Canadian Association for Plant Biotechnology **Newsletter**

Issue 2015.1 **July 19, 2015**

Inside this issue:

CAPB President's message

Dear CAPB (IAPB-Canada) Members,

Happy summer and I hope you are all enjoying the nice weather.

It has been a year since our last conference at McGill University. A lot has happened for our association and I would like to share with you some of the progresses and our future plans.

In December, 2014, the new Executive Committee was officially established. This Committee consists of 8 members and will be responsible for the management and development of our association for the next 4 years (2015-2019). The detailed assignments for the committee members were described in our December News Letter, and can be found from this newsletter and our newly updated association website: http://www.canadianplantbiotech.ca/. Here I like to acknowledge Dr. Gary Tian who serves on our committee and put in countless effort on updating and maintaining our website. The website is still work in progress and we would like to enhance its contents especially in the news, careers/jobs, past/current/future conferences and free access to IAPB journals sections.

After some thorough discussions, we have decided to rename IAPB Canada to Canadian Association for Plant Biotechnology (CAPB). Thanks for Dr. Pankaj Bhowmik's hard work, we have now officially registered this new name in Canada. We believe this new name will better reflect the purpose of our association, which is to promote interaction among plant biotechnology researchers in Canada,

Conferences:

Botany 2015
Edmonton, Canada
July 25-29, 2015

CSPB-CAPB AGM 2016
Kinston, Canada
June 19-21, 2016

International Plant & Animal Genome (PAG XXIV)

January 9-13, 2016 - San Diego, CA, USA

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Call for design of the CAPB Official Logo

Email to: HuangY@performanceplants.com.

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Call for articles for the next issue of CAPB Newsletter

Email to: Xiu-Qing.Li@agr.gc.ca

CAPB Executive Committee (2015-2019) in registration

President, National Correspondent and Government Liaison:
Dr. Yafan Huang

Vice-President, Deputy National Correspondent and Secretary:
Dr. Abdelali Hannoufa

Director of Communication:
Dr. Xiu-Qing Li

Academic and Industry Liaison:
Dr. Rima Menassa

Membership and Treasurer:
Dr. Pankaj Kumar Bhowmik

PostDoc and Student Affairs:
Dr. Gang (Gary) Tian

Student Affairs:
Mr. Dhananjay Dhokane

Observer (the immediate past president):
Dr. Lining Tian

(*Continued from Page 1: CAPB President's message*)

and to liaison with the International Association for Plant Biotechnology. Our association would like to advocate for plant biotechnology research, to bridge the gap between academic/basic research and industry, and to serve as a contact point for plant biotechnology related information in Canada. This new name will also be much easier to remember and understand, so I hope you will like it too.

With the new association name, we need a new association logo. Here, I would like to call for a CAPB Official Logo Competition. Please take advantage of your artistic creativity to submit a logo for this competition. From the submissions, we will choose 3 finalists and one will be the eventual winner. We will be happy to reward all 3 finalists with exciting prizes, including certificates, free registration for our next conference (in June 2016), and the prestige of showing off the eventual winning logo on our website, tee shirts, and everything related to CAPB! So please act on this now.

Talking about our new conference, it has been tentatively decided to hold a joint conference with the Canadian Society of Plant Biologists (CSPB: http://www.cspp-scpv.ca/). This exciting joint conference will be held at Queen's University between June 18-21, 2016. This will be a perfect opportunity for the researchers from both association/society to get together to present and discuss their research discovery, with a strong theme of linking basic research to applied biotechnology. More information on this will be followed shortly.

It is time again for your membership renewal. You can do that simply on-line here: http://www.canadianplantbiotech.ca/memberships/. Please let me know if you have any question or problem regarding the renewal.

Finally, Dr. Xiu-Qing Li is in the production of our semi-annual News Letter which will be ready to send to you very soon. Please let him know if you have important news or career positions available (Xiu-Qing can be reached at : Xiu-Qing.Li@AGR.GC.CA).

