012 and is currently an Alternative Feeds Coordinator and the project lead for the Cereals Program.



Presentation Title

Viability of Winter Wheat and Spring Barely Cultivation for Animal Feed Production in Insular Newfoundland

Abstract

Newfoundland and Labrador (NL) has a highly successful livestock industry with over 11,500 cattle. We are currently able to supply most of our forage requirements, however over 60,000 metric tonnes (T) of grain (corn and cereals) must be imported annually. The Production and Market Development branch of Forestry and Agrifoods has teamed up with NL dairy producers to assess the viability of growing cereal grains in Insular Newfoundland, modifying techniques for our shorter seasons and wet/humid conditions. Cereals (winter wheat, spring wheat and spring barley) have been tested for two years and will continue with the addition this year of fall hybrid rye. High moisture grain is being assessed at various moisture contents (19% - 32%), testing for mycotoxin presence and nutritional contents at three weeks post-harvest and then monthly. Yields to date have ranged from 2.04 T per acre at 25% moisture content (MC) or 1.78 T equivalent dry grain to 1.05 T at 25% MC or 0.91 T equivalent as dry grain. Highest yields were on a field with a previous root vegetable crop with a pH of 5.7, and the lowest yield on a newly cleared field with a pH of 5.1. The long-term goals for this project is to determine best management practices that suit our climatic and edaphic conditions, and to successfully establish cereal production on the Island as a high quality and secure source of grain to assist the dairy and other livestock industries.

> *Dr. Catherine Keske*

Associate Professor, Boreal Ecosystem Research Institute (BERI),
Grenfell Campus, MUN (ckeske@grenfell.mun.ca)

Dr. Catherine Keske is an agricultural and forestry economist who studies contemporary resource issues. She is part of the newly established Boreal Ecosystem Research Institute (BERI) and the Division of Social Science at Memorial University-Grenfell Campus.

Catherine incorporates different economic methods into her research program and engages in interdisciplinary collaboration with bio-physical and social scientists, as well as agricultural producers and industry partners. Her research program includes work on agricultural risk, forest recreation and tourism, energy pricing, soil conservation and nutrient management, community sense of place, and ecosystem service valuation.

Catherine was raised around agri-business and agriculture. She earned her Ph.D. in agriculture and resource economics from Colorado State University in 2006 and her Master of Science in mineral economics from Colorado School of Mines in 2003.





Presentation Title

Home Grown: Trends in Agricultural Economics and Small Scale Agricultural Production

Abstract

As consumers show an increased awareness about where and how food is grown, there is opportunity for small-scale agricultural producers to market unique products and to increase farm profits. This presentation summarizes trends in North American agricultural production and provides case studies of successful local small-scale agricultural production and marketing programs. The presentation highlights the commonalities behind successful community-supported agriculture (CSA) programs, agro-tourism, supply-chain distribution, niche production, and brand recognition. Pitfalls to avoid are also addressed. Further insight is provided into how sustainable agriculture forms the background of a sustainable economy. Opportunities for branding and marketing Newfoundland and Labrador products are also discussed.

> Amy Sangster, MSc., P.Ag.

Soil Specialist, Perennia (asangster@perennia.ca)

Amy works with producers and producer associations to help improve soil health management practices and to promote farm sustainability from a ground up approach. Amy specializes in soil carbon and nitrogen cycling but also has a background in animal science which she uses to promote science based holistic solutions to agricultural issues. In April, she was awarded the Outstanding Young Agrologist Award for 2011 by the Nova Scotia Institute of Agrologists.

Amy supports and develops initiatives that encourage developing connections between farmers, researchers and agricultural interest groups. She disseminates production information through factsheets, workshops, producer meetings, farm tours and conferences.

Amy's undergraduate degree in Animal Science was completed at the NSAC but more recently completed a M.Sc. in soil science at the University of Saskatchewan. Amy has spent time as a research technician working on dairy reproduction and rotational grazing research projects and a teaching assistant for a quantitative animal genetics course. She has working experience on many local farms and participated in IAEA exchange where she worked on a 650 cow dairy operation in New Zealand. She also participated in a Rotary Club GSE exchange studying the agricultural industry in Southern Brazil.



