



2011 Annual Report Bioresource Engineering

Submitted by
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Department of Bioresource Engineering
Macdonald Campus of McGill University

Publications are from January 1, 2011 to December 31, 2011
All other information is from June 1, 2011 to May 31, 2012

Please note: this report is also available in pdf format at:
[http://webpages.mcgill.ca/staff/deptshare/FAES/
066-Bioresource/AnnualRp/index.htm](http://webpages.mcgill.ca/staff/deptshare/FAES/066-Bioresource/AnnualRp/index.htm)

SUMMARY

Research and publications: During the 2011-2012 academic year, our Department maintained an outstanding scholarly record per academic staff member. With 74 referred journal publications and 14 refereed conference proceedings, our Department maintains an outstanding scholar record per academic staff member.

Significant expansions of research programs were achieved in each stream of engineering pertaining to bioresource systems, from food and bioprocess to environmental engineering, ecology and agricultural production systems. With increased federal and provincial funding along with private sector contributions, our total grant and gifts income topped \$4.6 M, which provided capability to fund numerous graduate students and post-doctoral associates.

Teaching and learning (undergraduate and graduate): The undergraduate program in Bioresource Engineering has reached a historically maximum enrollment of 150 individuals with about 40 students per year entering U1 and over 15 entering the program at the U0 level Freshman Program). With the expected continuation of this trend, we anticipate reaching a target enrollment of 160 students soon. The total number of current graduate students tops 115, which makes our Department one of the strongest in graduate students per academic staff member among all sister Departments in North America. The continuously growing IWRM program is an excellent example of our innovative approach to meeting the growing demand for HQP in current conditions. The new support to establish an MS applied option in the area of Food Security suggests that this trend will continue.

The employment market for B.Eng. Bioresource Engineering graduates, as well as postgraduate students, has continued to be very good. Often we have employers from across Canada and the USA coming to interview final year students, and they find very few who have not already secured future employment. The breadth of areas of employment of graduates continues to be very wide. It includes the traditional food production, food processing, agricultural machinery and water resources sectors, but has expanded to embrace also the oil and gas industries, trucks and construction equipment, airlines, aerospace manufacturing and electronics, mining equipment and services, renewable energy enterprises, municipal city management, waste management, roads and water supply, railway maintenance and building construction, and many other fields of industry and government. This is in addition to the graduates who choose to enter the profession of education at all levels, or who proceed to different professions such as the foreign service, non-governmental aid agencies, law, medicine and more.

Involvement in the community: Led by Drs. Madramootoo, Adamchuk and their co-presenters, [an IdeasLab session with McGill University](#) at the 2011 World Economic Forum Annual Meeting of the New Champions (Dalian, China) has become an excellent opportunity to discuss the problem of global food security with a community of the most talented global leaders and entrepreneurs. These initiatives have further promoted the importance of bioresource engineering research in the modern world of economical instability, climate change and risks of sustainability of global food supply for the future generations.

Partnerships: Most of the professors in the department are involved in international activities. In this regard, Professor Barrington was part of a CIDA-funded project in Ethiopia where she evaluated waste management research opportunities. Professors Kok, Ngadi, and Raghavan continued their work on a rice-processing project in Benin and Nigeria. Professor Madramootoo is the Project Director of CARIWIN, Caribbean Water Initiative project, funded by CIDA/AUCC. Professor McKyes is also working with Dr. Madramootoo on CARIWIN in Barbados, Grenada, and Jamaica. Professors Prasher and Adamowski carried out an expert workshop on water issues in India in early 2011. The project was funded by ISTP Canada.

Milestones: New hires, promotions, and retirements: After Dr. Suzelle Barrington's retirement in August 2011, we have completed the search for two new tenure-track academic staff members in water engineering and bioprocess engineering. Both new Assistant Professors have agreed to start their appointments on August 1, 2012. Dr. Valerie Orsat was granted tenure and promoted to the rank of Associate Professor in 2012. Dr. Michael Ngadi has applied to become a full professor and we are eagerly waiting to hear the good news.

Honours, awards, and prizes: Professor Chandra Madramootoo was the President of the International Commission on Irrigation and Drainage (ICID) in 2011-12. Professor Shiv Prasher was the president of the Canadian Society for Bioengineering (CSBE/SCGAB) for 2010-11. He was the President-Elect of the Society in 2009-2010. Professor Shiv Prasher was elected to the grade of a Fellow of the Indian Society of Agricultural Engineers (ISAE) in 2012. Recognizing the outstanding work of Professor Raghavan both in India and Internationally, he was elected as a Fellow of the National Academy of Agricultural Sciences (FNAAS), India. With this recognition, he joins the top coveted team of eminent scientists who contribute to the Academy. Professor Raghavan was also elected to serve as a member of the Food Expert Advisory Committee (FEAC) of Health Canada. Professor Raghavan received an Honorary Doctorate Degree (Honoris Causa), conferred in “recognition of services rendered to the development of agricultural education, research and extension in the country”, at the 24th Convocation of University of Agricultural Sciences-Dharwad, Dharwad, Karnataka, India, on 27 December, 2010. Professor Raghavan was awarded the Arun S. Mujumdar Medal at the 2010 International Drying Symposium in Madgeburg, Germany. The Medal is for recognition of individuals who combine at a high level, research, community services, and mentoring in drying. Professor Raghavan received a certificate in June 2010 in recognition of being one of the top five contributors to the Drying Technology Journal.

Fundraising: The highlight of the year was the launching of the Liliane and David M. Stewart Water Management Program for the Department. This program is making \$1.5 Million available to the Department over the next 15 years for undertaking new cutting-edge research in the area of water engineering and water resources management. This is the biggest award ever given to a single department in our Faculty.

SECTION I – DESCRIPTION OF THE UNIT

Bioresource Engineering

Bioresource Engineering is a unique branch of engineering where professional engineering practice intersects with biological sciences. It is a broad-based discipline, which, although focused on the application of engineering principles to the design, construction, optimization, and management of systems which include living organisms or biological materials, also requires that students study the fundamentals of several other engineering disciplines. Bioresource Engineers design, improve and manage biologically-based systems to operate in efficient and sustainable way for the well-being of the society and environment. Whereas our interests were previously largely confined to agricultural systems, our discipline now encompasses the design, construction, remediation, and management of all manner of biosystems, addressing a much wider spectrum of system types and scales than before. The primary focus areas of Bioresource Engineering are biological, agricultural, ecological, and environmental engineering.

Bioresource Engineering encompasses a number of sub-disciplines, as listed below. It should be noted that the department's involvement in each sub-discipline includes research oriented to the development of knowledge and methods for engineering, as well as the teaching of programs at both undergraduate and graduate levels. The department also teaches courses at the technologist level as part of contractual obligations with other units inside McGill (e.g., the FMT program).

Sub-disciplines in Bioresource Engineering

- a) Soil and Water Management - the design and development of systems for soil and water management, including irrigation, drainage, soil conservation, remediation, and reclamation
- b) Food and Biotechnology - included in this are areas such as food, bioprocess, and fermentation engineering for the production of food, nutraceuticals, pharmaceuticals, etc.
- c) Larger Environment - includes ecosystem design, management at the watershed scale, agricultural pollution control, biofuel generation, and remote sensing
- d) Materials Processing - includes post-harvest engineering, as well as the handling of agricultural materials, and composting
- e) Automation and Control - application of control and computer technologies to biosystems; this includes mechatronics, robotics, and computer-based intelligence.
- f) Structures - buildings and associated systems for the production and processing of plants, animals and animal products, as well as the storage of biomaterials
- g) Machinery - the design and development of machinery, equipment, and power units for the mechanization of the production and handling of both food and feed

Our staff and students have remained engaged in teaching and learning, research, various types of professional work, administrative tasks, international travel, and extracurricular activities. Our undergraduate enrollment has been increasing significantly over the last few years, and this trend has continued with over 150 students in B.Eng. program. Similarly, our graduate student population has also been experiencing a very healthy renewal and is presently close to 115.

The Purpose and General Objectives for the Department

The primary purpose and general objectives for the Department of Bioresource Engineering are as follows:

- a) To provide an excellent engineering education to our undergraduate, graduate, and postdoctoral students, so that they may continue to serve as leading professionals in the province of Quebec, in the rest of Canada, and elsewhere in the world;
- b) To provide an ideal setting for our academic staff to fully develop their potential, in terms of their research and professional accomplishment;
- c) To make it possible for both our staff and students to do outstanding research, and to engage in other academic and outreach activities in strategic areas of Bioresource Engineering;
- d) To stimulate curiosity in all those whose lives are intertwined with the department's, and to encourage them to widen their view to the greatest possible extent;
- e) To provide leadership in the Bioresource Engineering profession to sustain viable and vital role in the provincial, national, and international mosaic; and
- f) To contribute to the health and welfare of our planet by helping to maintain the diversity of the biosphere and thus ensure its longevity.

Quality of Educational Experience

The undergraduate student quality, morale and commitment begins with the high quality of character with which they enter the B.Eng. Bioresource program. Most enter from a Québec CEGEP, or through the Freshman Program from a high school or other institution outside of the province. A small but increasing number of students return to study after some time in the work force. They enter with predominantly positive attitudes, the desire to learn, and the goal to become competent professional engineers.

