KEYNOTE THEME E

Biotechnology: A key driver in the canadian canola industry; A farmer's perspective

M. Delage

Delage Farms
Indian Head, SK, Canada

The application of biotechnology in Canola resulted in two major breakthroughs in growing the crop in Western Canada. The first was highly effective broad spectrum post emergent weed control (herbicide tolerance) which allowed for the crop to be grown under minimum tillage. The second breakthrough was the development of hybrid vigor which has resulted in substantially higher yields and stress tolerance. Both breakthroughs have combined for significantly expanded seeded acreage and higher total production which has manifested into a vibrant domestic crushing industry.

KEYNOTE THEME E

Opportunities and challenges for canola in the next 25 years – Carbon and nitrogen fixation and science "fictation"

M. Hartman

Alberta Agriculture and Rural Development
Lacombe, AB, Canada

Over my career spanning about 25 years, I have witnessed dramatic changes in agriculture in western Canada – examples include reduced tillage seeding systems, engineered herbicide tolerance in canola, hybrid canola, short rotations and challenging new pests such as clubroot disease. I expect the next 25 years to be equally exciting. I am honored to give this keynote lecture on opportunities and challenges for canola. Drawing on my career experiences, I will narrow my focus to three topics: carbon and nitrogen fixation, and social perceptions of agricultural technology. I will briefly review the progress and potential for capturing the benefits of increasing atmospheric concentrations of the plant mega-nutrient, CO_2. Secondly, I will review progress in improving nitrogen use uptake, efficiency and biological fixation for *brassica* species. Given the interplay and feedback between plant C and N metabolism, there will need to be coordinated improvements in photosynthesis and N efficiency to achieve the best yield gains. Finally I will discuss the hurdles new technology faces in agriculture due to poor science knowledge of the general public, the ability of the internet to disperse information regardless of truth or fiction, reluctance of scientists to engage in social media on agricultural issues, and the poor public knowledge on risk perspectives versus benefit.

KEYNOTE THEME E

Rapeseed: Economic trends and prospects

F. Isermeyer

Johann Heinrich
von Thünen-Institute
Braunschweig, Germany

The paper looks at economic aspects of rapeseed production and use on a global scale. The development of the rapeseed branch is assessed against the background of other agricultural branches, the global oilfruit branch and especially the "G4" (palm, soybeans, rapeseed, sunflower).

The rapeseed branch has developed very successfully. Since 1990, world production has almost tripled, caused both by an increase in rapeseed acreage (average: 3 percent per annum) and by an increase in rapeseed yields (average: 1.5 percent per annum). Within the oilfruit branch, only palm oil achieved higher growth rates. In contrast, grain acreage experienced almost no growth in recent decades.

Especially in the last decade (from 2000), the strong growth of the oilfruit branch was heavily pushed by the non-food segment. Between 2001 and 2011, the non-food use of vegetable oils („G4") increased by 39 mio. t., while the food us increased only by 17 Mio. t. (feed use: +83 mio. t).

Meanwhile, global production of biodiesel has reached a level of about 27 bn. liters. This is equivalent to approximately 15 percent of global vegetable oil production, 1.5 percent of global diesel consumption and 0.15 percent of global energy consumption.

European producers are worried about possible changes in biofuel legislation which may severly deteriorate the economc prospect of rapeseed-derived biodiesel. Yet even in an extreme scenario with no EU-rapeseed-derived biodiesel at all, prospects for European rapeseed production would remain rather positive. As the global markets for vegetable oil are closely interrelated, excess rapeseed oil from the EU would find its way into the growing global markets for vegetable oil. In this scenario, the EU would become a net exporter of rapeseed. Even though this would result in a certain deterioration of EU farm gate-prices, on many EU locations farmers would regard rapeseed still profitable enough to keep it in their crop rotation.

In the global competition against soybeans, the position of rapeseed is negatively affected be the weak eceonomic performance of rapeseed meal against soybean meal. If policy support for biodiesel would be cut back in future, the performance of the protein component might gain economic importance.