Speaker Profiles and Presentation Abstracts

Amy has initiated a number of projects including cattle hoof care clinics, pasture tours, promoting an implementing on-farm food safety programs for beef producers and sheep producers, and designing and implementing a sheep production course, “the Modern Shepherd”, through a partnership between NSAC Continuing Education and the sheep producers association of Nova Scotia (SPANS). She has also assisted a number of nutrient management plans and applied research trials. Upcoming work includes applied research trials related to soil properties and processes, developing on-farm soil assessment programs, and continued soil related presentations and publications.

Presentation Title

Beyond N, P and K. The Real Dirt on Managing Soil for Optimal Crop Production

Abstract

Historically soil productivity has been measured mainly through chemical extractions used to measure soil fertility status. However, efforts have increased over the last 30 years to improve our understanding of how short term management decisions are affecting soil properties and processes beyond merely the effects on soil fertility. A more complete depiction of soil quality is gained by using a host of soil quality indicators, including physical and biological measurements. Management decisions using additional information gained from these assessments can better equip farmers with the knowledge they need to ensure their cropping systems are sustainable. Focusing on crop rotations including multiple years of corn, results from soil quality testing will be discussed.



Speaker Profiles and Presentation Abstracts

> *Rachael Cheverie, MSc., P.Ag., CCA*

Horticulturist, Perennia (rcheverie@perennia.ca)

Rachael has more than 13 years extension experience in the horticulture industry.

As part of Perennia's horticulture team, she works with clients in the vegetable, highbush blueberry, cranberry, greenhouse and grape sectors in Nova Scotia to provide timely extension information and has worked on a number of research projects in these sectors.

From 1998 to 2007, she was the Integrated Pest Management Specialist for PEI, in which role she dealt directly with farmers and industry groups and covered a whole range of crops. In 2007 she was appointed as the PEI Department's Potato Industry Coordinator, coordinating research, training and extension activities for that important industry.

During her time in PEI she was PEI's Minor Use Coordinator, and served on various regional and national expert committees.

Rachael has experience in Insect, Weed, and Disease Identification and Management and has worked on many projects involving pesticide risk reduction. She has written numerous pest management factsheets and coordinated and edited an IPM Manual for PEI Potato Production.



Speaker Profiles and Presentation Abstracts



> Alex Turkewitsch, M.A.Sc., P.Eng.

Chief Engineer. Greenhouse Engineering
(alex@greenhouseengineering.com)

Alex Turkewitsch is chief engineer at Greenhouse Engineering; a company specializing in engineering services related to greenhouses and controlled environment facilities. Located in Canada, Greenhouse Engineering is active in North America, the Caribbean, the Pacific and Europe. A systems design and mechanical engineer, Alex has devoted his entire career to problem solving and providing professional engineering solutions for commercial and institutional greenhouses, including plant production facilities, retail greenhouses, conservatories, arboreta, atria, research greenhouse facilities and phytotrons.

Presentation Title

Light and Lighting Considerations in Maritime Temperate Production Greenhouses

Abstract

This presentation will address Daily Light Integral (DLI) requirements for greenhouse production, light quality and, briefly, supplemental light sources for greenhouse production and properties of greenhouse cladding materials.



> Dr. Dawn Bignell

Assistant Professor, Memorial University of Newfoundland
(dbignell@mun.ca)

Dr. Dawn Bignell is an assistant professor in the Department of Biology at Memorial University. She received her B.Sc. in Biotechnology from the University of Manitoba and her Ph.D. in Microbiology and Biotechnology from the University of Alberta. Prior to starting her current position, Dr. Bignell held a postdoctoral research fellowship in the Department of Plant Pathology and Plant-Microbe Biology at Cornell University, USA, where she worked under the guidance of Professor Rosemary Loria on potato common scab disease. Dr. Bignell's current research interests focus on the role of secondary metabolism in *Streptomyces* plant pathogenicity and on the development of new control strategies for common scab disease.