The educational experience of students in the B.Eng. Bioresource program is supported by the academic staff. The staff strives to foster an atmosphere of mutual respect with the students, allowing them flexibility and decision-making power in their studies and design projects. They help the students to learn the skills of analysis, problem solving, and engineering design as quickly and capably as possible, and to take pride in their own work and intellectual creations. Additionally, the Bioresource Engineering freshman students are well-supported by the Freshman Seminars, which make the transition into all aspects of the university community easier. In particular, as part of the winter semester seminar, the freshmen participate in group projects in the labs of the regular research faculty.

The academic staff members in the Department have an open-door policy, and allow ample time for academic advising, as well as for project supervision in courses such as BREE 188, BREE 490, 495, 497. The Department also ensures that students are exposed to different fields of engineering in their coursework, seminars, and projects. Students see practical examples of problem solving and engineering design drawn from the experience of the staff, graduates students, and invited speakers. They are also given explanations of the role of Canadian Engineering Accreditation Board, their membership in future professional associations in Canada or abroad, and their legal and social role as professional engineers.

After some months in the program, undergraduate students respond to this treatment almost universally with enthusiasm, excitement to learn, and confidence in their own abilities and

their potential as professional engineers in the service of society. There is ample evidence of this positive reaction. The undergraduates from the Department are very active, take initiatives and participate in independent activities through the students' Bioresource Engineering Association, participate in student affairs at the faculty level, and in outside organizations such as Engineers Without Borders. The Bioresource Engineering Association (BEA) organizes career fairs in conjunction with the Faculty's own annual event, to which dozens of potential engineering employers are invited. They are also working on an initiative to hold joint Senior Design Project presentations with Université Laval, alternating every year between the two universities. As itemized elsewhere, our students consistently win competitions and prizes for academic and engineering excellence at the university, provincial, national, and international levels. Finally, and most importantly, graduates from this program demonstrate subsequent success in their professional engineering careers. They find employment in many sectors, including: academia, government and private organizations, working in a vast array of applications in every part of the world.

Some of the awards and scholarships won by students of the Bioresource Engineering department include:

Liliane and David M. Stewart Water Fellowships
ASABE Travel Scholarship
NSERC USRA
Force Avenir
Ottawa Eco-Logical Student Design Competition
Quebec Engineering Competition: Innovative Design
Quebec Engineering Competition: Environmental Awareness
Quebec Engineering Competition: Social Awareness
CSBE Thesis Awards
NABEC-ASABE Student Design Competition

Quality and Commitment of the Faculty

There are 10 tenure-track staff members in the Department, including 4 Full Professors, 2 Associate Professors, 4 Assistant Professors, and 2 Faculty Lecturers (oversee the Freshman Program in the Faculty). An Administrative Assistant and two secretaries provide support to all academics and other staff in the Department. In the Engineering Shop, we have a Shop Supervisor and a Professional Associate.

The quality, morale and commitment of the faculty members in the Department is high, notwithstanding the current fiscal environment. Dr. Suzelle Barrington retired in August 2011 and we have finalized the hiring of a new tenure-track appointment at the Assistant Professor level to take her place. In addition, we have received approval for hiring a new academic staff member in water engineering at the Assistant Professor (tenure-track) level. The two new academics will join our department on August 1, 2012. McGill University had awarded four prestigious James McGill Professorships (comparable to the NSERC Canada Research Chair Tier I) to the Faculty of Agricultural and Environmental Sciences, and three of these chairs have been awarded to our Department. In addition, we have also been awarded one William Dawson Professorship (comparable to the NSERC Canada Research Chair Tier II) in the Department.

Quality and Commitment of Support staff

The Department relies heavily on the support of an Administrative Assistant and two secretaries. In the Engineering Shop, we have a Shop Supervisor and a Professional Associate. The two secretaries, Ms. Abida Subhan (full-time) and Ms. Patricia Singleton (5 hrs/day), work under the leadership of Ms. Susan Gregus, and take care of the day-to-day departmental business. While Abida and Patricia deal mostly with undergraduate students in the department, Susan takes care of the graduate students.

The Department has a large (approximately 160 m²) machine shop in which lathes, drill presses, bench grinders, milling machines, automatic saws, and welders are located. There are also work benches. Machines for sheet metal forming and woodworking are available in adjoining rooms. Sixteen welding stations with workspace (used for teaching) are located in a separate room (40 m²) that is independently ventilated. Eight of these stations are equipped with arc welding machines and the other eight have oxy-acetylene welding sets. Adjacent to the main shop area is a room where larger equipment and machines can be used, assembled, or modified. Moderate-sized groups (10-15) can be accommodated here for demonstrations and teaching. The same building also contains a storage area (300 m²) for the storage of field equipment, tractors, pumps, etc.

The shop facility is multi-purpose in use. Thus, it is used by all members of the department, for a variety of purposes including teaching, research, fabrication, and maintenance of equipment. It is under the control of a senior technician (Mr. Scott Manktelow). Although his primary task is to run the facility, he helps teaching students fabrication techniques such as welding, machining, sheet metal forming, etc. He also often acts as a consultant on the practical aspects of their projects, and helps out in teaching labs. The second member of our Department who spends considerable time at the shop facility is Dr. Sotocinal, the department's professional associate. He is involved in teaching courses and labs for several courses. Laboratories for a number of our courses are taught at the shop facility. Undergraduate students often use the shop complex during the execution of their design projects and Mr. Manktelow spends part of his time instructing and supervising them.

SECTION II – THE PAST YEAR’S ACTIVITIES

Over the past year, our staff and students have engaged in teaching and learning, research, various types of professional work, administrative tasks, international travel, and extracurricular activities. Our undergraduate enrollment has been increasing significantly over the last few years, and this trend has continued with over 150 students presently in B.Eng. program. Similarly, our graduate student population has also been experiencing a very healthy renewal and it stands at over 110. Our new IWRM (Integrated Water Resources Management) M.Sc program has 23 students.

The Department and its Programs

- ♪ The undergraduate program in Bioresource Engineering is getting stronger; our enrollment has increased steadily and now tops 150. There are about 30 students per year entering U1 and over 15 entering the program at the U0 level (freshman program). It is anticipated that the undergraduate student body will continue to increase, especially through the increased freshman enrollment. The goal for total undergraduate enrollment remains over 160 students. It should be possible to attain this goal in the next few years.
- ♪ We have hired a new tenure-track Brace Professor in Water Engineering. The new academic will start on August 1, 2012.
- ♪ Dr. Suzelle Barrington retired in August 2011. We have hired a new tenure-track academic for this position, starting on August 1, 2012.
- ♪ Unfortunately, we also could not renew contract with Mr. Edmondo Tilli, the program recruiter for the Department, due to budgetary reasons. He used to market the BEng program through personal visits to career and guidance counselors at CEGEPs and high schools throughout Quebec. He also used to assist in maintaining the departmental website (<http://www.mcgill.ca/bioeng/>) and prepare printed recruitment materials for recruitment. A special departmental committee has been formed to contact potential donors for raising funds to hire a recruiter again.
- ♪ Dr. Jan Adamowski is the program director of the IWRM program. The enrollment in this non-thesis one-year Master’s program is currently 23.
- ♪ In the spring of 2012, twenty-two students graduated with B.Eng. (Bioresource) degree.
- ♪ Two PhD candidates, eleven MSc (Thesis) and three MSc (Applied) students graduated in the Spring 2012 convocation. In addition, eighteen MSc (IWRM) students graduated in Fall 2011.

Academic Staff - Developments

- ♪ It is most noteworthy that in the department we have three James McGill professors (Profs. Madramootoo, Prasher, and Raghavan) and one Dawson scholar (Prof. Ngadi). This makes us the most decorated department in the entire university (per capita, that is)!
- ♪ Professor Chandra Madramootoo remains as Dean of the Faculty of Agricultural and Environmental Sciences (as of August 15, 2005).
- ♪ Drs. Grant Clark and Edward McKyes are the Academic Advisors for the undergraduate program.
- ♪ Dr. Valerie Orsat is the Director of the Undergraduate Program.
- ♪ Dr. Orsat applied for early tenure and promotion last year and got it.
- ♪ As of December 2011, our complement of adjunct professors was as follows:
 - Dr. Serge Guiot
 - Dr. Joyce Boye
 - Dr. Young Choi
 - Dr. Aleksandra Drizo
 - Dr. Boris Tartkovsky
 - Dr. Clement Vigneault
 - Dr. Philippe Savoie
 - Dr. Murray Clamen
 - Dr. Pierre Jutras

International Activities

Most of the professors in the department are involved in international activities. In this regard, Professor Barrington was part of a CIDA-funded project in Ethiopia; she evaluated waste management research opportunities. Professors Kok, Ngadi, and Raghavan continued their work on a rice-processing project in Benin and Nigeria. Professor Madramootoo is the Project Director of CARIWIN, Caribbean Water Initiative project, funded by CIDA/AUCC. Professor McKyes is also working with Dr. Madramootoo on CARIWIN in Barbados, Grenada, and Jamaica. Professors Prasher and Adamowski carried out an expert workshop on water issues in India in early 2011. The project was funded by ISTP Canada.

