



Ontario Ginseng Innovation & Research Consortium

ANNUAL REPORT

April 2008 – October 2009



Overview – Year I April 2008 – March 2009

The Ontario Ginseng Innovation and Research Consortium (OGIRC) was established in April of 2008 with funding from the Ontario Ministry of Research and Innovation with partnership from academic and government institutions as well as the agriculture and industrial sector to study new technology for North American ginseng agriculture and product development.

Committees were formed to oversee the governance of the OGIRC, and an interdisciplinary research approach was fostered by the creation of seven platform technology groups. In our first year, 26 researchers, seven post-doctoral fellows, 6 graduate students 26 undergraduate students/volunteers, four technicians and one visiting scientist participated in OGIRC research programs. Our members produced seven published or accepted peer-reviewed publications and presented at various international conferences.

Rationale for the formation of the Ontario Ginseng Innovation & Research Consortium (OGIRC)

Canada is the world's largest producer of North American ginseng (*Panax quinquefolius*), with Ontario providing the bulk of the crop. Ginseng cultivated in North America (NA) is a heterogeneous mix of genetic material originally collected from wild populations; the mixing of different seed lots has contributed to genetic diversity in the cultivated populations. Despite its history of cultural use (i.e. the wide-spread acceptance of ginseng as a vital component in traditional Chinese medicine) and declared wide range of pharmacological activities associated with specific extracts or ginsenosides, there is little agreement as to the identity of the active chemical constituents of ginseng and evidence supporting traditional health claims is limited. The primary reason for this ambiguity is often ascribed to poor quality control of the test materials used in clinical trials. In addition, the lack of technology to distinguish the highly valued Ontario grown NA ginseng from cheaper ginseng grown elsewhere compounds the quality issues and threatens the Ontario ginseng market.

Strategic goals and objectives

The Ontario Ginseng Innovation & Research Consortium (OGIRC) is composed of researchers from diverse areas including agriculture, life sciences, biochemical engineering, social sciences, economics, marketing, knowledge translation, and commercialization, organized into seven Platform Technology Groups (PTGs): Plant Biotechnology, Phytochemistry; Pre-Clinical; Safety; Advanced Processing; Knowledge Translation; and Commercialization & Intellectual Property (IP). They are based in major Ontario Universities and Colleges, Agriculture & Agri-Food Canada and collaborate with the Ontario Ginseng Growers Association and the Natural Health Product (NHP) industry (Naturex and Jamieson Laboratories Ltd). The Consortium objectives are:

- i) to provide a systematic evaluation of the quality of ginseng roots existing in Ontario and to develop criteria for certification of Ontario brand ginseng

- ii) to develop a unique (protectable and trackable) ginseng variety with predictable quality, safety, and medicinal properties by taking advantage of recently developed technologies; and to develop scientific methodologies to validate the uniqueness of these Ontario ginseng varieties
- iii) to develop new value-added Ontario branded products possessing selected health promotional effects by applying both established and emerging scientific technologies.

Future directions of the OGIRC

The OGIRC has built a strong foundation and achieved the milestones mandated by the ORF-RE “New Technologies for Ginseng Agriculture and Product Development” grant upon which it is based, but we have also been active in our first year pursuing new funding sources, new collaborations, and expanding our research focus. We were a co-applicant on Algoma University’s Canadian Foundation for Innovation infrastructure project titled “Innovation and Integrative Technologies for Natural Health Products”; a co-applicant on a Genome Canada Letter of Intent proposing a “Centre for Medicinal Plants” (lead institution: The University of Western Ontario) and we submitted a Letter of Intent to the Network Centres of Excellence proposing the establishment of a “Natural Products for Health Network”, that would function as a research hub to evaluate, develop and integrate the use of natural products in the mainstream health care system, with a focus on Canada’s aging population.