Presentation Title

Characterization of Plant Pathogenic *Streptomyces* spp. Causing Common Scab Disease in Newfoundland

> D. Bignell and J. Fyans

Memorial University of Newfoundland

Abstract

Plant pathogenic *Streptomyces* species are responsible for common scab (CS) disease of potato, which is characterized by the presence of corky-like lesions on the tuber surface. CS reduces the market value of the affected potato crop, and traditional strategies for controlling the disease are largely ineffective. Most CS-causing pathogens produce a phytotoxin called thaxtomin A, which is required for disease development. Novel CS control strategies have been proposed which focus on suppressing the production of this molecule in the field, or on the use of thaxtomin A in breeding programs to select for plants that display enhanced scab resistance. However, recent findings suggest that some CS-causing streptomycetes can utilize thaxtomin A - independent strategies for causing disease symptoms. The purpose of this study was to assess the types of *Streptomyces* species that are responsible for CS in Newfoundland, and to determine the ability of such species to produce thaxtomin A. *Streptomyces* strains were isolated from scab lesions on infected potatoes, and the virulence phenotype of each was assessed using plant bioassays. Morphological characterisation combined with DNA sequencing was performed for identification of pathogenic isolates, while the ability of each strain to produce thaxtomin A was determined using a combination of genetic and chemical approaches. The results of our study support previous findings that some pathogenic streptomycetes do not produce thaxtomin A, but instead use other virulence factors for promoting host infection and disease development. The implications of our results for the development of new CS control strategies will be discussed.

> Dr. Vasantha Rupasinghe

Associate Professor, Canada Research Chair (vrupasinghe@Dal.Ca),
Dalhousie University

Dr. Vasantha Rupasinghe is an Associate Professor and Canada Research Chair in Fruit Bioactives & BioProducts at the Faculty of Agriculture of Dalhousie University, Truro, Nova Scotia. He also serves as an Adjunct Professor of the Faculty of Medicine and Faculty of Engineering of Dalhousie University. He earned his M.Sc. from Iowa State University, USA and PhD from University of Guelph, Canada. He has developed a unique research program for investigating the biological properties and mode of actions of flavonoids of cool climate fruits. He is the author or co-author of 105 refereed journal, 16 book chapters and 142 abstracts of conference presentations.



Presentation Title

Cytoprotective and Neuroprotective Properties of Canadian Partridgeberry

> *V. Rupasinghe and K.B. Bhullarry*

Abstract

This study aimed at understanding the health promoting properties of wild partridgeberry (*Vaccinium vitis-idaea* L. var. minus Lodd) found in Southern Labrador, Canada. Goals of the initial investigations were the extraction and biochemical characterization of polyphenols of partridgeberry and investigation of their cytoprotective and neuroprotective properties. Three partridgeberry polyphenol fractions (PPFs) were prepared, which were rich in either, anthocyanins, flavan-3-ols or flavonols. The PPFs showed strong cytoprotective activity against oxidative injury in human fibroblasts via activation of Nrf2 pathway. The fractions rich in flavan-3-ols and flavonols, were potent antioxidants, and displayed effective attenuation of amyloid-beta ($A\beta$) sensitized neural injury in primary neurons in vitro, possibly through superoxide dismutase and catalase hyperactivity. All four partridgeberry polyphenol preparations also reduced the intracellular $A\beta$ levels by 7-15 folds, and initiated $A\beta$ clearance from neurons. Partridgeberry-derived polyphenol preparations, especially the flavonol-rich fraction significantly inhibited the in vitro acetyl cholinesterase activity, indicating potential pharmacotherapy application in Alzheimer's disease. Furthermore, pre-exposure of primary neurons to these PPFs significantly reduced the injury in in vitro stroke models. damage of primary neurons as well modulated the levels of TNF- α , IL-6, HIF-1 α and PPAR- γ . These properties make the flavan-3-ols- and flavonols-rich PPFs suitable aspirants for preventive nutritional intervention against brain disorders such as Alzheimer's disease and ischemic stroke, for which there is currently no medicinal remedy. Therefore, further investigations using experimental animal models are warranted for confirming these in vitro results for further



> *Daniel Borges*

MSc Candidate, University of Guelph (dborges@uoguelph.ca)

Daniel Borges is a graduate student at the University of Guelph. He is working toward a Master's degree in Environmental Sciences under the supervision of Dr. Ernesto Guzman. Daniel completed a Bachelor's degree in Science at McMaster University, where he majored in Biology with a minor in English and Cultural Studies. He also received a Bachelor of Education at the Ontario Institute for Studies in Education (OISE) at the University of Toronto.

Presentation Title

Honey Bee Colony Mortality: Investigating Causes and Potential Solutions

Abstract

Insect and animal pollinators contribute to the production of roughly 35% of crops used for human consumption worldwide. In 2005 alone, this amounted to an estimated value of \$235 billion CAD.

