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CANADIAN IAPB NEWSLETTER

Newsletter of the International Association of Plant Biotechnology-Canadian Section

Editor: Abdelali Hannoufa
Agriculture and Agri-Food Canada, London, Ontario

Inside this Issue:

Happy Holidays

Message from the National Correspondent, Dr. Lining Tian

The international Association for Plant Biotechnology (IAPB) was formed in a structure that includes a president and elected national correspondents from each participating country. The president is in charge of the association and the national correspondent in each country is in charge of the businesses and issues of IAPB in the country.

For the past 40 plus years, IAPB Canada has greatly promoted scientific research and technology development in plant and plant agriculture research in Canada and the national correspondents have played important roles in leading the association. Nevertheless, the national correspondent has been the only person who takes care of IAPB Canada issues. Indeed, there exists a great potential for further development of IAPB Canada if other sources can be used. In order to promote IAPB Canada growth and development and further promote plant biotechnology development in Canada, after discussion with some former national correspondents and some IAPB Canada members, we have formed an Executive Committee. The committee consists of four researchers from different organizations and each member will work on different aspects of the association. Dr. Lining Tian was elected by the members across the country as the national correspondent and he will serve as the president. Dr. Tian has invited three other researchers to join the committee. All these researchers are conducting active research in plant biotechnology and have actively involved in IAPB Canada for the past time. (cont'd on page 2)

The specific roles of the executive committee members will be as follow. Dr. Tian will look after the overall business of IAPB Canada. He will represent IAPB Canada to communicate with IAPB main office and the national correspondents of other countries. He will also communicate with other academic associations and other organizations in Canada for IAPB Canada related businesses and issues. Dr. Abdelali Hannoufa will look after the issues of communications including IAPB Canada Newsletters. Dr. Jaswinder Singh will mainly work on membership and promote IAPB Canada membership development. Dr. Yafan Huang will be the industry liaison and will focus on promoting communications, interactions and collaboration among academic research laboratories and Canadian agriculture and biotechnology industries. Each member's short biography is included in this Newsletter.

The executive committee is a trial and the members are voluntary-based. We will run the committee for one year. In October/November, 2014, we will call nomination for new executive committee and send ballots to all the members to elect new executive committee. The committee will then work for four years.

The Operational Committee will dismiss upon the forming of the executive committee. However, Mimmie Lu and Dr. Abdelali Hannoufa will retain the roles of looking after the finance of IAPB Canada and some general activities, such as distributing copies of the In Vitro Journal to members.

As indicated before, Canadian Plant Biotechnology Conference (CPBC) will be held once every two years. The 9th CPBC will be held from May 12- 15, 2014 in Montreal, Quebec. The conference information is included in the Newsletter.

To promote communication and IAPB Canada development, we have established IAPB Canada web (iapbcanada.ca). The web provides information of IAPB Canada to all members and interested people, such as IAPB Canada news, membership form, meetings, job opportunities. We hope our members to visit the web from time to time for new information related to the association. At this time, the web contains the basic information. The web will be updated gradually.

We welcome suggestions for IAPB Canada development. We believe though continuous efforts IAPB Canada will be on a fast development route.

Sincerely yours,
Lining Tian, Ph. D.
National Correspondent and President
The International Association for Plant Biotechnology – Canada Section

IAPB Canada Executive Committee

Lining Tian, Ph. D. (President and National Correspondent)
Abdelali Hannoufa, Ph. D. (Communication and newsletter)
Jaswinder Singh, Ph. D. (Membership development)
Yafan Huang, Ph. D. (Academic and industry liaison)

Meet the executive committee of IAPB-Canada

President: Dr. Lining Tian is a research scientist at Southern Crop Protection and Food Research Centre, Agriculture and Agri-Food Canada, London, Ontario. He is also an adjunct professor of Department of Biology, University of Western Ontario. He received his Ph. D. from Carleton University, M. Sc. from St. Francis Xavier University and B. Sc. at Lanzhou University, China. He joined the International Association for Plant Biotechnology (IAPB) in early 1990' when he was a Ph. D. student. He has since been actively involved in various activities with IAPB. He attended most IAPB congresses and IAPB Canadian conferences in the past years and presented papers and chaired some sessions at these meetings. His research focuses on use of molecular biology and plant biotechnology for crop trait improvement. He has published about 60 scientific papers and book chapters in various international scientific journals and books. He has supervised and trained many graduate students (M. Sc., Ph. D), undergraduate thesis students, and co-op students. Dr. Tian was elected as the national correspondent of IAPB Canada in 2011.