Best regards,

Yafan
Yafan Huang, Ph.D.
President & IAPB Canada National Correspondent
Canadian Association for Plant Biotechnology
Web: http://iapbcanada.ca/about-us/

President & Chief Scientific Officer
Performance Plants, Inc.
700 Gardiners Road
Kingston, Ontario, Canada, K7M 3X9
Tel: 1-613-545-0390 Ext. 2207
Web: http://www.performanceplants.com

Introduction to the TBSPG pipelines for Illumina sequence analyses

Xiu-Qing Li

Potato Research Centre, Agriculture and Agri-Food Canada, 850 Lincoln Road, Fredericton, New Brunswick, E3B 4Z7, Canada, xiu-qing.li@agr.gc.ca

Six freely available pipelines for analyzing Illumina sequence reads have been published in June 2015 (Heng Xiang and Xiu-Qing Li, 2015, "Development of the TBSPG Pipelines for Refining Unique Mapping and Repetitive Sequence Detection Using the Two Halves of each Illumina Sequence Read." *Plant Molecular Biology Reporter*, DOI: 10.1007/s11105-015-0912-8).

The full pipelines are freely downloadable from https://github.com/XiangH-LiXQ/TBSPG.

The pipelines can be used in the analysis of both single-end reads and pair-end reads, both unique mapping and multi-mapping, and both full-length reads and half-length reads. There is also the option of removing or not-removing the nuclear-organelles-shared (homologous) sequences.

One important feature of these pipelines is the option to remove the sequences shared by the nuclear-cytoplasmic genomes. This removal greatly improves the data accuracy of the reads-number mapped to the chromosomes and the detected single nucleotide polymorphism (SNP). Another important feature is that the uniquely mapped reads are indeed the reads that are each mapped to only one location. This option is critical for the correct estimation of ploidy variation, chloroplast and mitochondrial genome copy numbers, and metagenomics-based bacterial density.

Introducing the newly published book—-

Somatic Genome Manipulation: Advances, Methods, and Applications

Editors: **Xiu-Qing Li, Danielle J. Donnelly, Thomas G. Jensen**

Published in June 2015, by Springer, New York
ISBN: 978-1-4939-2388-5 (Print),978-1-4939-2389-2.
http://link.springer.com/book/10.1007%2F978-1-4939-2389-2

- Truly one-of-a-kind text that integrates somatic genome manipulation for plants, microorganisms, algae, humans and animals

Somatic genome manipulation is required when a sexual crossing approach cannot be used in breeding or genetic treatment of an individual organism. Examples can include gene- or cell-therapy of a person to correct disease, genetic improvement of vegetatively propagated plants, and genetic replacement of cytoplasm without significantly modifying the nuclear genome. The advantage of somatic genome manipulation is maintenance of the general genotype while correcting one or more traits. Somatic genome manipulation is also an option for genetic improvement of sexually propagated plants in polyploidy breeding or in overcoming issues of sexual incompatibility. Recent novel technologies in somatic genome manipulation are developing quickly but much of this literature is fragmented and difficult or inconvenient to access. This book represents the first attempt to assemble updated reviews, detailed protocols, and their applications in all fields in which somatic genome manipulation has thrived. This is a truely one-of-a-kind work that brings together the most important and relevant advances in somatic genome manipulation in plants, algae, microorganisms, humans and animals, and demonstrates where the science interacts and where it diverges. The chapters are written by experts on the topic with ready-to-use protocols that were originally developed or adapted from the literature in their laboratories. We expect that this book will be useful for students, researchers, and teachers in both plant and animal research as a resource for the latest information on somatic genome manipulation and for its useful laboratory methods.

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(Contributed by Xiu-Qing Li)

Fusarium Head Blight: A Nightmare to Wheat Growers and a Potential Challenge for Plant Researchers

