Bridging pulse tradition and modern innovation to accelerate food solutions to sustainable development: A convergent innovation research and action strategy

By Laurette Dubé, Vilas Shirhatti, and Sushil K Chaturvedi

On the eve of 2017, the International Year of Pulses (IYP) is leaving 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.

In this article, the last of a series of six articles by the Global Pulse Innovation Platform[1] over the course of the IYP, we build upon this three-pronged legacy and offer a complementary convergent innovation research and action strategy to scale up and accelerate what pulses can contribute as food solutions to sustainable development.

Ambitious sustainable development goals (SDGs) have recently been 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.

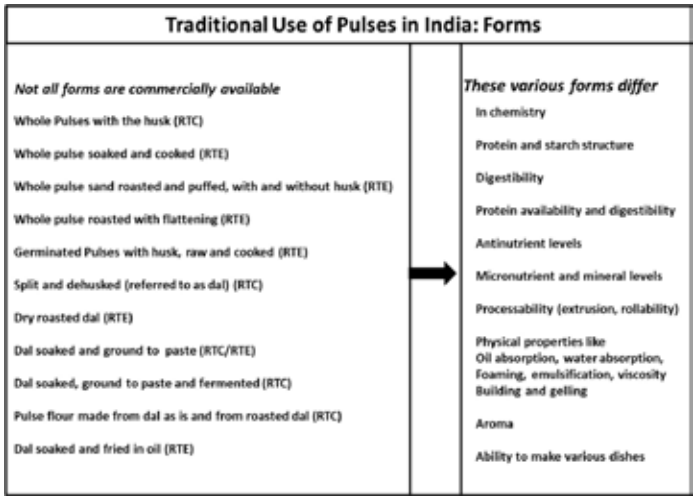
We first illustrate how traditional pulses, when combined with modern science and technology, can transform them from commodities into higher-margin value-added food products that support sustainable development. Second, we point to a few transformational levers for agricultural research to enable agricultural supply as critical input for this food of the future. Third, we sketch key features of the strategy.

Pulse food tradition and modern innovation: The case of India

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.

As can be seen from the nearby figure taking the case of India, various forms of pulses have accumulated over the years through necessity, creativity, collective wisdom and traditions. Pulses in their various forms are also the objects of a rich portfolio of traditional processes, including soaking, dry roasting, puffed roasting, fermentation.

These further contribute to chemistry, physical, and other properties that define the food profile, including nutritional value and environmental foot prints, but also texture, flavour and sensory appeal.



With the IYP having positioned pulse as the future of food, there is clearly high potential for scale in integrating traditional pulse forms and processes into modern food innovation. Some traditional products, like roasted chick peas in India, are now inspiring modern food "renovation" in product categories like snacks that have gained over time a "junk food" label in consumer mind because of their generally low nutrient density (see nearby figure), However, such synergy between pulse tradition and modern food innovation is still limited in its scale as traditional recipes and processes remains practiced largely at home level, or at best at small scale in local unorganised markets.

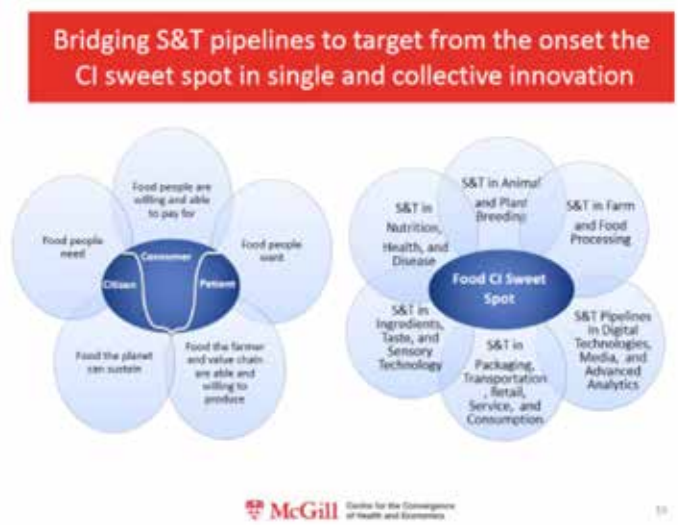
[1]Support for PIP development and series of POD articles comes from International Development Research Canada (IDRC), Social Sciences and Humanities Research Council of Canada (SSHRC), and Fonds de Recherche Quebec Societe et Culture (FRQSC).