Highlights of Year 1

1. 2008 Joint OGIRC – CICMR Conference

Our first year was extremely busy with many events and activities. Our greatest achievement was hosting, along with the Canadian Institute of Chinese Medicinal Research (CICMR), our first annual conference (October 16 – 19, 2008). This conference brought together over 100 participants from across Canada and the US, UK and China; featured internationally renowned speakers such as plenary lecturer Professor P.C. Leung from the Institute of Chinese Medicine (Chinese University of Hong Kong); scientific lectures; panel discussions; student poster presentations; and a public forum held at the Central Branch of the London Public Library. This was a truly multi-disciplinary conference, with scientific sessions on “Chinese Medicine Product R&D”, “Efficacy & Safety Issues of Herbal Medicinal Products”, “Advances in Chinese Medicine and Integrative Medicine”, and “Ginseng Scientific Sessions” which included a great breadth of topics including ginseng agriculture and plant biotechnology, phytochemistry, pharmacodynamics, and medicinal effects on animal and human physiology and neurology.

- Student Poster Award Winners:
 - First place: Alison Buckner, Laurentian University “The effects of *Linum usitatissimum* (flaxseed oil) on growth of malignant versus non-malignant cell lines
 - Second place: San Nguyen, University of Ottawa “Ethnopharmacology study of Traditional Vietnamese medicinal plants: inhibitory effects on lens aldose reductase”
 - Third Place: Denise Adams, University of Alberta “Traditional Chinese Medicine for the Treatment of Chronic Fatigue: A Systematic Review”

- Student Travel Award Winners

Denise Adams, University of Alberta
Alison Buckner, Laurentian University

Nabeel Ghuyar, McMaster University
Rui Liu, University of Ottawa

2. *PTG Workshop*

In December 2008, the OGIRC hosted a Workshop for the Pre-Clinical and Advanced Processing Platform Technology Groups. Seventeen researchers and trainees met to introduce each other to their respective research programs, identify areas of collaboration and methods of co-operation, and to discuss how to best execute experiments so that the results will be comparable across labs.

3. *Journal Club*

The OGIRC kicked off 2009 with our first Journal Club – an opportunity for OGIRC trainees to present their research proposals or findings, and introduce members from other platform groups to research in their area, thereby enhancing the multi-disciplinary experience for OGIRC researchers and trainees. Presentations by:

Chike Azike, GS (Dr. Lui - Pre-Clinical)
Dr. Sijun Zhou, PDF (Dr. Brown at AAFC
- Plant Biotechnology)

Kristina McIntyre, GS (Dr. Arnason –
Phytochemistry)
Dr. Subhrojit Sen, PDF (Dr. Chakrabarti – Pre-
Clinical)

4. *WORLDiscoveries Research Showcase*

In January, 2009, the OGIRC exhibited at this networking event where researchers and graduate students from the UWO Faculties of Engineering, Science and the Schulich School of Medicine & Dentistry presented their latest research finding to industry representatives. We made valuable contacts with trade representatives from the health care sector and other exhibitors.

5. *Media Coverage*

OGIRC and its members were featured by several media outlets in our first year:

- London Free Press Biz Monday cover story “Rooting for Ontario ginseng”, August 11, 2008
- The National Post “Root from the home team”, November 17, 2008
- The Walrus “Change of Pace”, December 23, 2008
- The Toronto Star “Students make healthy good enough to eat”, February 12, 2009
- The Guelph Mercury “Playing with food”, February 12, 2009

Platform Technology Group Reports

1. *Plant Biotechnology Platform Technology Group Report*

In Year 1, studies on germplasm evaluation and development were initiated and a recently developed six-step *in vitro* tissue culture system which can produce large numbers of genetically identical plants in about 24 weeks was modified and adapted to heritage seed obtained from the Ontario Ginseng Growers Association. 162 lines were introduced into tissue culture and evaluated for potential donor lines to establish the first synthetic ginseng cultivar in Year 2. The ginseng germplasm collection (approx 600 accessions) at the Delhi site of the Southern Crop Protection and Food Research Centre of AAFC was “dug” and evaluated for visual quality and disease. About 400 of these accessions were selected and re-established in a newly- formed beds for further observation and selection. Samples of three- and four-year-old root was collected from 11 established growers in the Delhi/Simcoe area of the southern Ontario ginseng growing region. Samples were processed using commercial washing and drying protocols and provided to Dr. J. Arnason for ginsenoside analysis and to Naturex for preparation of ethanolic and aqueous extracts. Soil samples were taken from the same grower sites and provided to A&L laboratories for nutritional and pesticide analysis. Samples of 25 roots and seed pods from 5 selected growers were taken, along with soil samples, and cleaned and dried and sent to J. Arnason for individual plant ginsenoside determinations. These samples provide an indication of plant to plant and grower site to grower site variability in the Ontario ginseng commercial crop. Initial results indicate substantial variability in ginsenoside content and profiles exists.