Dhananjay Dhokane

Department of Plant Science, McGill University

Wheat (*Triticum aestivum* L.) is the second most important cereal crop, feeding one third of the world's population. Even though, it is widely cultivated and extensively consumed all around the world; the production and the productivity of wheat are highly influenced by biotic and abiotic stresses, leading to global food insecurity. Fusarium head blight (FHB), also known as head scab, is one of the most devastating and alarming diseases of wheat ruining harvests. The disease is caused by several species of *Fusarium* in wheat producing regions around the world. *Fusarium graminearum* Schwabe [telomorph: *Gibberella zeae* Schw. (Petch)] is the most prominent causal agent, leading to enormous losses in wheat and barley in North America. Other important species of *Fusarium* which are known to cause the disease are *F. culmorum, F. avenaceum, F. nivale, F. poae, F. oxysporum, F. moniliforme* and *Microdochium nivale.* Fungi in its initial stage survives as a biotroph, subsequently turning into the necrotroph, stay upon invading the host. The source of inoculum for FHB may be macroconidia, ascospores, mycelium or chlamydospores. FHB incidence is common in warm and humid conditions during flowering and early stages of kernel development. The infection cycle of fungus begins with the colonization of florets, spreading through the rachis to adjacent spikelets causing necrotic lesions, bleaching, and shriveling of kernels. The disease causes severe losses in yield as the infected florets and spikelets fail to produce mature grains or detoriates the grain quality by the accumulation of trichothecene mycotoxins such as deoxynivalenol (DON), nivalenol (NIV), rendering them unsuitable for food or feed. DON is the most hazardous mycotoxin and is of serious concern for human and animal health, as the toxin causes food refusal, vomiting and is an immune modulator. DON contaminates world's food supply up to 25 %. Human exposure to DON is through consumption of wheat-based foods like bread, biscuits, pasteries, pasta, roti etc. Human exposure to DON causes burning sensations in the mouth and stomach, headache, reduction in red blood cell count, bleeding and even death in severe cases. The mycotoxin is known to have adverse effects on the nervous system, liver, kidneys, circulatory system, endocrine system and digestive tract. Exposure of animals to the high dose of DON (> 10 mg/kg) causes vomiting and serious consequences, such as inflammation of mucous membranes lining the mouth and the esophagus. Several poisoning incidents due to the accumulation of toxins have been reported in China and India. Advisory levels of DON content in grain and processed products have been imposed by the country's health and food agencies. Several European nations, the USA and Canada have set maximum DON content levels in wheat grains ranging from 0.5 to 2 ppm for human consumption. The Canadian Food Inspection Agency (CFIA) has set an advisory level of 0.5 ppm concentration of DON in infant food, and 1 ppm for processed food. The grains with higher levels of DON may be graded down or rejected completely in the market.

The infected grains even reduce the germination percentage, cause seedling blight and unhealthy growth and development. FHB also decreases the nutritive value (degradation of proteins, starch granules) and processing quality (baking quality, malting quality) of the grains. Enormous losses due to FHB epidemics have been reported worldwide wherever wheat is under cultivation, being a nightmare to the wheat growers. The FHB has adversely affected wheat harvests in eastern Canada and the USA for many years. The Canadian grain industry suffered high economic losses during the 1990s, totalling US$200 million for Ontario and Quebec and US$300 million for Manitoba. FHB has affected more than 7 million hectares of wheat and has caused yield losses of more than 1 million tonnes in China.

Several management measures have been employed to reduce the incidence of FHB such as application of fungicides, utilization of various biological and cultural practices, with little success. An efficient, economic, and ecofriendly approach to control the incidence of FHB and the accumulation of mycotoxins is the development of resistant cultivars. Three different types of FHB resistance mechanism are reported in wheat: (i) Resistance to initial infection or spikelet resistance (type-I); (ii) Resistance to spread within the spike or rachis resistance (type-II); (iii) Resistance to mycotoxin accumulation (type-III). FHB resistance is quantitative in nature, involves "many, many genes," each with small effect, that confer resistance when combined. Resistance is influenced by interactions among genotypes, pathogen and the environment. The development of resistant wheat cultivars is very challenging because of limited understanding of genetics of resistance and lack of cost-effective means of phenotyping. The existing methods used for phenotyping