Staff Awards

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- Professor Shiv Prasher was the president of the Canadian Society for Bioengineering (CSBE/SCGAB) in 2010-11. He was the President-Elect of the Society in 2009-2010.
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Student Awards

2012 Quebec Engineering Competition

1st Place for Innovative Design

Jonathan Martel-Gagnon, Minh-Vy Le & Wilson Wong

Project: Detention Ponds for Agricultural Fields Team Qualifies for the Canadian Engineering Competition in Vancouver

Environmental Awareness Award

Jonathan Martel-Gagnon, Minh-Vy Le & Wilson Wong

Social Awareness Award

Mehdi Bihya, Cameron Butler, Sadman Islam, Vivian Mau

2012 CSBE/SCGAB Undergraduate Thesis Award

Allison Busgang, Vivian Mau, Katherine Rispoli and Wathsala Tennakoon

2012 CSBE/SCGAB Undergraduate Design Award

Rebecca Chin, Nicholas Matlashewski, and Kristian Swan

Eco-logical Competition, Ottawa

Claire-Mérodie Pilault and team-mates from other institutions (1st place)

Justin Dougherty, & Yue Su and team-mates from other institutions (2nd place)

Elizabeth Cote & Emma Cabrera-Aragon and team-mates from other institutions (3rd place).

DAAD-RISE scholarship for the summer research internship position in Leipzig, Germany

Dzuy-Tam Tran

Force Avenir

Finalists in the "Environment" category

"Design and Construction of a Demonstration Rainwater Harvesting System at McGill

University".

Sadman Islam, Blake Bissonnette, and Alison Busgang

Bourse de l'Avenir, La Fondation de l'Ordre des Ingénieurs du Québec

M. Pascal Genest Richard

In the 2011-2012 Scholastic Awards Reception, the following students from the department received awards:

Walter M. Stewart Postgraduate Award: Ashutosh Singh

John Deere Scholarship: Thomas Ammerlaan

Mac Branch of McGill Alumni Association: Jérôme Boisvert-Chouinard

James H. Cooper: Yves Roy

ITT Water & Wastewater: Philippe Brunet

McEwen Clean Water: Dzuy-Tram Tran

Jeff Mills Memorial: Beaudin Oliver

Jeff Mills Memorial: Yves Roy

EMJ: Mali Leclair-Vance

EMJ: Sophie Yuan

EMJ (Renewal): Druzy-Tam Tran

Drummond: Vivian Mau

Drummond: Pascal Genest-Richard

Research Associates/PDFs in the Department

♪ G. Dodds

♪ Y. Gariepy

♪ M. Lautman

♪ Z. Li

♪ L. Liu

♪ M.T. Nagrin

♪ R. Patel

♪ M. Simpson

SECTION III – FUNDING

Project and research funding for the department comes from many different sources. During the past five fiscal years total income to the department was as follows:

Fiscal Year 2006-2007	\$ 4,955,205
Fiscal Year 2007-2008	\$ 6,570,443
Fiscal Year 2008-2009	\$ 4,553,808
Fiscal Year 2009-2010	\$ 6,703,546
Fiscal Year 2010-2011	\$ 4,655,362

Funding details are presented in table format on the next two pages.

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Funding is shown per year during the fiscal years indicated

Name	Grant or Contract	Agency	Program	Title of Project	Fiscal Year	Fiscal Year	Fiscal Year	Fiscal Year	Fiscal Year
					2006-2007	2007-2008	2008-2009	2009-2010	2010-2011
Adamchuk		Nebraska Soybean Board		Profitability-oriented site-specific liming for soybean production			\$25,630	\$25,630	\$37,740.00
Adamchuk	Grant	NSF		Robotics and GPS/GIS in 4-H: Workplace skills for the 21st century			\$499,788	\$499,788	\$499,788.00
Adamchuk	Grant	USDA/National 4-H Council	Curriculum Dev.	4-H Robotics: Engineering for today and tomorrow				\$202,500	
Adamchuk	Grant	CLAAS Omaha Scope	International	Logistics and economics of dual harvesting of grain and biomass				\$30,000	\$30,000.00
Adamchuk	Grant	Nebraska Water Energy & Agric		Evaluation of biofuel driven irrigation pumps and/or electric generators for...				\$61,700	\$61,700.00
Adamchuk	Grant	Nebraska Water Energy & Agric		Optimization of Irrigation Efficiency of Center-Pivot Systems using spatial...				\$57,693	\$57,693.00
Adamchuk	Grant	USDA		USDA/CSREES: Small Business Innovation Research (SBIR)					\$100,000.00
Adamchuk	Grant	John Deere		Crop Management Zone Delineation basee on landscape position					\$45,000.00
Adamowski	Grant	MIT		Cyprus Institute Fund			\$40,000		
Adamowski	Grant	NSERC		Discovery Grant					\$21,000.00
Adamowski	Grant	Startup-fund		McGill University				\$9,166	\$9,166.00
Barrington	Grant	NSERC	Discovery	Valorisation of organic wastes	\$26,000	\$26,000	\$26,000		
Barrington	Contract	Consumaj Inc.		Efficacite des additives dan le controle des fumiers de porcs a l'epandage					
Barrington	Contract	AEDQ		BNQ 3460-540 course					
Barrington	Contract	CDAQ		Evaluation de la performance de panneaux solaire	\$26,180	\$26,180			
Barrington	Contract	Nat Res. Canada		Evaluation de la performance de panneaux solaire	\$33,000	\$33,000			
Barrington	Contract	AEDQ		BNQ 3460-540 course	\$2,750				
Barrington	Contract	KHD Humbolt Germany		Microbial uptake of carbon dioxide from exhaust chimneys		\$318,000			
Barrington	Grant	NSERC CRD	GTI	In storage anaerobic digestion		\$131,400	\$131,400	\$131,400	
Barrington	Contract	Intellectum Inc. Vancouver, BC		Microbial carbon dioxide fixing		\$13,820	\$159,000	\$159,000	
Barrington	Contract	CDAQ		Utilisation du biogaz produit par digestion Anaérobie à l'entreposage			\$40,750		
Barrington	Grant	NSERC	Discovery	Improving organic waste management to reduce GGE				\$22,000	
Barrington	Contract	Qc Drainage Contractor Assoc		Training for drainage equipment operators			\$2,750	\$16,000	
Barrington	Contract	CDAQ - Coop Federee		Evaluation of solar heater for livestock barn heating			\$26,600	\$26,600	
Barrington	Grant	NSERC	Discovery					\$24,000	
Barrington	Grant	NSERC-CRD						\$87,000	
Bonnell	Grant	NSERC		Linking remotely sensed data to rootzone soil moisture	\$17,000	\$17,000			
Clark	Grant	Canada Foundation for Innovation		Laboratory for monitoring and control of pilot-scale microbial ecosystems			\$193,000		
Clark	Grant	Start-up-funds		Ecological Engineering		\$55,000			
Clark	Grant	Edmonton Waste Management..		Mitigation of carbon monoxide from municipal waste co-composting		\$45,000			
Clark	Grant	Edmonton Waste Management..		Determining the pathway of carbon monoxide generation from Cloverbar...				\$4,430	
Clark	Grant	Dr. Louis G. Johnson Foundation		Freeze drier and -85°C freezer for biological sample preservation				\$51,201	
Clark	Contract	AAFC		Evaluate and prototype software method to estimate effects of key global...				\$20,000	
Clark	Grant	Edmonton Waste Management..		Manuscript finalization "Determining the pathway of carbon monoxide...."				\$1,413	
Clark	Contract	AAFC with Edsel Phillip		"Software Design of Analytical Framework for Understanding Impacts..."				\$20,000	
Clark	Contract	AAFC Lethbridge		Collaborative projects with Ecosystem Modeling Laboratory				\$20,000	
Clark	Grant	NSERC Discovery		Engineering of complex adaptive microbial ecosystems					\$19,000.00
Knutt	Grant	McGill	Equipment	Introductory Freshman physics lab and demonstration	\$40,000				
Knutt	Grant	McGill	Equipment	Prephysics/remedial Freshman physics experiment/demonstration	\$22,000				
Knutt	Grant	McGill	Innovation Fund	Enhancing the learning experience in large introductory physics		\$20,400			
Lefsrud	Grant	Dr. Louis G. Johnson Foundation	Equipment	Freezer for Biological Sample Preservation			\$12,800		
Lefsrud	subcontract	NSERC		Measure of corn stover			\$2,500	\$2,500	
Lefsrud	Grant	McGill	Start-up	Biomass production		\$55,000			
Lefsrud	Grant	Canada Found. For Innovation	Fund	Mass Spectrometer: Monitoring and Optimization of Environmental...				\$50,468	
Lefsrud	Grant	MAPAQ		Système de chauffage durable et carbone neutre pour serre alimenté...				\$40,000	
Lefsrud	Grant	Industrial Grant		Screening for an oilseed pea				\$12,000	
Lefsrud	Grant	NSERC CRD		Development of an oilseed pea				\$31,302	
Lefsrud	Contract	Industry General Electric		Horticulture LED Lighting for Commercial Controlled Environment				\$300,000	
Lefsrud	Grant	CRIBEC		Lipid characterization of field peas for nutritional & biodiesel properties				\$12,000	\$12,000.00
Lefsrud	subcontract	Hydro Quebec		Subvention pour projet de démonstration de la technologie TI-SmartLamp...				\$32,280	
Lefsrud	Grant	MITAC-LED Innovation Design		Projet de démonstration de la technologie TI-Smart Lamp chez HydroSerre...				\$10,000	
Lefsrud	Grant	DIAP		Horticulture LED lighting for Canadian commercial greenhouses				\$856,383	\$856,383.00
Lefsrud	Contract	IDRC		Strengthening of rural families through empowerment by introducing food...				\$468,588	\$468,588.00
Lefsrud	Grant	FORNT		Recherche en partenariat contribuant à la réduction et la séquestration...				\$83,300	\$83,300.00
Lefsrud	Grant	Industry		Project to determine Ratio and Intensity for Intercanopy Lighting....					\$180,000.00
Lefsrud	Grant	MITAC Acceleration		Maximizing Plant Production using Light Emitting Diode Arrays					\$26,666.66