HQP research projects in the Plant Biotechnology PTG include:

- Sijun Zhou – “Micropropagation of ginseng lines”

2. *Phytochemistry Platform Technology Group Report*

The Year 1 objectives of the Phytochemistry Platform Technology Group were to develop product quality standards, characterize and phytochemically differentiate Ontario land races of ginseng and undertake an advanced analysis of polysaccharides. We are progressing on schedule, and have validated two advanced methods for phytochemical analysis in the University of Ottawa lab. The first is a recent AOAC HPLC-DAD method for ginsenosides developed by Paula Brown at BCIT and the second is an HPLC/MS method for malonyl ginsenosides developed at NRC by Windust et al (2008). These methods are now being applied to characterization of five Ontario land races of ginseng and new lines of ginseng developed by the biotechnology group in collaboration with Dan Brown. University of Ottawa Honours student Cathy Sun has characterized the antiglycation activity of different phytochemical extracts and pure ginsenosides from the phytochemistry program. In the Charpentier lab at UWO, the complex polysaccharides are being fractionated and characterized according to molecular weight and degree of branching by gel filtration. These will then be assessed in pharmacology labs in Year 2 and beyond.

The impact of the standardization on the overall project is to provide best evidence of quality of Ontario ginseng with the most up to date methods. The land race study and new lines quality study are providing differentiation of Ontario germplasm from other ginseng types. Both have potential commercial implications. The polysaccharide research is very novel and provides a first look at complex polysaccharides in N American ginseng.

Establishment of the phytochemical methods has allowed us to assist in a separate OGGA project on trace pesticide removal with supercritical CO₂. The results show that trace pesticides can be removed without removing ginsenosides.

3. Pre-Clinical Platform Technology Group Report

The overall objective of the Pre-Clinical Platform Technology Group is to evaluate the medicinal effects of ginseng extracts based on non-human studies with results that could be applied to support non-traditional health claims and the breeding program of ginseng, as well as to assist in the development of advanced processing techniques for value-added ginseng products.

The first year progressed on schedule, as these researchers had to wait for the ginseng roots to be collected and processed to provide the extracts to be used in the pre-clinical experiments. Our recruitment and progress in most cases were consistent with or ahead of the scheduled project Milestones and Deliverables. Year 1 was designed to establish pharmacological testing models *in vitro* and *in vivo* to evaluate the difference between types of extracts as well as preliminary data on the mechanism of action of ginseng. The study on metabolic syndrome (M. Bakovic), diabetes complication related to the retina and kidney (S. Charkrabarti), cardio protection (QP Feng and M Karmazyn), vascular effect (E. Lui), immunomodulation (E. Lui and Q. Madrenas) are on or ahead of schedule. The research groups studying the antioxidant properties on cataract (J. Trevithick), anti-stress & endurance (E. Noble) as well as the anti-infective (Z. Suntres) effect of ginseng have initiated the recruitment for HQP, and are ready to move forward with their research in Year 2. The study on reproductive function, which was scheduled for year two, is on schedule with the recruitment by Dr L. Coolen of an MSc candidate, who will start in May of 2009. The evaluation of the suppression of inflammatory and neurogenic pain by Dr Henry is also scheduled for year 2 and organization of this study is underway.

The research on ginseng conducted in year 1 has provided new technologies appropriate to evaluate the pharmacology of ginseng, understand its mechanism of action and assess product quality. They will have a broader impact on the evaluation of the biological action of herbal medicines in general. The integrative and interdisciplinary nature of this research project has provided the opportunity to subject the same test materials for concurrent evaluation for its multi-medicinal effects. These data will be valuable in validating the multi-action aspects of ginseng which have been proposed for some times. Our most significant findings were the confirmation of the multi-action aspect of NA ginseng, and the observation of the different activities of the organic and aqueous ginseng extracts.