KEYNOTE THEME E

P. Jorasch

Bundesverband Deutscher Pflanzenzüchter e.V.
Kaufmannstraße, Bonn, Germany

EU-policy on intellectual property, new tools in plant breeding and access to plant genetic resources. Impact on innovation and competitiveness in rapeseed breeding and commercialization

Plant breeding consists in creating ever new combinations of best traits from different plants in new, innovative and improved plant varieties. It is therefore necessary for plant breeders to be able to start from the prior achievements of other plant breeders by using their varieties. They need access to plant genetic diversity. Having said this, a key issue for plant breeders worldwide is government policy for intellectual property protection (IP), access to and use of plant genetic resources (PGR) and new technologies.

Within the underlying conflict between protection of intellectual property rights on the one hand and the need for access to genetic diversity on the other hand, a balanced IP system is vital. Plant variety protection with its breeders' exemption is such a balanced protection system whereas the patent system is much more restrictive. With their decisions in the so called broccoli and tomato cases, the European Patent Office extended the scope of patent protection to conventional breeding.

The EU regulation 511/2014 on the implementation of the Nagoya Protocol is shaping the legal framework under which access and use of plant genetic resources are allowed. Excessive obligations for documentation and the restriction of the breeders' exemption are negatively affecting EU scientists and breeding companies.

The latest breeding methods like genome editing, cisgenesis or reverse breeding allow plant breeders to create new and better varieties faster and more precise. Unnecessary regulation and associated costs might impede the utilization of these breeding methods and with that innovation in plant breeding as such.

KEYNOTE THEME E

P. MacDonald

Canadian Food Inspection Agency, Ottawa, ON, Canada

The plant with novel trait approach, its history and what it has meant for the commercialization of GM canola in Canada

The OECD was among the first to articulate some of the core principles for GMO environmental risk assessment in the Blue Book in 1986. In Canada, consultations with the scientific community endorsed the OECD principles as an approach to the environmental risk assessment of a GMO, then went further to say that the method used to produce a plant with a novel trait was not as important as the consequences of the introduction of a novel trait to a species. This input from scientists has resulted in the unique Canadian product based "plant with novel trait" (PNT) approach that despite the wider scope, effectively addresses regulatory issues such as how to deal with some of the emerging techniques for plant breeding that do not meet the regulatory definitions in more process based regulations yet may still result in plants with novel traits that a competent authority wishes to regulate. The Canadian approach to regulatory oversight has had a direct impact on the canola industry. Canada grows about 11.3 million acres of canola per year, primarily in western regions, making it the largest single producer country. Of that acreage, almost 95% is sown to herbicide tolerant lines, and a herbicide tolerant crop could be considered as a plant with a novel trait (PNT) and trigger regulation regardless of the whether it was produced using the methods of modern biotechnology or more traditional means such as mutation breeding. Science remains the foundation of regulatory oversight of PNTs in Canada and a recently published paper by Canadian regulators highlights the evolution in regulatory thinking (Schnell J. et al 2015) and steps towards modernization of the comparative safety assessment of PNTs

Jaimie Schnell, Marina Steele, Jordan Bean, Margaret Neuspiel, Cécile Girard, Nataliya Dormann, Cindy Pearson, Annie Savoie, Luc Bourbonnière, and Philip Macdonald

A comparative analysis of insertional effects in genetically engineered plants: considerations for pre-market assessments

Transgenic Res. 2015; 24: 1–17.

KEYNOTE THEME E

Designing canola's future: The prospects and opportunities

P.W.B. Phillips

Johnson-Shoyama
Graduate School of Public Policy
University of Saskatchewan
Saskatoon, SK, Canada

Canola is in many ways a designer crop, having been deliberately selected and bred for its oil and meal properties. Since that first step to designing the future, the biosciences, the industrial food system and farmers have successfully positioned canola as one of the healthiest, most flexible and most sustainable crops in the global agri-food system. This talk will review the roots of this transformation, examine the current opportunities and threats and assess the feasibility of continuing to meet and exceed the food, agronomic and industrial needs for the crop.