SECTION II – GRANTS, PUBLICATIONS AND SERVICE OUTSIDE OF MCGILL
GRANTS:**Adamchuk, V.****2006-2009**

- Adamchuk, V. (PI), A. Samal, C. Wortmann, L. Soh, and R. Ferguson. Delineation of differentiated management areas within an agricultural field to optimize crop production. University of Nebraska-Lincoln: Channing B. and Katherine W. Baker Fund #3524. \$36,000, 100%.
- Barker, B.S. (PI), and V.I. Adamchuk (Co-PI). Robotics and GPS/GIS in 4-H: Workplace skills for the 21st century. NSF – Information Technology Experiences for Students and Teachers (ITEST). \$864,000, 20%.

2008-2009

- Wortmann, C. (PI), V. Adamchuk (Collaborator), R. Ferguson, C. Shapiro, J. Hay, and D. Varner. Farmer evaluation and learning of spatial management of soil acidity. University of Nebraska Extension. \$7,000, 10%.

2008-2010

- Adamchuk, V. (PI), C. Shapiro, C. Wortmann, R. Ferguson, and R. Perrin. Profitability-oriented site-specific liming for soybean production. Nebraska Soybean Board. \$89,000, 90%.

2008-2012

- Lund, E.D. (PI) and V.I. Adamchuk (Consultant). Automated, in-field measurement system for soil nitrate and other properties. USDA/CSREES: Small Business Innovation Research (SBIR). \$400,000, 5%.

2008-2013

- Barker, B. (PI), V. Adamchuk (Co-PI), G. Nugent, and N. Grandgenett. Scale-up: Robotics and GPS/GIS in 4-H: workplace skills for the 21st century. NSF: Information Technology Experiences for Students and Teachers (ITEST). \$2,500,000, 20% (on-going McGill subaward agreement).

2009-2010

- Barker, B. (PI), S. Krehbiel, C. Nelson, and V. Adamchuk (Collaborator). Robotics: engineering for today and tomorrow. USDA/CSREES 4-H National Headquarters. \$400,000, 10%.
- Adamchuk V. (PI) and C. Lutz. Development of an integrated crop sensing system. University of Nebraska-Lincoln: Undergraduate Creative Activities and Research Experiences (UCARE). \$2,000, 100%.

2009-2011

- Adamchuk, V.I. (PI), S. Ci, D. Martin, H. Shariff, and R. Ferguson. Optimization of irrigation efficiency of center-pivot systems using spatial and temporal data integration. Nebraska Water, Energy and Agriculture Initiative (WEAI). \$115,000, 70%.
- Hanna M. (PI), R. Hoy, D. Martin, W. Kranz, and V. Adamchuk (Collaborator). Evaluation of biofuel driven irrigation pumps and/or electric generators for use during peak electricity demand. Nebraska Water, Energy and Agriculture Initiative (WEAI). \$137,000, 5%.
- Kocher M. (PI), D. Keshwani, V. Adamchuk (Collaborator), and D. Jones. Logistics and economics of dual harvesting of grain and biomass. CLASS of Omaha, Inc. \$60,000, 10%.

2009-2012

- Ferguson R. (PI), J. Shanahan, and V. Adamchuk (Collaborator). Crop management zone delineation based on landscape position. John Deere. \$180,000, 5%.

2011-2012

- Adamchuk, V.I. (PI). Development of an integrated sensing technology to facilitate optimized management of agroecosystems. Natural Sciences and Engineering Research Council of Canada (NSERC): Discovery Grant Program – Individual. \$19,000, 100%.
- Adamchuk, V.I. (PI). Integrated soil sensing technology for optimized management of land resources. Canada Foundation for Innovation (CFI) Leaders Opportunity Fund. \$250,000, 100%.

2011-2013

- Yatsenko V. (PI) and V. Adamchuk (Collaborator). New methods for active remote sensing of chemical and biological agents by optical devices. Science and Technology Center in Ukraine (STCU): project #5240. \$112,000, 2%.

2011-2015

- Madramootoo, C. (PI), J. Whalen, V. Adamchuk (Collaborator), D. Burton, and A. Madani. Effects of agricultural water management systems on greenhouse gas emissions in Eastern Canada. Agriculture and Agri-Food Canada: Agricultural Greenhouse Gases Program (AGGP). \$2,000,000, 20%.

Adamowski, J.

- McGill Start up Fund \$55 000
- NSERC Discovery Grant (Individual) \$105 000
- SSHRC Standard Research Grant \$92 000
- FQRNT New Research Grant \$40 000
- Agriculture and Agri-Food Canada Grant \$30 000
- CFI LOF Grant \$275 000

Clark, G.**2008-2009**

- Laboratory for monitoring and control of pilot-scale microbial ecosystems (Canada Foundation for Innovation)
\$193,000 (100%)

2009

- Feasibility study of Integrated Assessment Modeling of Canadian agricultural sector (Agriculture and Agri-Food Canada)
\$20,000 (100%)
- Freeze drier and -85°C freezer for biological sample preservation (Dr. Louis G. Johnson Foundation)
\$51,201 (25% with M. Lefsrud, V. Orsat, J. Whalen)
- Determining the pathway of carbon monoxide generation from the Cloverbar co-composting (Edmonton Waste Management Centre of Excellence)
\$4,430 (100%)

2009-2014

- Engineering of complex adaptive microbial ecosystems (NSERC Discovery)
\$19,000 annually (100%)

2010

- Collaborative projects with Ecosystem Modeling Laboratory, AAFC Lethbridge
\$20,000 (100%)

2011

- Effects of agricultural water management systems on greenhouse gas emissions in Eastern Canada (Dr. Louis G. Johnson Foundation)
\$40,000 (20% with J. Whalen, Strachan, V. Adamchuk, Smith)

Lefsrud, M.**2007**

- McGill Start-up. Biomass production.
(\$55,000)

2008

- Dr. Louis G. Johnson Foundation. Freeze Drier and -85C Freezer for Biological Sample Preservation.
P.I. with J. Whalen, V. Orsat, G. Clark.
(\$51,201)

2008-2010

- NSERC Subcontract, Measure of corn stover, with Dr Savoie.
(\$7,500/3yrs)

2009

- Canada Foundation for Innovation – Leaders Opportunity Fund. June 2009. Mass Spectrometer: Monitoring and Optimization of Environmental Factors for Fermentation.
(\$252,340/5 yrs)

- Canada Foundation for Innovation – Leaders Opportunity Fund. June 2009. Infrastructure operating funds. (\$20,000/5 yrs).
- MAPAQ Programme de soutien à l'innovation en agroalimentaire. Système de chauffage durable et carbone neutre pour serre alimenté aux granules de bois avec réutilisation du dioxyde de carbone pour les plantes. P.I. with P. Thomassin, D. Smith, V. Orsat. (\$120,000/3 yrs)
- NSERC CRD Grant. Development of an Oilseed Pea. P.I. with J. Singh, and T. Warkentin (\$93,906/3yrs)
- Industrial Grant. Screening for an Oilseed Pea. PI with Lefsrud Seed and Processor. (\$36,000/3yrs)

2010

- MITAC Acceleration. Maximizing Plant Production using Light Emitting Diode Arrays. PI with GE Lumination Lachine (\$80,000/3years)
- Industry Grant. Horticulture LED Lighting for Commercial Controlled Environment Agriculture. PI with General Electric (\$300,000/1yr)
- HydroQuebec Subcontract. Subvention pour projet de démonstration de la technologie TI-SmartLamp chez HydroSerre Mirabel. PI: Philippe Lefebvre with LED Innovation Design 9210-4363 Québec Inc. (32,280/1yr)
- CRIBEC. Lipid Characterization of Field Peas for Nutritional and Biodiesel Properties. PI with V. Orsat and J. Singh. (\$36,000/3years)
- MITAC Acceleration. 2010. Projet de démonstration de la technologie TI-SmartLamp chez HydroSerre Mirabel producteur de laities. PI with LED Innovation Design (\$10,000/1year)
- Developing Innovation Agri-products Initiative (DIAP). Horticulture LED lighting for Canadian commercial greenhouses. PI: V. Artokun with 8 others (\$2,569,150.00/3yrs)
- International Development Research Centre (IDRC). Strengthening of rural families through empowerment by introducing food security through production, processing and value addition of regional staple food grains. PI: V. Orsat with 8 other researchers. (\$937,176/2yrs)
- FQRNT Grant (Projet de recherche orientée en partenariat). Recherche en partenariat contribuant à la réduction et la séquestration des gaz à effet de serre.