HQP research projects in the Pre-Clinical PTG include:

- Branden Deschambault – “Alleviation of the metabolic syndrome phenotype in *Pcyt2* deficient mice with North American ginseng (*Panax quinquefolius*)”
- Ratnesh Singh – “Effects of ginseng on lipase activity and lipoprotein clearance in the *Pcyt2* knockout mouse model for metabolic syndrome”
- Subhrojit Sen – “Preventive effects of ginseng on chronic diabetic complications”
- Tomasz Dzialszynski – “Modeling experimental cataract risk reduction by ginseng extracts”
- Yan Wu – “Cardioprotective effects of ginseng in mice following myocardial infarction”
- Juan Guo – “Antihypertrophic effect of ginseng”

- Chike Azike – “Separation and Characterization of the Immunomodulatory Polysaccharides of North American Ginseng root (*Panax quinquefolius*)”
- Jirui Hou – “Study on anti-oxidative stress activities in vascular injury of ginseng”

4. *Safety Platform Technology Group*

The objectives of the Safety Platform Technology Group are (1) to evaluate the level of contaminations (pesticides, heavy metals, bacteria) of Ontario grown NA ginseng; (2) to study the reproductive toxicity of ginseng extracts with emphasis on those elite breeding lines derived from the breeding program; and (3) to study the potential for drug-ginseng interaction. Work on the first object began in Year 1, and is progressing on schedule. The reproductive toxicity studies are anticipated to begin in Year 2, and work on objectives 2 and 3 are scheduled to start in the latter part of the project. A significant finding was that the concentration of pesticides, especially DDT was detectable and the levels varied among different farms. Processing, such as lyophilization reduced the levels of DDT; and the alcoholic extracts contained higher levels, whereas the aqueous extracts contained no detectable contamination. Bacterial contamination was minimal. In Year 2, this research will be extended to include soil analysis. This will allow the examination of the correlation between ginseng farm soil and ginseng root contamination. This information will be useful for improving the Good Agricultural Practices guideline for ginseng.

The determination of the extent of pesticide contamination is an important step in assessing the issue of safety to the consumers and the market value of ginseng roots and ginseng products. In addition, it allows one to ascertain whether the pharmacological activities observed in the preclinical studies could be attributed to the presence of contaminants. The analysis of the contaminants of ginseng has called for a close working relationship with the industrial and agricultural sector. This has allowed the establishment of a medium for exchange between academia and the industrial/agricultural sector.

5. *Advanced Processing Platform Technology Group* – A report from the Advanced Processing Platform Technology group is not available.

HQP research projects in the Advanced Processing PTG include:

- Robert Bi – “The research of processing, formulation and delivery system of Ontario Ginseng”
- Raizye Samimihaghgozar – “Extraction Of Ginsenosides from Ginseng”

6. *Knowledge Translation Platform Technology Group* – A report from the Advanced Processing Platform Technology group is not available.

7. *Commercialization Platform Technology Group* – A report from the Advanced Processing Platform Technology group is not available.

OGIRC Governance

Management Committee

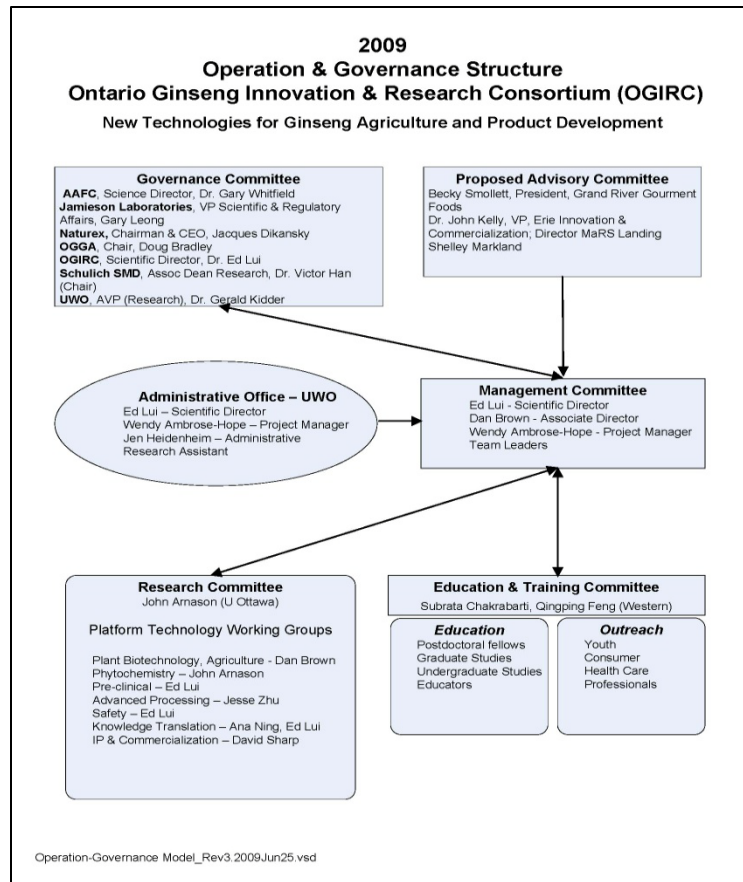
The Management Committee is comprised of the Project Manager, Scientific Director, Associate Director and the Platform Technology Group leaders. The Management Committee's mandate is to oversee the scientific progress of the OGIRC and ensure all Milestones and Deliverables committed to in the ORF Grant Agreement are met.