Communications Officer: Dr. Abdelali Hannoufa is a research scientist with Agriculture and Agri-Food Canada in London, Ontario. He is an expert in the areas of functional plant genomics, biotechnology and secondary metabolism. In his career, Dr. Hannoufa has co-authored over 40 articles and two book chapters, and has presented his research findings at numerous scientific conferences. He was an invited speaker at many national international scientific meeting. He is currently leading and co-leading multi-institute research projects involving plant functional genomics and biotechnology. He served on the steering committee of the ABIP Cellulosic Biofuel Network and was the co-leader of the cell wall biosynthesis section of the Network. Dr. Hannoufa is also an adjunct professor and a full member of the school of graduate and postdoctoral studies at the University of Western Ontario, where he supervises graduate students, serves on the advisory committees others, and has served as an examiner of M.Sc. and Ph.D. research proposals, as well as Ph.D. and M.Sc. theses defenses. He is a member of the science advisory or editorial board of five international journals, and has peer reviewed manuscripts for numerous journals, and reviewed grant proposals for major granting agencies. Dr. Hannoufa has been a member of the operations committee of IAPB-Canada since 2011, and will be in charge of assembling and editing the IAPB-Canada newsletter and will also be responsible for populating and updating the website. If you wish advertise jobs, studentships, or publications, please feel free to contact him with the details

Membership officer: Dr. Jaswinder Singh is currently serving the Department of Plant science, McGill University, Quebec, Canada. Dr. Singh received his PhD from the University of Sydney/ CSIRO Plant Industry, Canberra Australia and did his postdoctoral studies at the University of California Berkeley, U.S.A. His research focuses on the enhancement of quality traits, stress tolerance and bioenergy capability of crop plants using modern genomic and biotechnological tools. Dr. Singh, an internationally recognized innovator in the use of transposon tagging in cereal crops. His findings have shown for the first time the reversal of epigenetic silencing in plants. Recently, his laboratory discovered a key gene that acts as a switch to determine how a particular plant responds to high humidity and excess rainfall. The research opens up a new epigenetic-based direction for exploration of seed dormancy and Pre Harvest Sprouting. He has delivered numerous talks in the international meetings and prestigious institutes. He has published over 35 research papers; including high impact peer reviewed journal papers and conference proceedings. Additionally, he is actively involved in teaching of plant breeding and plant biology courses and training of graduate students, postdoctoral fellows and lab assistants. He is serving as advisory board member for four international journals and a reviewer for various national and international granting agencies. He has served as Eastern Director of Canadian Society of Agronomy from 2010-2012 and recently appointed as a member of International Committee of the American Society of Plant Biologists. He is an active member of two major networks of Canadian researchers including BioFuelNet-National Center of Excellence and FQRNT supported network, Centre SÈVE.

Through genomic and sequencing breakthroughs, the Global and Canadian biotechnology is entering into a new phase. Canadian division of the International Association of Plant Biotechnology recently took new initiatives and committed to offer their members a full spectrum of fundamental and applied plant biotechnology research. Membership will connect you to numerous biotechnology resources which will be valuable for you to build your career in academia and industry. Membership is open to anyone from any nation engaged with Plant Biotechnology.

Industry Liaison Officer: Dr. Yafan Huang is responsible for the overall science, technology and commercial development of Performance Plants Inc., which is one of the leading agricultural biotechnology developers of the world. Dr. Huang specializes in the field of plant biotechnology and has published extensively in the research areas of plant signal transduction and abiotic stress tolerance, and has presented many keynote seminars and symposia in prestigious research conferences and research institutes around the world. Dr. Huang is one of the key inventors of over 80 patent applications of Performance Plants, and his profound international credibility in plant science has made strong contribution to his role as the President of the company, where he has successfully built many commercial partnerships with major international seed companies, thereby expediting the development of next generation of high yielding seeds for farmers around the world. Dr. Huang earned his M.Sc. in Plant Biochemistry from Mt. Allison University, and his Ph.D. in Plant Molecular Biology from Queen's University. Prior to his work in Performance Plants, Dr. Huang worked as a postdoctoral fellow in Dr. Joseph Kieber's lab in the field of plant genetics and hormone signal transduction in University of Illinois at Chicago.