Research and action are needed that bridge science and technology pipelines to advance traditional knowledge and accelerate the convergence of their single and collective investment on the production and consumption of whole and value added pulses products that address the health of people and planet while meeting consumers want at an appropriate price point for targeted markets and providing appealing incentives for farms and food businesses (what we have called the convergent innovation sweet spot).

Such food of the future can enrich food categories with modern appeals, like pasta, breakfast cereals, snack, breads and others. Research is needed that traces the exact change in the physic-chemical properties and in the nutritional and other quality profiles associated with specific traditional forms and processes.

Research is also needed to document appropriate nutrition and health claims and trace the array of demand drivers for different target population for proper communication strategy to consumers at large.

There is also a need for engineering and marketing research and action to develop process and other technologies for large commercial applications to produce value added pulse based products and ensure their successful commercialization, branding, and consumption.



Enabling crop and farm research and action

The power of pulse food tradition and modern science and technology to bring societal-scale solution to sustainable development can be magnified importantly by crop and farm research and action that builds upon their rich biodiversity to ensure stable and high quality inputs.

A country like India for instance is the host to twenty crops adapted to different agro-ecological conditions and seasons. Much can be gained not only in increasing cultivation acreage, yield and productivity, but also the availability of pulse crop options suited for every arable acre and altogether providing stable diversify input for domestic and international pulses food, be it as whole food or as ingredients in value-added products.

We propose two lines of work for moving in this direction, beyond the present emphasis of the global ten-year pulse crop research strategy on improvement to pulse production and productivity and to build resilience to a large number of abiotic and biotic stresses.

Biodiversity with prioritization and integration of modern technologies.

The wild relatives and primitive landraces are useful source of genes to improve the varieties of different pulses with high yield, grain quality and resistance against biotic and abiotic stresses.

The whole diversity of indigenous pulses grown in diverse agro-ecological condition and seasons around the world can be included in such pool with allele mining and transfer of desirable genes using molecular tools that now can help in developing cultivars having broad genetic base in shortest possible time.

Characterizations of these cultivars in terms of their potential for successful value addition (i.e., nutritional and environmental food print, taste, texture, other functional processing characteristic) can help prioritize crop and farm research. Also, conventional plant breeding can be complemented by modern techniques for accelerating crop improvement programs worldwide, including nano-technology, transgenic and molecular marker technologies.

Cropping systems research and simulation based forewarning and forecast models:

Growing pulses in mixed or intercropping systems is an age old practice originally intended to minimize the risks of complete loss of the crops, in particular in dry lands, In modern Agriculture, little research has been done to improve output from a intercropping system.

Opportunities exist for increasing pulses growing area by integrating them into intercropping and sequential cropping systems if appropriate techniques combined with forewarning of forecasting models for productivity, cost reduction and demand planning are developed.

Pulses food convergent research and action strategy

The proposed pulse food convergent research and action strategy takes individual awareness and crop/farm research as twin anchors and places food at the nexus between agriculture, industry, environment and health systems in a novel solution-oriented approach to science, technology, innovation and development (see figure nearby).

(adapted from Boye, Global PIP workshop, 2016)

The approach combines pull and push efforts to foster better balance and more reciprocity between traditions and modern technologies and practices within and across crop, farm, food, wellness, health, medicine, and healthcare sectors. Transformation at scale though such strategy is facilitated by digital technologies and anchored into the most cutting edge science and tools from the behavioral, commercial and social sciences.

Authors

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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.

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Dr. Sushil K Chaturvedi, Former Head, Division of Crop Improvement, ICAR-Institute of Pulses Research, Kanpur (India) has vast experience on development of large number of pulses varieties including chickpea. He has worked extensively for management of quality seed production chain. He initiated research on development of extra large seeded kabuli chickpea varieties, varieties for high input management conditions, high temperature & drought tolerance, post emergence herbicide tolerance, and development of varieties for amenability to machine harvesting, etc. As Visiting Scientist, he has served for six months at University of Western Australia. He has participated in different scientific programs held in Canada, Spain, Kenya and Syria. He is PhD in mutation breeding in soybean from GBPUA&T, Pantnagar. He is currently serving as Principal Scientist (Chickpea Breeding) & Nodal Officer (Seed-Hubs) and coordinating quality seed production activities at 150 Seed-Hubs spreaded over 24 states of India.