The Management Committee met in April 2009 to discuss items such as the criteria for reallocating ORF funds; approaching UWO to establish a "Centre for Natural Products and Integrative Medicine" with OGIRC as a component; mechanisms for extending OGIRC membership to new collaborators; and mechanisms for collecting information from the members for inclusion in the ORF Annual Progress Report

Governance Committee

The OGIRC Governance Committee's objective is "To provide forward-thinking leadership and guidance, feedback and strategic planning to ensure the performance and fiduciary responsibilities of the Project are met"; and is responsible for providing vision and recommendations for future administrative and managerial actions, providing fiduciary oversight and reviewing and endorsing the Annual ORF Progress report prior to its submission. The committee membership is based on organizational position, and is comprised of representatives from AAFC (Science Director), Jamieson Laboratories (VP Scientific & Regulatory Affairs), Naturex (Chairman/CEO or Scientific Manager), the Ontario Ginseng Growers Association (Chairperson), Schulich School of Medicine & Dentistry (Dean or Associate Dean of Research), and the University of Western Ontario (Vice President – Research & International Relations, or Associate Vice President – Research).

In Year 1, the Governance Committee met in May 2009, prior to the submission of the ORF report to the Ontario Ministry of Research & Innovation. At this meeting, the Management Committee Terms of Reference were reviewed and accepted; the motion to pass the ORF Annual Progress Report to the Ontario Ministry of Research & Innovation was passed unanimously, and a decision was made to strike a new committee to develop communication guidelines such as recommendations for publications and media releases and resolving any IP issues. The Governance Committee expressed enthusiasm for the application to UWO for a "Centre for Natural Products and Integrative Medicine", suggesting we pursue this goal in the later years of the project.



Sponsorship

The Ontario Ginseng Innovation & Research Consortium (OGIRC) acknowledges the following sponsors and partners:

Government Sponsors

- The Ontario Ministry of Research & Innovation
- Agriculture and Agri-Food Canada

Private Sector Sponsors

- Naturex Inc.
- Jamieson Laboratories Inc.
- A&L Laboratories Inc.
- Ontario Ginseng Growers Association

Institutional Partners

- The University of Western Ontario
 - Schulich School of Medicine & Dentistry
- The University of Guelph
- McMaster University
- University of Ottawa
- Northern Ontario School of Medicine

List of OGIRC Researchers and Trainees

OGIRC Researchers (April 2008 – March 2009)

Plant Biotechnology PTG

Dan Brown (AAFC)

Praveen Saxena (U Guelph)

Phytochemistry PTG

John Arnason

Paul Charpentier

Pre-Clinical PTG

Ed Lui (UWO)

Marica Bakovic (U Guelph)

Jim Henry (McMaster)

Zach Suntres (NOSM)

Qingping Feng (UWO)

Morris Karmazyn (UWO)

Earl Noble (UWO)

Subrata Chakrabarti (UWO)

Advanced Processing PTG

Jesse Zhu (UWO)

Paul Charpentier (UWO)

John Arnason (U Ottawa)

Safety PTG

Ed Lui (UWO)

David Bailey (UWO)

Valter Feyles (UWO)

Knowledge Translation PTG

Ana Ning (King's College)

Ed Lui (UWO)