Canada is one of the largest agricultural producers and exporters in the world, and agriculture has been a key pillar for the country's economy. In order to maintain high agricultural productivity and output, plant scientists in Canada will need to work together to convert some of our major research discoveries into plant biotechnologies that will have significant impacts on the production of food and feed materials. The role of the academic and industrial liaison within the executive committee of IAPB Canada is to promote a broader base collaboration and liaisons between all plant research scientists, growers, economists and policy makers in academic, industrial and governmental settings. Through our effective collaborations, together we can make significant contribution and can become a significant driver of the country's bioeconomy.

Plant Biotechnology Laboratory Profile

Dr. Rima Menassa, Agriculture and Agri-Food Canada, London, ON

The current issue of IAPB bulletin recognizes a Plant Biotechnology laboratory from the Southern Crop Protection and Food Research Centre of Agriculture and Agri-Food Canada in London, Ontario. Dr. Rima Menassa obtained her B.Sc. and M.Sc. in plant pathology from the American University of Beirut, and her Ph.D. from the Department of Biology at McGill University. She then joined Agriculture and Agri-Food Canada first as a postdoctoral fellow with Jim Brandle, then as a scientist, and now leads the molecular farming effort for the production of recombinant proteins in tobacco leaves at AAFC. She also holds an adjunct professor appointment at Western University in London Ontario, and has trained 5 research technicians, 3 postdoctoral researchers, 4 PhD students, and 7 MSc students.

The Menassa lab out for a birthday lunch

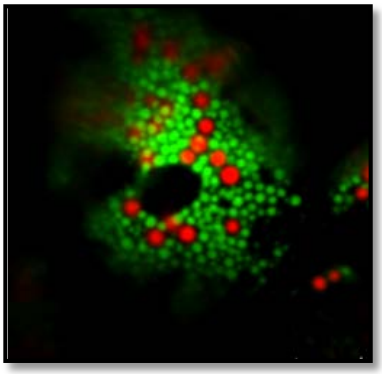
Dr. Menassa has been developing a program focused on producing recombinant proteins in plants. Transgenic plants have considerable potential for the production of recombinant proteins, particularly because they can reduce costs of production and offer easy scalability. Many different crop platforms have been used to produce recombinant proteins, but because of biosafety concerns, the use of food crops is meeting with increasing criticism. Tobacco leaves are an attractive alternative to the use of food crops since tobacco is not a food or feed crop. This minimizes regulatory barriers associated with plant recombinant protein production by eliminating the risk of entry into the food chain, and significantly reducing the potential for gene leakage into the environment through pollen or seed dispersal. One aspect of Dr. Menassa's work was originally to establish a proof of principle that a variety of recombinant proteins could be produced in tobacco leaves, and that, although these proteins were from different organisms (human, invertebrate, viral), the plant-produced proteins are fully functional. Once this was established, Dr. Menassa's interest became the maximization of production

of these proteins because the accumulation of some recombinant proteins in tobacco leaves is usually low, often several orders of magnitude below the 1% of total soluble protein economic threshold. The reasons why a specific recombinant protein does not accumulate are numerous and many efforts have been made in tobacco and other species to optimize transcription, translation, and intra-cellular targeting but none so far offer the magnitude of increase really needed. Chloroplasts are a potential solution and can be engineered to produce very large amounts of recombinant protein, and Dr. menassa has established the chloroplast transformation technology in her lab through the efforts of a former post-doctoral fellow, Dr. Igor Kolotilin. Several genes were produced in tobacco chloroplasts, three xylanases for lignocellulosic biofuels and a potential subunit vaccine for post-weaning diarhea in piglets. The highest levels of accumulation were obtained in the latter case, with 11% of total soluble protein, and no deleterious effects on plant growth and development. Homoplastomic plants are currently grown in the new greenhouse facility at SCPFRC for purifying and testing the immunogenicity of this putative subunit vaccine.