Speaker Profiles and Presentation Abstracts

The western honey bee (*Apis mellifera* L.) is responsible for 90% of this pollination, making it the world's most economically important pollinator species.

Since 2006, beekeepers in Canada and around the world have been reporting higher than usual colony mortality, with rates reaching an average of 36%. While these colony loss incidents are not symptomatically identical to each other, they point to a global pollinator decline that could have resounding environmental and economic implications. Many factors have been identified as potential causes for the global decline in honey bees. These include, but are not limited to, honey bee parasites such as *Varroa* mites, tracheal mites, and the fungal parasite *Nosema*, viruses and diseases spread by these parasites, pesticide use, and beekeeping management practices.

Newfoundland and Labrador stand out as havens for honey bees and beekeepers alike. Newfoundland remains free from many of the most damaging honey bee parasites and pesticide use is much lower than what is seen elsewhere in the world. These healthy Newfoundland bees are of great interest to the global scientific community.

This presentation will highlight some of the factors responsible for the global decline in honey bees, the work that is being done at the Honey Bee Research Centre at the University of Guelph, as well as discuss the special status of bees in Newfoundland.



> **Harold House**

Agricultural Engineer, Ontario Ministry of Agriculture, Food and Rural Affairs (harold.house@ontario.ca)

Harold has been an Agricultural Engineer with the Ontario Ministry of Agriculture, Food and Rural Affairs (OMAFRA) for over 30 years. Harold is OMAFRA's provincial dairy and beef housing and equipment engineer, working out of the Clinton field office. He has a special interest in livestock housing, cow comfort, ventilation, manure handling, robotic milking, calf housing, and anaerobic digestion.

Harold was raised on a dairy and swine farm in South Western Ontario. He received his BSc and MSc degrees in agricultural engineering from the University of Guelph in 1978 and 1990. He worked in ag industry and ag research before starting his career with the OMAFRA in 1981.



Speaker Profiles and Presentation Abstracts

Harold has written numerous articles and bulletins on dairy housing issues. He received the T.R. Hilliard Distinguished Agricultural Extension Award for his work with Ontario dairy producers in 2004, and in 2014 Harold received the John Turnbull Award in recognition of his outstanding leadership in industry, teaching, applied research and extension in the area of dairy farm building systems.

Harold and his wife Louise live near Goderich. They have four grown children, and two grandchildren.

Presentation Title

Bedding Alternatives for Livestock Industries

Abstract

Livestock bedding serves many purposes. It offers comfort by providing cushioning. It keeps livestock clean by absorbing moisture. It provides insulation to protect livestock from cold and drafts. In some cases the type of bedding used improves traction, and bedding can be selected that does not support bacterial growth.

Producers are looking for alternative bedding materials. Some traditional bedding materials are becoming difficult to source. Many of the wood products are becoming more difficult to obtain as they are now in demand for energy materials. Others are not available in a ready supply or are just becoming expensive. With this in mind many dairy producers are considering separated manure solids for bedding. The undigested pieces of feed fibers can be separated from dairy manure and used for bedding. Compost bedding as it is called is a readily available renewable source that is available in large quantities that can be used liberally in free stall applications.

Peat moss is another material of interest to livestock producers. In some locations it is readily available. It is very absorbent, and with a lower pH it may inhibit some bacterial growth.

There are also many paper products that can be shredded and used separately or combined with sawdust or shavings. Wood can also be shredded from logs or recycled materials.

All alternatives have some advantages and disadvantages. This presentation will focus on how some of the alternative beddings are being used, and some of the management techniques that determine how successfully they perform.