PI: D. Smith with 7 other researchers.
(\$249,900/ 3years)

2011

- Industry Grant. Project to determine Ratio and Intensity for Intercanopy Lighting.
PI with General Electric.
(\$180,000/1yr)

2011-2013

- McGill Sustainability Fund. Water Collection System for Irrigation and Education at Macdonald Campus.
J. Adamowski and M. Lefsrud.
(\$46,991/3yrs)

Madramootoo, C.A.

2006-2012

- CIDA
Caribbean Water Initiative (CARIWIN)
\$1,000,000

2008-2011

- OMAFRA New Directions Program
Increasing water use efficiency and improved nutrient management for processing tomatoes
\$200,000
- FQRNT Programme de recherche en partenariat sur les cyanobactéries
Mesures précises et approches innovantes en modélisation de la dynamique des nutriments en bassins et en plan d'eau contribuant aux fleurs des cyanobactéries
\$200,000

2008-2012

- Canadian Water Network NCE Tri-Council Program
More value for the same water: maximizing water's sustainable contribution to the Canadian economy
\$109,600

2009-2014

- NSERC
Increasing water use efficiency in crop production systems
\$25,000

2010-2012

- NSERC PromoScience
You are what you eat – the science of food and the environment
\$50,100

2011-2014

- CIDA/IDRC
Improving food and nutrition security in CARICOM countries
\$1,666,666

2011-2015

- Agriculture and Agri-Food Canada
Effects of agricultural water management systems on greenhouse gas emissions in Eastern Canada
\$1,999,710

McKyes, E.**2008-2009**

- CIDA/AUCC
Caribbean Water Initiative
(C. Madramootoo)
\$500,000
- Québec Ministry of Transport
Guardrail Post Strength

2009-2010

- CIDA/AUCC
Caribbean Water Initiative
(C. Madramootoo)
\$480,000
- Québec Ministry of Transport
Guardrail Post Strength

2010-2011

- CIDA/AUCC
Caribbean Water Initiative
(C. Madramootoo)
\$440,000

Ngadi, M.O.**2008-2009**

- NSERC (I)
Structural changes in batter coating systems during frying
\$25,300/year
- McGill William Dawson (I); M.O. Ngadi (PI)
Food process engineering research
\$15,000/year
- NSERC Strategic (Simpson and 4 others)
An integrated approach to transform animal and fishery processing discards into biofuels
\$40,000/year
- PIC
Hyperspectral imaging analysis of chicken egg
\$25,000/year
- Genome Canada (PI)
Exploring Jerusalem Genome for recovery of high-value bioproducts and biofuels
\$15,000/year
- CGIAR-CIDA (PI)
Improving rice processing strategies for food security in West Africa

\$29,750/year

2009-2010

- NSERC (I)
Structural changes in batter coating systems during frying
\$25,300/year
- McGill William Dawson (I); M.O. Ngadi (PI)
Food process engineering research
\$15,000/year
- NSERC Strategic (Simpson and 4 others)
An integrated approach to transform animal and fishery processing discards into biofuels
\$40,000/year
- NSERC CRD (PI)
Assessment of egg quality and hatchability using hyperspectral imaging
\$21,739/year
- CGIAR-CIDA (PI)
Improving rice processing strategies for food security in West Africa
\$29,750/year
- Quebec Egg Board
Impact of age of laying chicken on egg quality
\$25,000/year

2010-2011

- NSERC (I)
Structural changes in batter coating systems during frying
\$25,300/year
- McGill William Dawson (I); M.O. Ngadi (PI)
Food process engineering research
\$15,000/year
- NSERC CRD (PI)
Assessment of egg quality and hatchability using hyperspectral imaging
\$21,739/year
- CGIAR-CIDA (PI)
Improving rice processing strategies for food security in West Africa
\$29,750/year
- CCSI (PI)
Defining Canadian carcass and meat quality standards
\$32,000/year
- CIDA – Africa Rice (PI)
Enhancing food security in Africa through the improvement of rice post-harvest handling, marketing and the development of new rice-based products
\$132,084/year

Orsat, V.

2008-2010

- ABIP Network: Natural fibres for the green economy, Platform 5 “Primary Fractionation and Transformation”

Project: Extraction from flax (Orsat): \$97,500 total operating funds

- ABIP Pulse Network: Project entitled : Pulse flours and their fractionation products in beverage and dessert applications.
Boye, Simpson, Malcolmson, Swallow and Orsat. Graduate stipend paid to Ms. Fatemeh Zare (\$12000/year)

2009-2012

- MAPAQ PSIA : Système de chauffage durable et carbone neutre pour serre alimentée aux granules de bois avec réutilisation du dioxyde de carbone pour les plantes.
(Lefsrud, Orsat, Smith and Thomassin) \$120,000

2010-2012

- IDRC-CIFSRF fund: Strengthening of rural families through empowerment by introducing food security with production, processing and value addition of regional staple food grains.
McGill (Orsat), UAS-Dharwad (Yenagi) and MSSRF (BalaRavi) \$976,176 (total)

2010-2013

- CRIBIQ : Lipid Characterization of Field Peas for Nutritional and Biodiesel Properties
(Lefsrud, Orsat and Singh) \$36,000 (total)

2011-2014

- FQRNT-équipe “Développement d’une approche biocatalytique innovatrice pour la synthèse d’oligosaccharides phénoliques non-digestibles à partir des sous-produits de l’industrie agroalimentaire : ingrédients fonctionnels et bioactivité”
Karboune, Fliss, Orsat and Yaylayan. \$39,500/year

2011-2016

- FQRNT-regroupement stratégique “Institut des nutraceutiques et des aliments fonctionnels (INAF)”
Yves Pouliot et al (20+ scientists). \$460,000/year.
- NSERC-Discovery Grant: “Development of processing methods for enhanced production, extraction and encapsulation of bioactive compounds for functional foods”
Individual grant \$25,000/year

Prasher, S.O.

2008-2009

- McGill University
James McGill Professorship
\$15,000
- NSERC
Fate and transport of swine pharmaceuticals
\$38,000
- CDAQ (13,000)
Evaluation of solar walls

Principal Investigator – Suzelle Barrington
\$26,675

- PIC (\$12,500)
Hyperspectral imaging analysis of chicken eggs
\$25,000
- NSERC-CRD (\$12,500)
Hyperspectral imaging analysis of chicken eggs
\$25,000
- NSERC-GTI (\$30,000)
In storage anaerobic digestion
Principal Investigator – Suzelle Barrington
\$131,400

2009-2010

- McGill University
James McGill Professorship
\$15,000
- NSERC
Fate and transport of swine pharmaceuticals
\$38,000
- CDAQ (13,000)
Evaluation of solar walls
Principal Investigator – Suzelle Barrington
\$26,675
- PIC (\$12,500)
Hyperspectral imaging analysis of chicken eggs
\$25,000
- NSERC-CRD (\$12,500)
Hyperspectral imaging analysis of chicken eggs
\$25,000
- NSERC-GTI (\$30,000)
In storage anaerobic digestion
Principal Investigator – Suzelle Barrington
\$131,400

2010-2011

- McGill University
James McGill Professorship
\$15,000
- NSERC
Fate and transport of swine pharmaceuticals
\$38,000

Raghavan, G.S.V.

2006-2009

- NSERC Strategic
Microwave pasteurization of in-shell eggs
Principal Investigator: G.S.V. Raghavan

\$146,000

2008-2010

- ABIP
Electro-technologies for the processing of flax and hemp straws (Project 5 of platform 3 of NAFGEN, [Natural Fibers for the Green Economy Network])
\$120,000

2008-2011

- Africa Rice Center (WARDA)
Improving rice processing strategies for food security in West Africa
M.O. Ngadi (PI, McGill University), R. Kok, G.S.V. Raghavan
\$89,250

2009-2011

- NSERC Strategic
Optimization of potato nutraceutical extracts for prevention and treatment of diabetes and other disorders
Kubow (PI, McGill University), Donnelly, G.S.V. Raghavan
\$542,935

2009-2014

- NSERC Discovery Grant
Electro-technologies for post-production processing in agriculture, food, and bio-energy
\$47,000 per year
- James McGill Professor Grant
McGill Research Chair
\$15,000 per year

2010-2013

- CIDA, AUCC-UPCD Scaling-Up Program
Postharvest Enterprises for Rural Development (PHERD) in India
Principal Investigator: G.S.V. Raghavan
\$299,920

2011

- NSERC Engage
Optimisation de l'efficacité énergétique des séchoirs à grain industriels
Principal Investigator: G.S.V. Raghavan
Industrial Partner: Law-Marot-Milpro Inc.
\$24,060
- NSERC Engage
Contrôle du vieillissement accéléré du blé utilisé pour la préparation de farines spécialisées
Principal Investigator : G.S.V. Raghavan
Industrial Partner: Les Moulins de Soulanges
\$25,000