David Sharp (UWO)

Joel Gagnier (U of T)

Paul Saunders (OCNM)

Mary Wu (TSTCM)

Ling Ting (WORLDiscoveries)

Commercialization & IP PTG

David Sharp (UWO)

John Trevithick (UWO)

Lique Coolen (UWO)

Joachim Madrenas (UWO)

Kem Rogers (UWO)

OGIRC HQP (April 2008 – March 2009)

Plant Biotechnology PTG

Sijun Zhou (PDF)

Carla Schmidt (T)

Pre-Clinical PTG

Subhrojit Sen (PDF)

Yan Wu (GS)

Juan Guo (PDF)

Advanced Processing (PTG)

Robert Bi

Raizye Samimihaghozar

Jirui Hou (PDF)

Chike Azike (GS)*

Hua Pei (T)

Luan Chau (T)

Phytochemistry PTG

Kristina McIntyre (GS)

Chike Azike (GS)*

Tomasz Dzialosynski

Branden Deschambault

Ratnesh Singh

Morgan Fullerton

PDF = Postdoctoral Fellow; GS = Graduate Student; T = Technician

*co-supervised by members of different PTGs

Update on Year 2 Progress (April 2009 – October 2009)

1. New funding applications and networking activities

The OGIRC sought out new collaborators and funding sources through the following networking activities:

- ORF – Global Leadership Round in Genomics & Life Sciences Competition “Systems Biology Initiative for the Health Effects and Agriculture of American Ginseng”

PI: EMK Lui

International Partners

National Partners

<ul style="list-style-type: none"> • William Jia (Shanghai Innovation Research Centre for TCM) • S.L. Chen (Institute of Medicinal Plant Development) • Gane Wong (Beijing Genome Institute) • PC Leung (Chinese University of Hong Kong – Institute of Chinese Medicine) • Ming Zhu (Beijing University of Chinese Medicine) • Ricky Wong (Hong Kong Baptist University) • Wei Jia (University of North Carolina (Greensboro–Center for Research Excellence in Bioactive Food Components) • C.S. Yuan (University of Chicago – Tang Center of Herbal Medicine Research) • Gregory Chass (Bangor University – School of Chemistry) • Z. Howard (National Institute of Health – National Cancer Institute) 	<ul style="list-style-type: none"> • Jeffrey Zidichouski (National Research Council – Life Science Division) • Dan Brown (Agriculture and Agri-Food Canada) • Marica Bakovic (University of Guelph) • David Mutch (University of Guelph) • David Ma (University of Guelph) • Vladimir Vuksan (University of Toronto) • Imre Csizmadia (University of Toronto) • Zach Suntres (Northern Ontario School of Medicine) • Christine Bear (The Hospital for Sick Children)
---	---

- Canada-China International Science & Technology Cooperation (ISTP) Collaborative R&D Project “Technology for production of red American ginseng with enhanced health benefit effects”

<p>Team Canada Lead: EMK Lui</p>	<p>Team China Lead: Guixing Ren (Crop Quality Group, Institute of Crop Science, CAAS)</p>
<ul style="list-style-type: none"> • Lique Coolen (UWO) • Quim Madrenas (UWO) • Subrata Chakrabarti (UWO) • Qingping Feng (UWO) • Jesse Zhu (UWO) • Paul Charpentier (UWO) • Simon Chiu (UWO) • Denton Hoffman (OGGA) 	<ul style="list-style-type: none"> • Li Lv (The General Hospital of the Chinese People’s Armed Police Forces) • Jianguo Fu (Heilongjiang Dongdu Ginseng Company Ltd.) • Jia Feng (Ginseng and Antler Association, Jilin Province) • Gang Zhou (Chengdu University) • Yang Yao (Functional Ingredient Lab, Institute of Crop Science, CAAS)

- Canada-China International Science & Technology Cooperation (ISTP) Partnership Development Activities “ Sino-Canada Networking for Natural Health Products”

PI: EMK Lui

Organizers and contributors:

Team Canada	Team China
<ul style="list-style-type: none"> • D. Brown (Agriculture and Agri-Food Canada) • Jeffrey Zidichouski (National Research Council – Life Science Division) • John Arnason (University of Ottawa) • Praveen Saxena (University of Guelph) • Subrata Chakrabarti (The University of Western Ontario) • Joseph Tai (Children & Women Health Centre, University of British Columbia) • Gary Leong (Jamieson Laboratories Ltd.) • Winnie Pang (Natural Health Products Directorate) • Denton Hoffman (Ontario Ginseng Growers Association) 	<ul style="list-style-type: none"> • Lead: SL Chen (Institute for Medicinal Plant Development, CAMS) • S. Chao Z. Yang (Shanghai Innovation & Research Centre for Traditional Chinese Medicine) • William Jia (Shanghai Innovation & Research Centre for Traditional Chinese Medicine) • Guixing Ren (Crop Quality Group, Institute of Crop Science, CAAS) • PC Leung (Chinese University of Hong Kong – Institute of Chinese Medicine) • Jianguo Fu (Heilongjiang Dongdu Ginseng Company Ltd.) • Li Ping (China-Japan Friendship Hospital) • J. Song (Institute for Medicinal Plant Development, CAMS) • X. Zhanf (Beijing Institute of Genomics, Chinese Academy of Sciences) • C. Liu (The University of Hong Kong)

2. Trainee recruitment

Student recruitment in Year 2 has been active, and the following HQP have joined the OGIRC:

- VS Binhu – Post-doctoral fellow with Dan Brown (Plant Biotechnology)
- Matthew Barnes – Graduate student with Lique Coolen (Pre-Clinical)
- Melissa Moey – Graduate student with Morris Karmazyn (Pre-Clinical)
- Gillian Hewson – Medical student with Quim Madrenas (Pre-Clinical)
- Colin Carruthers – Graduate student with Kem Rogers (Pre-Clinical)
- Jessica Davies – Technician with Kem Rogers (Pre-Clinical)
- Misagh Alipour – Graduate student with Zach Suntres (Pre-Clinical)
- Mehrbod Estaki – Graduate student with Earl Noble (Pre-Clinical)

3. Presentations at scientific conferences

OGIRC members and HQP have attended several national and international conferences to present their ginseng research:

- Jirui Hou – presented at the 2nd Annual Cancer Drug Discovery Symposium, Sudbury ON, August 2009. Winner of a travel award.
- Subhrojit Sen – presented at the 8th Meeting of the Consortium on Globalization for Chinese Medicine, Nottingham UK, August 2009. Winner of a travel award.
- Ed Lui presented at the 4th International conference of TCM on diabetes. Beijing, August 2009.
- Ed Lui presented at the International Conference & Exhibition of the modernization of Chinese Medicine and Health Products. August 2009.
- Marica Bakovic – co-authored three presentations at the Canadian Lipoprotein Conference, Windsor ON, September 2009
- Ed Lui and Subrata Chakrabarti will be presenting at the Recent Development in Chinese Herbal Medicine conference in Singapore, January 2010.

**Ontario Ginseng Innovation & Research Consortium
Financial Report**

Ontario Research Fund - Research Excellence Grant
New Technologies for Ginseng Agriculture and Product Development
Ontario Ginseng Innovation & Research Consortium

Cash/In Kind Expenses Reported Year One
April 1, 2008 to March 31, 2009

	ORF	Institution	Industry		Total
			Cash	In Kind	
PI Salaries & Benefits		397,995.15			397,995.15
Salaries & Benefits (HQP)	178,290.83	172,273.03			350,563.86
Facilities		26,920.50			26,920.50
Equipment	0.00	0.00			0.00
Research Expenses	19,919.46	153,532.25			173,451.71
Conference			15,000.00		15,000.00
Travel / Visitors	12,844.13				12,844.13
Mgmt & Admin - S&B	73,266.04				73,266.04
Mgmt & Admin - Other	24,833.97				24,833.97
Youth Outreach	0.00	0.00			0.00
Audit	0.00	0.00			0.00
Total Cash Expenses	309,154.43	750,720.93	15,000.00	0.00	1,074,875.36
Total Overhead (Cash/In Kind)	123,661.77	306,288.37	*		429,950.14
Total Cash/In Kind Expenses	432,816.20	1,057,009.30	15,000.00		1,504,825.50

* Institution makes in kind contribution by not assessing overhead on Industry \$'s

Note: Audited financial statement for Year 1 not available for annual report. Audit underway.