> *Dr. Raymond Thomas*

Associate Professor, Grenfell Campus, Memorial University of Newfoundland (rthomas@grenfell.mun.ca)

Academic qualifications include an ASc in General Agriculture (College Science and Education), BSc in Agriculture (Lincoln University), MSc in Horticulture (University of Minnesota) and PhD in Biology- Plant Biochemistry and Physiology (University of Western Ontario). My research interests are multidisciplinary and involved an integrative approach to answer questions from scales at the cellular to system levels. I use specialized chromatographic and mass spectrometric techniques to elucidate functional, mechanistic and compositional alterations of secondary metabolites (antioxidants and lipids) in environmental stress response in the following systems: plant/animal/insect physiology, microbiology, food science, agriculture, and neurobiology. Most notably, within the last 6 years, I have significantly contributed to the establishment of 3 world class research centers in Canada {Advanced Facility for Avian Research- Western (\$9mil - 2009), Boreal Research Institute - NAIT (\$5mil- 2012), Boreal Ecosystem Research Facility - Memorial (\$4mil – equipment configuration/purchase - 2014)} in the capacity as project manager, research coordinator and faculty respectively. Areas of expertise include lipid biochemistry, mass spectrometry, plant science, horticulture, agriculture, biology, microscopy and microbiology.



Presentation Title

Potential Considerations for Soybean Production in Newfoundland and Labrador

> *R. Thomas, M. Cheema, A. Unc, and C. McCall*

Abstract

The Province of Newfoundland and Labrador is an Island isolated from mainland Canada by the Atlantic Ocean. Most of the food consumed on the Island are imported at considerable cost to importers and consumers. Unstable weather pose major challenges to consistent supply of affordable high quality produce to the Province. As part of a greater strategy to increase food production, self-reliance and food security in the Province, several agronomic crops are currently being investigated for large scale production. Soybean (*Glycine max* L. Merr.) is one of these crops. Several considerations are important for successful cultivation and production of soybean in the Province. These include selection of soybean varieties ideal for production in Newfoundland and Labrador climate, crop use (forage, food or animal feed), and disease considerations. This presentation will focus on considerations for disease selection in high yielding varieties. Specific reference will be made to stem and root rot caused by *Phytophthora sojae* (Kaufmann & Gerdemann), and potential strategies for crop protection and selection during cultivation in Newfoundland and Labrador.

> *Dr. Joinal Abedin*

Research Associate and Adjunct Professor, Memorial University of Newfoundland (joinal.abedin@mun.ca)

Dr. Joinal Abedin, P.Ag joined the Labrador Institute of Memorial University as a Research Associate in November 2012 and is presently an adjunct professor with the Department of Earth Sciences, St. John's campus and with the Division of Science (Environmental Science), Grenfell campus. Joinal obtained his B.Sc. Ag (Hons) and M. Sc. Ag in Soil Science from Bangladesh Agricultural University and PhD from University of Aberdeen, UK in 2002 where he studied arsenic contaminated irrigation water effects on rice. Before coming to Labrador, Dr. Abedin worked at Bangladesh Rice Research Institute as a Soil Scientist for more than 10 years, at Laurentian University as a NSERC Postdoctoral Fellow for two years and subsequently as a Research Scientist for another three years. At Laurentian University he was involved in projects concerning assessment of bioavailability/bioaccessibility/phytoavailability of contaminant metals and metalloids in mining impacted regional soils.



Speaker Profiles and Presentation Abstracts

Presentation Title

Soil Amendment with Biochar for the Improvement of Soil Fertility and Crop Production

Abstract

At Labrador Institute Dr Abedin is conducting a multi-year research project on the soil application of biochar to increase the soil fertility and crop productivity of the sandy soils of Labrador with an initial funding from Agricultural Research initiative in 2013 and for the second year (2014) from Growing Forward 2 and Harris Centre Applied Research Fund. In a laboratory scale study funded by RDC (Research and Development Corporation), Dr Abedin is also evaluating the application of different types of biochar on sulfidic mine tailings to reduce acid generation and increase immobilization of toxic metals.

> *Dr. Antony Card*

Associate Vice-President of Research for Grenfell Campus of Memorial University (acard@grenfell.mun.ca)

Dr. Antony Card is the Associate Vice-President of Research for Grenfell Campus of Memorial University. He will provide an overview of the Boreal Ecosystem Research Initiative (BERI). BERI aims to provide research and development capacity in agriculture, forest and environmental science. A new world-class \$8.1 million laboratory facility has been constructed and five research professors have been hired to support the agriculture and forestry sectors in Newfoundland and Labrador. Graduate programs are being developed and the BERI governance structure includes partnerships with the Canadian Forest Service (Natural Resources Canada), the provincial Forest and Agrifoods Agency (Department of Natural Resources), and Agriculture-Agrifoods Canada (Government of Canada).