2011-2014

- IDRC, \$34,990, part of IDRC obtained by the Canadian Mennonite University, Winnipeg, Manitoba (\$1,191,905).
Revalorizing minor millets in rainfed regions of South Asia.
Principal Investigator: G.S.V. Raghavan

2011-2016

- CIDA - Central and West African Regional Program, \$1,000,000 of \$7,000,000
Enhancing food security in Africa through the improvement of rice post-harvest handling, marketing and the development of new rice-based products.
Africa Rice Center, McGill team: M.O. Ngadi (PI), G.S.V. Raghavan, R. Kok

Savoie, P.**2008-2011**

- Agriculture's contribution to bio-based energy. Ressources Naturelles Canada. Programme ecological Energy Technology Initiative (ecoETI). Fonds transférés au CRDSGC. Responsable : P. Savoie. Montants : 38 000 \$ en 2008-2009 (dont 30 000 \$ en salaire), 29 000 \$ en 2009-2010 (dont 22 000 \$ en salaire) et 26 000 \$ en 2010-2011 (dont 20 000 \$ en salaire). Le total initial est de 93 000 \$. Suppléments en salaire de 23 000 \$ en 2009-2010 et 15 000 \$ en 2010-2011 approuvés le 5 juillet 2009 (total rajusté de 131 000 \$).

2008-2013

- Monitoring and treatment of harvested forages and biomass. NSERC Discovery Grant (subvention CRSNG à la découverte individuelle gérée à l'Université Laval). P. Savoie (resp.). Total (5 ans): 183 750 \$ (36 750 \$ par année).

2009-2012

- Récolte de la fibre de maïs. Bourse de recherche en milieu pratique (BMP) pour l'étudiant au doctorat Pierre-Luc Lizotte, sous la supervision de P. Savoie. Financement de 9000 \$ par année par La Coop fédérée, 9000 \$ par année par le FQRNT et 9000 \$ par année par le CRSNG. Période de validité, du 1er mai 2009 au 30 avril 2012. Total sur trois ans: 81 000 \$.

2009-2013

- Harvest, storage, handling and energy conversion at the farm and community level of woody crops and corn stover. Ressources Naturelles Canada. Programme de recherche et développement en énergie (PERD). Fonds transférés au CRDSGC. Responsable : P. Savoie. Montants : 75 000 \$ par année (total 300 000 \$) dont 24 000 \$ en salaire et 51 000 \$ en opérations. Supplément de 34 000 \$ en 2009-2010 approuvé le 28 janvier 2010. Supplément de 35 000 \$ en 2010-2011 approuvé le 23 juin 2010 (total rajusté de 369 000 \$.)

2010-2011

- Expérimentation et analyse de coût de récolte de biomasse arbustive. Bourse de recherche en milieu pratique (BMP) pour l'étudiant à la maîtrise Pierre Luc Hébert sous la supervision de P. Savoie. Financement de 7000 \$ par année par Le Groupe Anderson, 7000 \$ par année par le FQRNT et 7000 \$ par année par le CRSNG. Période de validité, du 1er janvier 2010 au 31 décembre 2011. Total sur deux ans: 42 000 \$.

2010-2012

- Harvest and Post-Harvest Methodologies. Sub-project within a Clean Energy Fund project entitled: Addressing Key Barriers and Issues to the Extensive Deployment of Short-Rotation Plantation/Agroforestry Energy Systems in Canada. Natural Resources Canada. Expected period: December 2010 to March 2012. Budget for sub-project under the responsibility of AAFC Québec Research Centre (P. Savoie). 2010-2011: \$26,400 in salary, \$25,600 in operations; 2011-2012: \$78,000 in salary, \$42,000 in operations. Total (2 fiscal years, 16 months): \$172,000.

2010-2013

- Reducing Greenhouse Gases with Improved Technology and Logistics for Hay in Dairy Rations. Within the Dairy Cluster funded by the Dairy Producers of Canada (DPC) and Agriculture and Agri-Food Canada (AAFC). In 2010-2011, \$35,196 from AAFC. In 2011-2012, \$40,224 from AAFC and \$71,905 from DPC. In 2012-2013, \$40,224 from AAFC and \$43,739 from DPC. Total: \$231,288 over three years.

2011-2012

- Theoretical and experimental basis for the development of a standard of woody biomass particle size and shape. ecoENERGY Innovation Initiative, R&D Component - Federal Departments and Agencies, Track A - Accelerated Project. Natural Resources Canada. Leader: P. Savoie. Period: October 2011 to March 2012. Budget: \$87,000.
- Novel cutting head adapted to a pull-type forage harvester for short-rotation woody crops. ecoENERGY Innovation Initiative, R&D Component - Federal Departments and Agencies, Track A - Accelerated Project. Natural Resources Canada. Leader: P. Savoie. Period: October 2011 to March 2012. Budget: \$65,000.

AWARDS RECEIVED:**Adamowski, J.**

- Finalist for the International Award for Excellence in the Area of Climate Change: Impacts and Responses.

Jutras, P.

- October 2011 Nominated to represent the Faculty of Agricultural and Environmental Sciences and McGill University at the CREPUQ ‘‘star researchers’’ competition (‘Chercheur-étoile: *Ça mérite d’être reconnu*’).

Prasher, S.O.

- Chair, Department of Bioresource Engineering
- President, Canadian Society for Bio Engineering (2010-2011)

- Member of the Senate Statutory Selection Committee Slate
- Member, Design and Installation of Subsurface Drainage Systems Committee of the American Society of Agricultural and Biological Engineering

Raghavan, G.S.V.

- Certificate of Merit in recognition of being among the top five contributors to archival literature in *Drying Technology Journal*, presented during the International Symposium on Processing and Drying of Foods, Vegetables and Fruits, Kuala Lumpur, Malaysia, April 12, 2011.
- Elected Fellow of the National Academy of Agriculture Sciences (NAAS), India, December 2011.

Savoie, P.

- Certification de reconnaissance remis par le président de la CSBE/SCGAB le 28 janvier 2011 à Québec pour souligner l'implication du Dr. Savoie dans l'organisation du 17e congrès mondial de la CIGR tenu conjointement avec la réunion annuelle de la CSBE/SCGAB en juin 2010 à Québec.
- ASABE 50 Innovations 2011. Prix remis à la compagnie Anderson, partenaire d'AAC pour la commercialisation d'une technologie appartenant à AAC et dont P. Savoie est le premier inventeur (brevets US en 2010 et brevet canadien en 2011, autre publication #126). Prix présenté à Atlanta, GA le 6 janvier 2011, et décrit dans la revue de l'ASABE (*Resource*, March/April 2011: 8-24). L'invention a reçu une désignation spéciale "Judge's Choice" se classant parmi les cinq meilleures inventions sur les 50 sélectionnées.
- L'invention du biobaler par le Dr. Savoie a été appuyée par la Direction scientifique et mise en candidature dans le cadre du Programme de récompenses pour les inventions et les innovations d'AAC en octobre 2011. Les résultats seront connus normalement au début de l'année 2012.
- Invitation à devenir membre du Club de Bologne par le Prof. Axel Munack le 16 novembre 2011. Groupe d'environ 80 experts en mécanisation agricole provenant de tous les continents qui se réunissent chaque année (à Bologne, Italie ou Hanovre, Allemagne). Le membership sera officialisé au cours des prochains mois. Le site est : <http://www.clubofbologna.org>

PUBLICATIONS IN REFEREED JOURNALS :**Adamchuk, V.**

- Roberts, D.F., R.B. Ferguson, N.R. Kitchen, V.I. Adamchuk, and J.F. Shanahan. 2012. Relationships between soil-based management zones and canopy sensing for corn nitrogen management. *Agronomy Journal* 104(1):119-129.
- Kocher, M. F., V.I. Adamchuk, J.A. Smith, and R.M. Hoy. 2011. Verifying power claims of high-power agricultural tractors without a PTO to sell in Nebraska. *Applied Engineering in Agriculture* 27(5): 711-715.
- Shiratsuchi, L., R. Ferguson, J. Shanahan, V. Adamchuk, D. Rundquist, D. Marx,

- and G. Slater. 2011. Water and nitrogen effects on active canopy sensor vegetation indices. *Agronomy Journal* 103(6): 1815-1826.
- Viscarra Rossel, R.A., V.I. Adamchuk, K.A. Sudduth, N.J. McKenzie, and C. Lobsey. 2011. Proximal soil sensing: an effective approach for soil measurements in space and time, Chapter 5. *Advances in Agronomy* 113: 237-283.
- Adamchuk, V.I., A.S. Mat Su, R.A. Eigenberg, and R.B. Ferguson. 2011. Development of an angular scanning system for sensing vertical profiles of soil electrical conductivity. *Transactions of the ASABE* 54(3): 1-11.
- Adamchuk, V.I., R.A. Viscarra Rossel, D.B. Marx, and A.K. Samal. 2011. Using targeted sampling to process multivariate soil sensing data. *Geoderma* 163(1-2): 63-73.
- Roberts, D.F., V.I. Adamchuk, J.F. Shanahan, R.B. Ferguson, and J.S. Schepers. 2011. Estimation of surface soil organic matter using a ground-based active sensor and aerial imagery. *Precision Agriculture* 12(1): 82-102.