(*Continued from Page 4: CAPB Fusarium head blight*)

genotypes, both under field and greenhouse conditions, often resulted in high experimental error, leading to inconsistent ranking of genotypes over years. The thorough understanding of genetics of FHB resistance and implementation of accurate phenotyping techniques will facilitate the identification of resistant genes and their transfer into elite wheat cultivars possessing good agronomic characters. Though, more than 100 QTLs imparting FHB resistance has been reported, the underlying resistance mechanisms are still unknown. The transfer of resistant QTLs/genes often led to linkage drag effects, carrying undesirable genes. The hexaploid nature of wheat with the genome size of 17 Gbp, unavailability of complete genome sequence and recalcitrant behavior to in vitro cultures has provided fewer opportunities for the improvement of FHB resistance. Though several transgenic lines are developed, targeting few genes, the level of resistance delivered is minimal. For lack of understanding of mechanisms of resistance and genes involved, the quantitative resistance underlying remains a mystery. Hence, it's a potential challenge for plant researchers to identify the genetic controls underlying FHB resistant mechanisms, to develop crop resistant to FHB, thus bringing a ray of hope to the wheat growers.

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Editorial positions assumed by CAPB members

Editor-in-Chief, **Scientia Horticulturae**,
Dr. Samir C. Debnath
Agriculture and Agri-Food Canada (AAFC)
St. John's
Newfoundland and Labrador
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samir.debnath@agr.gc.ca

Academic Editor, **PloS ONE;**
Editorial Board Member: **Genetics and Epigenetics; Potato Journal.**
Dr. Xiu-Qing Li
Potato Research Centre
Agriculture and Agri-Food Canada
850 Lincoln Road Fredericton
New Brunswick, E3B 4Z7, Phone: 1-506-460-4511,
email: Xiu-Qing.Li@agr.gc.ca

Welcome submissions to these journals!

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Call for posters and oral presentations for the Somatic Genome Workshop at the Plant and Animal Genome Conference 2016 (PAG XXIV, January 9-13, 2016, San Diego, CA) http://www.intlpag.org/

Email the workshop organizer: Dr. Xiu-Qing Li
Xiu-Qing.Li@agr.gc.ca; tel 1-506-460-4511
Suggested areas: Genome instability; variation in somatic genome network (nuclear, chloroplast, mitochondrion) ; somatic genome characterization; somatic genome evolution; genomic characterization of somaclonal variation; somatic breeding (e.g., targeted mutation, breakthroughs in genetic engineering, and cultivars obtained through non-sexual crosses; protoplast fusion and cybrids, and graft-hybrids).

Call for news articles for the next issue (December 2015) of CAPB Newsletter

All members of the CAPB are welcome to submit articles to CAPB Newsletter. The newsletter is mainly for news about the members but it is also a forum for CAPB members to share ideas and commentaries on plant biotechnology. The following are some of the example areas:

- Job ads
- Conference briefings
- Scientific discovery
- New books
- New technologies
- New software packages
- Awards
- Important nominations
- Plant biotechnology advances

Each news article should be brief, less or up to one page (in Times New Roman, font 12). See "In Vitro Cell Dev. Biol. – Plant" for the reference format.

Email to:

Dr. Xiu-Qing Li (Editor, CAPB Newsletter)
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850 Lincoln Road, Fredericton
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Tel 1-506-460-4511; email: Xiu-Qing.Li@agr.gc.ca

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(*Canadian Association for Plant Biotechnology Newsletter, Issue 2015.1; July 19, 2015.*
Edited by Xiu-Qing Li)

Canadian Association for Plant Biotechnology
Membership Application / Renewal 2015

New Member Renewal

First name: _____

Last Name: _____

Institute: _____

Address: _____

_____

Telephone: (____) _____ Fax: (_____) _____

Email: _____, Subscription enclosed: $ _____

Receive hardcopy of In Vitro Cell Dev. Biol. – Plant? Yes No

Membership	**Fees**	**Notes**
Regular Members	$40	
Emeritus Members	$15	
Postdoctoral Associate	$15	Supervisor: _____
Student Members	$15	Thesis supervisor: _____

SUBSCRIPTION payable to: Canadian Association for Plant Biotechnology (CAPB) CAPB can only accept cheque, certified cheque or money order. An official receipt will be sent to the subscriber up on receiving the form and full payment to confirm the membership. (The membership fee can be paid for up to three years each time).

Please fill out the form and return with the membership fee to:

Pankaj Bhowmik, Ph.D.
National Research Council of Canada
110 Gymnasium Place
Saskatoon, SK. S7N 0W9

Signature: _____ Date: _____