> *Dr. Barbara Neis*

Professor, Memorial University of Newfoundland (bneis@mun.ca)

Professor Neis is a University Research Professor in the Department of Sociology and Senior Research Associate in the SafetyNet Centre for Occupational Health and Safety Research at Memorial University.

Professor Neis grew up on a family farm in Northern Ontario. She received her Ph.D. in Sociology from the University of Toronto in 1988. Her research focuses broadly on interactions between work, environment, health and communities in rural and remote contexts. She has researched many aspects of the Newfoundland and Labrador fisheries including gender and fisheries, occupational asthma to snow crab, participatory ergonomics, and fishing vessel safety. Her current research responsibilities include acting as Project Director on a 7-year Partnership grant from SSHRC entitled On the Move: Employment-Related Geographical Mobility in the Canadian Context. She is also a co-investigator, theme co-lead and member of the Research Management Committee of the Marine, Environmental, Observation, Prediction and Response Network of Centres of Excellence, and co-chair of the Newfoundland node of the SSHRC-funded Centre for Research on Work Disability Policy. Dr. Neis and the SafetyNet Centre are currently developing proposals for a multi-year research initiative on agricultural safety in Newfoundland and Labrador.



Presentation Title

Growing Agri-Safety Research Capacity in Newfoundland and Labrador: The Need, the Opportunity and a Strategy

Abstract

This presentation will provide a brief overview of potential health and safety issues associated with the kinds of agriculture carried out in Newfoundland and Labrador and the place of health and safety research and knowledge transfer in a strategy to help strengthen agricultural production in the province. It will discuss the gap in research and research expertise in the province in the field of agricultural health and safety and present a strategy to develop an industry-engaged research program and to build research capacity in the province.

Poster Presentations

Wild Blueberry Renovation

> *K. Kennedy*

Department of Natural Resources, Corner Brook, NL (karenkennedy@gov.nl.ca)

On the Island of Newfoundland there are approximately seven commercial blueberry producers. In 2005 wild blueberry production on the Island totaled 2,100 acres, but as of 2010 production plummeted to 901 acres. The largest issues experienced by lowbush blueberry producers, outside of the price paid for their berries, are pest pressures - weeds, diseases and insects. Pests have the ability to compete with the crop, to the point of hindering a producer's viability. Blueberry leaf-tier (*Croesia curvalana*) is currently the insect pest of most concern within NL lowbush blueberry fields.

In 2013, 100 acres of blueberry land was straw burned and 4 acres were mowed at one site. The experiment was a 2x3 factorial design in 4 blocks, whereby treatments consisted of pruning at two levels (mowing or burning) in conjunction with fertilizer at three rates, 0 kg N/ha, 14-18-10 at 20kg N/ha, and MESZ at 20kg N/ha. Percent cover, floral bud numbers, and yield were assessed. The effects of burn-pruning resulted in significantly more floral buds per stem compared to mowing. Plots that were fertilized resulted in significantly more floral buds/stem compared to the control. Floral bud numbers obtained from using the MESZ fertilizer and the standard 14-18-10 fertilizer were not significantly different.

Blueberry leaf-tier populations were monitored using pheromone traps under three pruning treatments: mowing, burning, and a control. There were significantly fewer leaf-tier moths present in the burned fields compared to the mowed and the control. There was no significant difference in leaf-tier numbers between the control and the mowed plots.



Poster Presentations

A Field Evaluation of New Half-High Blueberry Hybrids

> *D. Simms¹, M. Feener¹, W. Farrell¹, and S. Debnath²*

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At the Atlantic Cool Climate Research Center in St. John's, wild native lowbush blueberries were crossed with non-native half-high/high-bush blueberry to produce a half-high offspring. These hybrids are presently being evaluated during a multiyear project which sets out to determine if these newly developed NL blueberry cultivars can be commercially viable while maintaining their local traits of taste, color and yield. Field trials have begun on 31 cultivars of 2 year old NL hybrids. Plants were spaced 1 meter apart within rows and rows were 3 meters apart. Mainland half-high blueberry varieties will be used as controls and information will be collected on yield, color, taste and nutritional analysis. In 2013 yield data was collected on the mainland type only; average yields were 47.14, 39.24 and 31.24 grams per plants for Northland, Polaris and Chippewa respectively. The blueberry industry in NL has great potential and local wild blueberry is well known for its exceptional yield and taste. However, to compete with other provinces, NL must commercialize its blueberry industry while keeping the traits of local blueberries intact. This research is the first step to NL becoming a leader in the blueberry industry while preserving the quality of local wild blueberry.