Transplastomic plants producing an ETEC subunit vaccine

The success of the subunit vaccine project led Dr. Menassa to focus her research program on the production of veterinary subunit vaccines in plants, and she recently co-organized with Dr. Ed Topp a workshop sponsored by the OECD on plant-made vaccines as an alternative to antibiotics: countering antimicrobial resistance to veterinary bacterial diseases and ensuring human food safety. This international workshop brought together experts from the research, regulatory, animal health and biotechnology industry communities. The objectives of this workshop were to identify priority bacterial targets for vaccine development, discuss the state of veterinary vaccine production in plants and identify key steps to success, assess challenges associated with their approval, commercialization and use, and provide strategies to support their development .
(http://www.csm-scm.org/workshop/workshop_about.asp)

However, issues related to post-translational processing and assembly of complex proteins are significant and chloroplasts cannot, for example, introduce glycosylation. Therefore other methods for producing complex recombinant proteins are also necessary. Dr. Menassa has explored transient expression in conjunction with fusion tags for improving accumulation levels of recombiannt proteins that require post-translational modifications. Transient expression via agroinfiltration and/or viral vectors has recently emerged as the preferred expression system for plant-made recombinant proteins. Transient expression can be scaled up to commercial production scale with vacuum infiltration. This technology is competing with conventional production systems, and large-scale production facilities are currently available for commercial production of valuable bio-pharmaceuticals such as antibodies. This technology was utilized in the Menassa lab by graduate student Eridan Pereira for producing and characterizing cell wall degrading enzymes, and by graduate student Reza Saberianfar for characterizing protein bodies that are induced in leaves overexpressing recombinant proteins. It is hypothesized that these protein bodies protect the recombinant protein from proteolytic enzymes while protecting the plant cell from toxicity associated with high accumulation of foreign proteins. Therefore, proteins accumulate to high levels when sequestered in those protein bodies.

(A)  **(B)**  **(C)** 

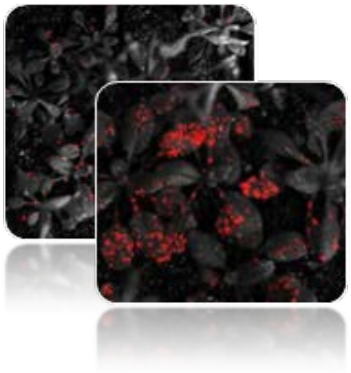
Transient Agro-infitration in *N. benthamiana*. (A) Manual syringe pressure infiltration. (B) Vacuum infiltration setup. (C) Protein bodies in leaf epidermal cells 4 days post-infiltration.

The research program of Dr. Menassa is funded by AAFC through the A-base, CCGI and ABIP programs. Dr. Menassa has co-authored over 40 scientific publications and was involved in three patent applications. She serves as a reviewer for many international scientific journals as well as national and international scientific granting agencies. Further information about Dr. Menassa's research and publications can be found at the AAFC website: http://www.agr.gc.ca/eng/science-and-innovation/research-centres/ontario/southern-crop-protection-and-food-research-centre/scientific-staff-and-expertise-southern-crop-protection-and-food-research-centre/menassa-rima-phd/?id=1181851813200

Plant Biotechnology Company Profile: PlantBiosis Ltd.

Dr. Igor Kovalchuk, President

PlantBiosis Ltd. (www.plantbiosis.com) is a plant biotechnology company emerging into a strong and constantly growing market of plant genetic and epigenetic engineering and highthroughput genomics and epigenomics.
Our philosophy is to provide high quality service and results at or below market price. University of Lethbridge, Alberta is the home for PlantBiosis office and lab space. This is where the company provides a full scale plant transformation service and nucleotide deep sequencing service.



As a part of research and development, using its own resources and government (IRAP) grants, the company is developing various biomonitors for sensing stress and environmental pollution, including water and soil contamination with pathogenic bacteria, heavy metals, pesticides etc.
In addition, the company works with API Labs to develop new poppy varieties with modified alkaloids content (such as thebaine poppy).