Adamowski, J.

- Adamowski J, Chan H. 2011. A Wavelet Neural Network Conjunction Model for Groundwater Level Forecasting. *Journal of Hydrology* 407, 28-40.
- Adamowski J, Chan H, Prasher S, Sharda VN. 2011. Comparison of multivariate adaptive regression splines with coupled wavelet transform artificial neural networks for rainfall–runoff forecasting in Himalayan micro watersheds with limited data. *Journal of Hydroinformatics* doi:10.2166/hydro.2011.044
- Adamowski J, Grey V. 2011. The application of wavelets and artificial intelligence methods in hydrological forecasting. *Journal of Current Development in Theory and Applications of Wavelets* 5, 35 – 50.
- Adamowski J, Halbe G. 2011. Participatory water resources planning and management in an agriculturally intensive watershed in Quebec, Canada using stakeholder built system dynamics models. *Land Reclamation* 43, 3-11.
- Adamowski J, Prokoph A, Adamowski K. 2011. Spatial temporal changes in streamflow patterns in Eastern Ontario and Southwestern Quebec, Canada and their relation to precipitation changes. *International Journal of Climate Change: Impacts and Responses* 3, 155-170.
- Adamowski J, Chan H, Prasher S, Ozga-Zielinski B, Sliusarieva A. 2011. Comparison of multiple linear and nonlinear regression, autoregressive integrated moving average, artificial neural network, and wavelet artificial neural network methods for urban water demand forecasting in Montreal, Canada. *Water Resources Research Canada* 48, W01528.
- Halbe J, Adamowski J. 2011. Use of Participatory System Dynamics Modelling for Collaborative Watershed Management in Québec, Canada. *Journal of Agricultural Engineering* 48, 2.
- Owringi A, Adamowski J, Rahnemaei M, Mohammadzadeh A, Sharifan RA. 2011. Drought monitoring methodology based on AVHRR images and SPOT vegetation maps. *Journal of Water Resource and Protection* 3, 325-334.
- Reig P, Adamowski J. 2011. Assessing the capacity of a North American watershed management regime to support adaptive management. *Journal of Environmental Hydrology* 19, Paper 13.

Saadat H, Adamowski J, Bonnell R, Namdar M. 2011. Development of a new GIS-based algorithm for interrill and rill erosion identification in large watersheds from remotely sensed data. *Journal of Photogrammetry and Remote Sensing* 66, 608-619.

Clark, G.

Phillip E.A., O.G. Clark. 2011. Algorithm for the detection of steady-state measurements of gas emissions from compost. *Applied Engineering in Agriculture* 27(3):485-489.

Phillip E.A., O.G. Clark, K. Londry, S. Yu, J. Leonard. 2011. Emission of carbon monoxide during composting of municipal solid waste. *Compost Science and Utilization* 19(3):170-177.

Xu, S., G.D. Inglis, T. Reuter, O.G. Clark, M. Belosevic, J.J. Leonard, and T.A. McAllister. 2011. Biodegradation of specified risk material and characterization of actinobacterial communities in laboratory-scale composters. *Biodegradation*: 1029-1043. DOI 10.1007/s10532-011-9461-5.

Knutt, M.

Marcia Knutt and Alice Cherestes, *FRACTAL: Freshman Advising Connection for Teaching And Learning*, Journal of College Orientation and Transition, Vol. 19, No. 1, 2011, pp. 119-123.

Lefsrud, M.

Sivagnanam K., V. Raghavan, M. Shah, R. Hettich, N.C. Verberkmoes, M. Lefsrud. 2011. Comparative shotgun proteomic analysis of *Clostridium acetobutylicum* from butanol fermentation using glucose and xylose. *Proteome Science* 9:66.

Dion, L.M., M. Lefsrud, V. Orsat. 2011. Review of CO₂ recovery methods from the exhaust gas of biomass heating systems for safe enrichment in greenhouses Generating usable and safe CO₂ for enrichment of greenhouses from the exhaust gas of a biomass heating system. *Biomass and Bioenergy*, 35(2011):3422-3432.

Madramootoo, C.A.

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Ngadi, M.O.

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Orsat, V.

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Prasher, S.O.

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Raghavan, G.S.V.

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Savoie, P.

- Massé, D., Y. Gilbert, P. Savoie, G. Bélanger, G. Parent and D. Babineau. 2011. Methane yield from switchgrass and reed canarygrass grown in Eastern Canada. *Bioresource Technology*, Volume 102, Issue 22, November 2011, Pages 10286-10292.
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- Adamchuk, V.I., A.K. Jonjak, C.S. Wortmann, R.B. Ferguson, and C.A. Shapiro. 2011. Case studies on the accuracy of soil pH and lime requirement maps. In: *Precision Agriculture: Papers from the 8th European Conference on Precision Agriculture*, Prague, Czech Republic, 11-14 July 2011, ed. J. Stafford, 289-301. Prague, Czech Republic: Czech Centre for Science and Society.
- Pan L., V.I. Adamchuk, D.L. Martin, M.A. Schroeder, R.B. Ferguson. 2011. Combining on-the-go soil sensing and a wireless sensor network to increase irrigation water use efficiency. In: *Precision Agriculture: Papers from the 8th European Conference on Precision Agriculture*, Prague, Czech Republic, 11-14 July 2011, ed. J. Stafford, 459-468. Prague, Czech Republic: Czech Centre for Science and Society.
- Ferguson, R., J. Shanahan, D. Roberts, J. Schepers, F. Solari, V. Adamchuk, L. Shiratsuchi, B. Krienke, M. Schlemmer, and D. Francis. 2011. In-season nitrogen management of irrigated maize using a crop canopy sensor. In: *Precision Agriculture: Papers from the 8th European Conference on Precision Agriculture*, Prague, Czech Republic, 11-14 July 2011, ed. J. Stafford, 503-513. Prague, Czech Republic: Czech Centre for Science and Society.
- An, W., S. Ci, X. Wang, H. Sharif, J. Lin, V. Adamchuk, and D. Martin. 2011. Monitoring-quality-driven sensor deployment optimization in wireless sensor networks. In: *Proceedings of the International Conference on Wireless Networks (ICWN'11)*, Las Vegas, Nevada, 18-21 July 2011. San Diego, California: Universal Conference Management Systems and Support.

Adamowski, J.

- Adamowski J, Chan H. 2011. Groundwater Level Forecasting Using Data Pre-Processing and Artificial Intelligence Methods: Case Study in the Chateauguay Watershed, Quebec. Proceedings of the 20th Canadian Hydrotechnical Conference of the Canadian Society of Civil Engineers. Ottawa, Canada, June 14-17 (accepted).
- Adamowski J, Chan H, Pulido-Calvo I. 2011. Irrigation water demand forecasting using wavelet transforms and artificial intelligence. Proceedings of the ASABE Annual International Meeting 3, 1810-1818.

Lefsrud, M.

- Sivagnanam K., V. G. S. Raghavan, M. Shah, N. C. Verberkmoes, R. L. Hettich, M. G. Lefsrud. 2011. Proteomic analysis of *Clostridium acetobutylicum* in butanol production from lignocellulosic biomass. BMC Proceedings, 5(Suppl 7):176-177.

Madramootoo, C.A.

- Boluwade, A. and C.A. Madramootoo. 2011. Assessment of spatial variability

saturated flow by irrigation moisture sensors in 2-dimensions using the COMSOL-multiphysics 4.1. Proceedings of the COMSOL International Conference, Newton, Massachusetts, USA. October 12-15.

Ngadi, M.O.

Bin L. M., Ngadi M. O. 2011. Ultrasound assisted extraction of lipids from microalgae. *Journal of Phycology* 47 (SI- 2): S85-S85

Hui H., Liu L., Ngadi M.O. 2011. Hyperspectral imaging evaluation of changes in vacuum-packed cold-smoke salmon during storage. Paper presented at the 6th International CIGR Technical Symposium, April 18-20, 2011. Nantes, France.

Liu L., Eze S.O., Ngadi M.O. 2011. Classification of crude palm oil using hyperspectral imaging. Paper presented at the 6th International CIGR Technical Symposium, April 18-20, 2011. Nantes, France.

Liu L. and M. O. Ngadi 2011. Detection of Chicken Egg Fertility and Early Embryo Development Using Hyperspectral Imaging. Paper presented at the 11th International Congress on Engineering and Food (ICEF11), May 22-26, 2011. Athens, Greece. (page 287)

Alakali J.S., Eze S.O. Ngadi M.O. 2011. Specific heat capacity of crude palm oil. Paper presented at the 11th International Congress on Engineering and Food (ICEF11), May 22-26, 2011. Athens, Greece. (page 239)

Raghavan, G.S.V.

Dutta, B, Dev, SRS, Gariépy, Y, Raghavan, GSV. 2011. Finite element modeling and experimental validation of rapid pyrolysis of lignocellulosic biomass. 8th International Conference on Heat Transfer, Fluid Mechanics, and Thermodynamics, Mauritius, 11-13 July, 2011, pp. 483-488.