Forage Blends for Newly Cleared Land

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Agriculture in Newfoundland and Labrador (NL) faces many unique challenges. Regional climatic conditions result in short growing seasons with a lot of precipitation. The soils are stony with low fertility, limiting crop production to approximately 2% of NL. With limited land resources NL producers are forced to import forages, increasing their annual cost of production. The objectives of this research are to: (1) identify forage blends with increased productivity and persistence, and (2) identify forage blends to help improve soil structure while adding organic matter. Currently, there are two trials taking place on newly cleared land in Pynn's Brook, NL. One trial aims to identify optimum blends of forage oats and ryegrass for new clear conditions, while the other trial focuses on identifying forage legume and grass blends with high productivity/persistence for newly cleared land. Experimental plots were seeded in June, 2014.

Capabilities of the New Boreal Ecosystem Research Facility on Grenfell Campus

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The purpose of the Boreal Ecosystem Research Facility is to build research capacity in forestry and agriculture, with multidisciplinary and integrative approaches to studying air, water, soils and plants. The facility's faculty members specialize in the following: soil science, agronomy, microbiology, molecular biology, plant biochemistry, hydrology and resource economics. The facility have a suite of the following four laboratories:

- 1) Pre-process laboratory: Primary space for preliminary processing and drying of samples. Major equipment include centrifuges, drying ovens, autoclaves and walk in freezer (-30°C) and coolers.
- 2) Extraction and Standard Chemical Analysis: High efficiency sample extraction and basic analysis will be done in this space. Major equipment include confocal microscope, accelerate solvent and supercritical fluid extractors, sonicators, Attune flow cytometer, cryomil and auto titrimeters.
- 3) Molecular Biology: Extraction and characterization of molecular compounds, RNA and DNA will be done primarily in this space. Major equipment include digital electrophoresis, RNA and DNA quantifiers, real time thermocyclers, photo-bioreactors and bioinformatics system.
- 4) Analytical Laboratory: Housed the most sensitive analytical equipment capable of analyzing organic or inorganic analytes from any sample matrix (liquid, solid or gases). Major equipment include Orbitrap mass spectrometers, laser ablation inductively coupled plasma mass spectrometers, chromatographs, confocal vibrational spectrometers and flow injection analyzers.

A suite of field equipment for monitoring non-destructive plant growth and physiological parameters are interspersed between the four labs. Major field equipment include portable leaf area meter, chlorophyll meter, portable photosynthesis system (LI 6400XT), CO₂ flux system (LI 8100A), root scanner (CI 600), and pressure chamber (Model 615).

Pollination of Commercial Cranberry (*Vaccinium Macrocarpon* Ait.) in Newfoundland by Native and Introduced Bees

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Cranberry flowers must be pollinated by insects for fruit to develop and bees are their main pollinators. This research was conducted to determine the native bee species important for the pollination of cranberry and the utility of importing commercial bumble bees to supplement pollination. Several native bumble bee and solitary bee species were indicated to be important pollinating species. Supplementation of cranberry fields with commercially supplies *B. impatiens* bees did not increase fruit set. We recommend that this practice be reviewed for its economic practicality. The practice of buying non-native bees for boosting yields is not supported by the data and should be reconsidered in the future.



Poster Presentations

Detection of nitrogen sufficiency in potato plants using gene expression markers

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Optimal fertilizer nitrogen (N) management is critical for achieving both economic and environmental objectives in potato production. Tuber yield is increased by fertilizer N application in most studies, while excessive fertilizer N application may decrease tuber quality. As the fertilizer N rate is increased above optimal, the risks of environmental N loss through nitrate leaching and nitrous oxide emissions also increase rapidly. While useful, current chemical and optical methods provide indirect measures of crop N sufficiency, and may be influenced by the availability of water or other nutrients, and by soil and environmental conditions. The potential to use gene expression markers to assess potato N sufficiency is therefore proposed. In this study, as a first step towards developing a diagnostic tool for quantification of potato N sufficiency, we demonstrate the potential to use gene expression markers for early detection of limitations in nitrate supply.





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