Our mission is to develop biotechnology company that provides services to large and small Canadian biotech firms, universities, research institutes, hospitals, government agencies and individuals. To date, PlantBiosis has completed over 50 projects, including metagenomics, de novo DNA sequencing, whole trancriptome sequencing, ncRNA sequencing, microarray mRNA and ncRNA expression analysis, methylation analysis using Infinium BeadChip and RRBS.

Our corporate strategy is to:

- find customers and build strong long-lasting relationships with them;
- develop products that are currently not existing and to improve those that already exist;
- find unique business niche in which the company would position itself as unique provider.

The company has been created in April 2010 and has posted profits in the past two years of operation. Igor Kovalchuk is the current president and CEO of the company. For all enquiries, please contact Igor Kovalchuk (igor.kovalchuk@uleth.ca) or Andrey Golubov (andrey.golubov@uleth.ca).

News from IAPB-Canada

The 9th Canadian Plant Biotechnology Conference (9th CPBC) will be held May 12-15, 2014 in downtown Montreal, Quebec. The Conference is organized by the International Association for Plant Biotechnology (IAPB) - Canada Section. Canadian plant biotechnology conference is held once every two years. The 9th CPBC will bring leading researchers from Canada and world to update and highlight the progress of major areas of plant and plant biotechnology research. The conference also provides a forum for various researchers to present their research discoveries and exchange information. The topic of the conference includes both basic and applied research. A major feature of the conference is that many Canadian plant and plant agriculture industries will attend the conference and update their technology development. It is a good opportunity for academic laboratories and industries to communicate to develop collaborations and to promote plant biotechnology development and application in Canada. You and your colleagues are invited to attend this conference and present your research findings to other plant scientists. We have also established a travel award program to support graduate students and postdoctoral fellows across Canada to attend the conference.

Please visit the conference website (www.mcgill.ca/iapbcanada2014) for registration, abstract submission, travel awards, and other conference information.

The Organizing Committee of the 9th Canadian Plant Biotechnology Conference

Jaswinder Singh, Ph. D., Co-Chair, McGill University (local committee)
Lining Tian, Ph. D., Co-Chair, Agriculture and Agri-Food Canada
Danielle Donnelly, Ph. D., McGill University (local committee)
Abdelali Hannoufa, Ph. D., Agriculture and Agri-Food Canada
Yafan Huang, Ph. D., Performance Plants Inc.
Krystyna, Klimaszewska, Ph. D., Forest Canada
Tamara Western, Ph. D., McGill University (local committee)
Surinder Singh, McGill University (local committee, student representative)

IAPB-Canada website: (iapbcanada.ca)

IAPB-Canada Membership: If you are a member, we urge you to renew your membership for 2014. If you are not a member, we ask you to join. Being a member entitles you to benefits, such as staying in touch with fellow plant biotechnologists, reduced registration fees for IAPB-Canada meetings, complimentary copy of In Vitro Cell. Dev. Biol. – Plant, advertising and viewing job opportunities on the IAPB-website.

Job Opportunity

A postdoctoral Visiting Fellow position is available immediately at Southern Crop Protection and Food Research Centre, Agriculture and Agri-Food Canada, London, Ontario, Canada. The research will involve in development of genetic transformation technology either using traditional methods or using cell penetrating peptide technology in dry bean. After the technology is developed, the project will move to development of herbicide resistance in dry bean using genetic engineering, mutagenesis and other approaches. The candidate should have experience in plant molecular biology, biotechnology, and bioinformatics. Background in development of plant genetic transformation method is desirable. The candidate should be motivated, work independently and efficiently. The position is for one year and renewable for another two years based on research progress and funding availability. Interested individuals can send CV and names of three referees to lining.tian@agr.gc.ca.

Upcoming Plant Biotechnology/Plant Biology Conferences

- **The 9th IAPB-Canada Meeting, Montreal, QC, May 12-14, 2014**
- **Plant and Animal Genomics Conference, San Diego, CA, January 11-15, 2014**
- **Joint meeting of the American and Canadian Societies of Plant Biologists, Portland, Oregon, July 12-16, 2014**
- **The International Association of Plant Biotechnology Congress, Melbourne, Australia, August 10-15, 2014**