Food Convergent Innovation Webinar Series: Pulses Program

By Laurette Dubé and Gordon Bacon

Convergent innovation *(CI)* builds on the best of current linear and open models to define the contours of a next generation of science, technology, and innovation programs that are better able to cope with important challenges facing 21st Century Society at the nexus of agriculture, industry and health systems. These have been the object of ambitious *sustainable development goals (SDGs)* recently set by the United Nations in a "One World" agenda that combines the three themes of health of people, environment, and economy as integrative target in a strategic vision that bridge traditions with new products, processes and practices in a diversity of sectors in novel ways. *For food,* the targets for sustainable development and affordable healthcare lie at the converging point where food is at the same time: what consumers want; what they need for their vitality and health; what they can and want to pay; what the planet can offer in a sustainable way; and what the agriculture and food sectors can and want to produce in a cost-effective and profitable manner.

Business solutions for successful innovation at this CI sweet spot calls for bridging a diversity of science and technology pipelines and expertise that encompass: plant breeding for improved nutrition profile and digestibility, process functionality or sensory qualities; improved agricultural output of pulses farming; deeper understanding of the chemistry of grains and the impact of processing on the chemistry; engineering solutions to scale to traditional wisdom; commercial scale up capability for select processes; measurement of physicochemical properties of grains and flour and other products; technology platforms of pulse processing (e.g., extrusion or roasting) for designing value added products; evaluation of health benefits of various processing platforms and value added products; improvement of odor or aroma; support for clinical studies and health claims development for value added products; innovative environment friendly packaging solutions, and others.

The CI Webinar series for food, inaugurated with the Pulses Program on the first International day of pulses January 18th 2017, will point to transformational levers for accelerating supply and demand at this convergent sweet spot. The series will feature cutting edge science, technology and innovation in agriculture, food and health domains as well as in the behavioral, commercial, social and complexity sciences. These, combined with traditions from around the world, will altogether articulate an interdisciplinary research and action strategy to transform agricultural products like pulses from undifferentiated commodities into higher-margin whole and value-added food products that support sustainable development and affordable healthcare. Progressively, programs in the CI-Food webinar series will be developed for other agricultural products with high CI potential, e.g., dairy, vegetables, etc.) Pulses are in a particularly strategic position as "One World" food solutions: they have been essential to agriculture and staple food in diets over millennia in traditional societies; modern science has also demonstrated their many benefits for environmental and human nutrition and health. Most importantly, the 2016 International Year of Pulses (IYP) has also left behind a strong legacy: 10-year research strategy for pulse crops; long-term plan to build global pulse brand equity; call-to-action for creating continuous awareness and market access for pulses. This three-pronged legacy is built upon by partners in the Global Pulse Innovation Platform in the complementary pulse convergent

innovation research and action strategy that will be supported by the CI-Food Webinar: Pulse Program. The strategy will scale up and accelerate what pulses can contribute as food solutions to sustainable development.

The inaugural presentation in the series by Laurette Dube and Vilas Sriharti from Tata Chemical Limited was entitled *"Bridging pulse tradition and modern innovation to accelerate food solutions to sustainable development: A convergent innovation research and action strategy.'* Presenters first illustrate how traditional pulses, when combined with modern science and technology, can transform them from commodities into higher-margin value-added food products that support sustainable development.

We then sketch key features of the research and action strategy that range from basic genomic and agricultural, food, nutrition and health research, to sophisticated behavioral insights and predictive analytics to support supply and demand for commercially successful whole and value-added pulse foods.

The second presentation, by plant breeding scientist Alison Ferrie from the National Research Council Canada was entitled *"Fast-track the breeding of new varieties using doubled haploidy."* Doubled haploidy methodology is commonly used in many agronomically important crops to speed the development of new cultivars. There are a number of advantages in using haploidy technology in both practical application (varietal development, mutagenesis, transformation) and basic research (genomics, biochemical, and physiological studies). Haploid plants are commonly produced using one of four methods: culture of anthers or microspores (androgenesis), culture of unfertilized ovules (gynogenesis), interspecific or intergeneric crosses followed by chromosome elimination, and by pollination with irradiated pollen. The most efficient method depends on the species. There are a number of factors affecting microspore embryogenesis including genotype, donor plant growth conditions, stage of microspore development, composition of the culture medium, and environmental conditions during culture. The frequency of embryo production will depend on whether or not these conditions are optimal and varies depending on the species. The pulses are considered recalcitrant to doubled haploidy methodology. For the past 25+ years, the National Research Council - Saskatoon has been developing doubled haploidy protocols in a number of different species. The presentation discussed doubled haploidy, gave some successful results and discussed the potential for the pulses.

In the coming year, each webinar presentation will be the object of a short report in the POD magazine, with next in line being on digital technologies, including but not limited to big data and business analytics, as being essential for successful convergence of health and economic outcome in pulse-based food innovation.

Authors

Laurette Dubé

Dr. Dubé is a Full Professor and holds the James McGill Chair of consumer and lifestyle psychology and marketing at the Desautels Faculty of Management of McGill University, Canada. Her research interest bears on the study of affects and behavioural economic processes underlying consumption and lifestyle behaviour and how such knowledge can inspire more effective health and marketing communications in both real-life and technology-supported media. She is the Founding Chair and Scientific Director of the McGill Centre for the Convergence of Health and Economics. The MCCHE was created to foster partnerships among scientists and decision-makers from all sectors of society to encourage a more ambitious notion of what can be done for more effective health management and novel pathways for social and business innovation.

Gordon Bacon

Gordon Bacon is CEO for Pulse Canada and is also CEO of the Canadian Special Crops Association, an organization that represents processors, exporters and brokers of all pulses and special crops. Pulse Canada is the national industry association that represents growers, processors and exporters of Canadian pulses. The association's mandate is to contribute to the profitability of the Canadian pulse industry by delivering innovative solutions that improve efficiencies and increase the value of pulse production, processing and marketing. When successful, Pulse Canada's efforts will ensure that different market segments recognize pulses as healthy, sustainable and functional food products, leading to increased worldwide demand for Canadian pulses. Direction and funding for Pulse Canada is provided by Alberta Pulse Growers, Saskatchewan pulse Growers, the Manitoba Pulse Growers Association, Ontario Bean Growers, and the Canadian Special Crops Association. Before joining Pulse Canada 19 years ago, Gordon was Director of Market Development at the Canadian Wheat Board (CWB). He has also served as Senior Policy Advisor to the Minister of State, Grains and Oilseeds in Ottawa; and in various roles with federal and provincial departments of agriculture.