ACADEMIC AND COMMUNITY ENGAGEMENT SERVICE OUTSIDE OF MCGILL**Adamchuk, V.**

- Engineering Societies: American Society of Agricultural and Biological Engineers (ASABE), Precision Agriculture Committee (PM-54), Soil Dynamics Research Committee (PM-45), Farm Machinery Management Committee (PM-43), Robotics Competition Committee (P-127) - vice-chair, Canadian Society of Biological Engineers (CSBE).
- Soil Science Societies: Soil Science Society of America (SSSA), International Union of Soil Sciences (IUSS) Working Group on Proximal Soil Sensing - vice-chair.
- Precision Agriculture Societies: International Society of Precision Agriculture (ISPA), NCREA-180 Site-Specific Management North-Central Regional Committee, CRAAQ Commission Géomantique et Agriculture de Précision.

- Editorial Boards: Editorial Board of Computers and Electronics in Agriculture Journal, Editorial Board of Precision Agriculture Journal, Guest Editor of a Special Issue of Geoderma Journal (17 manuscripts under review).

Adamowski, J.

- Living Water Policy Project – POLIS Water Sustainability Project. University of Victoria. 2011-2012 Board of Advisors.

Clamen, M.

- Member, Forum for Leadership on Water (FLOW)
- Member, Advisory Committee, Brock Environmental Sustainability Research Unit
- Member, Advisory Committee, "Value of Water" Program, Centre for Environment, University of Toronto

Clark, G.

- Canadian Society for Bioengineering, Vice President Technical (2011–)
- Organization of technical program for CSBE Annual Technical Conference in conjunction with NABEC (Northeast Agricultural and Biological Engineering Conference), Orillia, ON, 14-17 June 2012
- Member of Technical Review Committee for ORBIT 2012 Conference on Waste Management, Rennes, France, June 12th – 15th
- Member of Organizing Committee of Climate Change Technology Conference 2013, Engineers Canada, as representative for CSBE; Chair of technical stream Modeling, Analysis and Design, Montréal, May 27-29, 2013
- American Society of Agricultural and Biological Engineers, Member
- Mentoring of Engineer in Training (EIT) Mr. Sabestien Cordeau; review of work experience on a monthly basis in preparation for accreditation with Ordre des Ingenieurs du Quebec.

Jutras, P.

- Québec delegate and member of the national executive committee of the Canadian Urban Forest Network.

Knutt, M.

- Recruitment – Freshman Website, Bookmark, Literature
 - Meetings with Prospective Parents & Students
 - Campus Connect
 - Open House/Sneak Peek
- Professional Societies: Member of AAPT and MAA

Lefsrud, M.

- ASABE - SE 303, Environment of Plant Structures Past Chair

- International Committee for Controlled Environment Guidelines, Greenhouse Guidelines Subcommittee (NCR-101, CEUG), 2011. Committee Member

Madramootoo, C.A.

- President, ICID
- Member, Board of Directors, Valacta
- Member, Governing Board, ICRISAT
- Member, Board of Directors, IRDA
- Reviewer of NSERC, CRC and CFI Proposals

McKyes, E.

- Examiner, Order of Engineers of Québec
- Reviewer, NSERC Strategic Grants Program

Ngadi, M.O.

- Chair, NABEC
- Member, Executive Council Committee, NABEC

Orsat, V.

- Secretary-Elect, NABEC (Northeast Agr-Bio Engineering Conference), 2011 –
- VP-Membership, CSBE/SCGAB (Canadian Society for Bioengineering), 2011 –
- Member of INAF (Institut sur les nutraceutiques et les aliments fonctionnels), An FQRNT funded research centre. 2010 –
- VP-Technical, Canadian Society for Bioengineering CSBE/SCGAB, 2009-2011.
- Engineering Student Advisor, McGill Branch of the OIQ (Ordre des Ingénieurs du Québec, 2010-
- Engineering Student Advisor McGill Branch of ASABE (American Society for Agricultural and Biological Engineering), 2009-

Prasher, S.O.

- President, Canadian Society for Bioengineering

Raghavan, G.S.V.

- Food Expert Advisory Committee, formerly Food Regulatory Advisory Committee, Health Canada, 2011-
- ASABE, FPE-701
- CSBE Foundation – President 2011-
- CSBE, Fellow's Section Committee

Savoie, P.

- Membre du comité PM-23/7/2 de l'ASABE (American Society of Agricultural and Biological Engineers) : Forage & Biomass Engineering Technical Committee depuis 1984. Membre de l'exécutif pour la période 2008-2012 : Secretary en 2008-2009, Vice-Chair en 2009-2010, Chair en 2010-2011, Past-Chair en 2011-2012. Deux réunions par année pour le développement et la mise à jour de normes sur l'ingénierie des fourrages et de la biomasse : Atlanta, GA, 5 et 6 janvier 2011; Louisville, KY 7 au 9 août 2011. Le Dr. Savoie a présidé ces deux réunions. Participation à la coordination du programme scientifique du comité en 2010-2011 (38 communications en quatre sessions techniques en août 2011 au congrès de Louisville; modérateur de deux sessions à ce congrès).
- Membre du Comité plantes fourragères du CRAAQ (Centre de référence en agriculture et alimentaire du Québec) depuis 1983 (président de 1993 à 2001). Participation aux activités du Comité en 2011 : Demi-journée scientifique à Victoriaville le 15 février (trois communications #262, 263 et 264); participation au colloque sur les plantes fourragères le 19 novembre à Drummondville.
- Membre du conseil d'administration du CQPF (Conseil québécois des plantes fourragères) depuis 1999. Participation aux activités du CQPF en 2011: CA le 3 février à Bernières, Journée à foin à Saint-Césaire le 7 septembre sur le thème « Les plantes fourragères et la santé des sols » (article divers #133), CA le 9 novembre à Bernières, table ronde sur la filière des plantes fourragères le 14 décembre à Drummondville.
- Membre du comité scientifique, CIOSTA & CIGR Section V Conference 2011 : «Efficient and safe production processes in sustainable agriculture and forestry» du 29 juin au 1er juillet 2011, Vienne, Autriche. Il y a envoyé trois étudiants gradués (P.-L. Lizotte, P.L Hébert, F.-S. Robert) qui ont présenté deux communications (#270 et 271).
- Membre du comité scientifique, 33rd International Symposium of the Section IV of CIGR: "Bioenergy and other renewable energy technologies and systems", Bucharest, Roumanie, 23 au 25 juin 2011 (présentations #267 et 268 faites par les étudiants gradués).
- Membre des sociétés scientifiques et ordres professionnels suivants: Ordre des ingénieurs du Québec, Ordre des agronomes du Québec, Association des ingénieurs en agroalimentaire du Québec, Conseil québécois des plantes fourragères, Canadian Society of BioEngineering / Société canadienne de génie agroalimentaire et bioingénierie, American Society of Agricultural and Biological Engineers et British Grassland Society.
- Membre du comité d'évaluation des promotions RES-02 à RES-03 à AAC; réunion à Saskatoon, 14 au 18 février 2011 sous la présidence de Dr. Paul McCaughey.

SECTION III – CONFIDENTIAL INFORMATION**CONSULTING ACTIVITIES:**

Name of Faculty Member	Number of Days Private Sector Consulting	Number of Days Public Sector Consulting	Number of Days Other (Please Explain)	Total
Adamchuk, V.	Miko Technologies, Inc. (20 hrs)			20 hours (Private)
Lefsrud, M.	Diane Bischof, Construction of a farm shed, 5hrs	Andrew J. Daugulis, Queens University, <i>C. acetobutylicum</i> Butanol research, 5hrs		345 hours (Private) 157 hours (Public)
	Murray Frankel, Urban Agriculture, 150hrs	Richard Brathwaite. CARICOM Project for improvement of tropical greenhouses, 150hrs		
	Pierre Cry, Bio-electricity, 25hrs	Hesham Oraby, Agri-Food Canada, Li-Cor, 2hrs		
	Melissa Bacon, Golder Associates (remediation), 5hrs			
	Luc Verdonck, Pea and barley breeding, Agrocentre Belcan, 5hrs			
	Philippe Lefebvrem, LED, LED Innovation Design, 15hrs			
	Richard W. Smolla, Biochar production, Airex, 20hrs			
	Don Murray, Combustion systems, Emispec, 25hrs			
	David Brault, Les Serres du St-Laurent Inc. (Savoura), 20hrs			
	JeanFrancois Richard, LED, GE Lighting Solutions, 50hrs			
	Ed Lefsrud, Pea breeding, Lefsrud Seed and Processor, 25hrs			

Name of Faculty Member	Number of Days Private Sector Consulting	Number of Days Public Sector Consulting	Number of Days Other (Please Explain)	Total
McKyes, E.	Mezztek Construction, 1 day	MRC du Haut Saint-Laurent, 2 days		8 days (Private) 6 days (Public)
	NMP Golf Construction, 4 days	Collectif de Services-Conseils en Montérégie-Est, 4 days		
	Clublink Golf, 3 days			