



# GCIRC News

International Consultative Group for Research on Rapeseed

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## Editorial

### Growing Opportunities for Rapeseed/Canola Protein

*It is well known that while rapeseed (canola) is a highly valued source of vegetable oil, it is also a potentially important source of high value protein. Research has shown that biological value of this protein is equivalent or superior to many other plant proteins, including soybean.*

*However, the high level of fiber (due primarily to the hull) along with other anti-nutritional components such as phenolic, phytic acid and glucosinolates have reduced the value of the protein-rich rapeseed/canola meal that remains subsequent to the extraction of the oil. Furthermore, the most common method for processing rapeseed/canola for its oil involves extraction through the use of organic solvents followed by high temperature toasting of the meal. The outcome of this process results in low availability of the protein and thus the meal is limited primarily to ruminant (especially dairy cattle) feed along with some limited rationing in swine and poultry feed. Because of these limitations, rapeseed/canola meal is heavily discounted against soybean meal representing a significant lost opportunity for an important source of protein.*

*The current and future global situation in terms of increased population (approximately 10B by 2050) and the rapidly growing middle class in Asia, associated with an increased demand for meat is resulting in a rapidly increasing demand for plant protein for both feed and food. Rapeseed/canola offers a strategically important source of protein to address this growth in demand. Beyond the traditional use of rapeseed meal in cattle feed rations there is a growing opportunity for poultry and swine feed, aquaculture, pet food, and, of course, food for human dietary needs. Advances being made in genetics and plant breeding as well as processing technologies offer an excellent opportunity for moving rapeseed/canola protein to be utilized in new ways and this increases economic value of the crop and the industry including the farmers who grow the crop.*

*In Canada, as part of the new national innovation agenda, a program was initiated in 2017 to establish five strategic superclusters. One of these, Protein Industries Canada (PIC) was successful in a national competition and has received funding support of \$150M (over five years) which will be matched by at least equal levels of industry funding. The vision for PIC is 'to position Canada globally as a leading source of high-quality plant protein and plant-based co-products, while substantially contributing to Canada's growth and international trade balance.' Canola along with pulse crops (peas, lentils) will be a major target system for the development of a high value protein and ingredient industry. General information on the PIC supercluster is available at [www.proteinindustriescanada.ca](http://www.proteinindustriescanada.ca)*

*The Canadian canola research community holds an annual two-day event ('Canola Week') early in December (i.e. Canola Industry Meeting, Canola Innovation Day). In December 2018 a special*



session on canola protein opportunities was organized to discuss new/emerging opportunities. This event might be viewed as a first step in building community interest with the ultimate goal of a submission of a consortium proposal for funding support from PIC. Information on future canola week events will be available at [www.agwest.sk.ca](http://www.agwest.sk.ca).

It should also be noted that a number of conferences are being organized to provide opportunities for gaining new information and for business development and partnership opportunities on the topic of plant proteins. The Bridge2Food Protein Summit series is an excellent example of relevant conferences. The 2018 summit in Lille, France brought together representatives from private and public organizations to discuss opportunities in the plant protein area (including rapeseed/canola proteins). An overview along with highlights is available in Appendix A. I am pleased to note that the Bridge2Food protein summit series will be held for the first time in Western Canada with a meeting in Saskatoon May 29-31 (<https://bridge2food.com/summits/plant-protein-ingredients-summit/>) followed by a second event in Calgary, June 3-5 (<https://bridge2food.com/summits/plant-based-foods-north-america/>).

In Canada through a range of research and innovation initiatives, canola protein opportunities are being addressed. A few examples are given here. Corteva Agriscience is in the process of developing canola varieties with elevated protein content under the title of 'ProPound'. Such varieties might be viewed as a desirable starting point for protein extraction and purification initiatives. There is growing industry engagement with companies such as Burcon NutraScience ([www.burcon.ca](http://www.burcon.ca)) undertaking work to purify and evaluate canola protein isolates. Ongoing research in public laboratories includes work on modification of canola seed protein properties and utilizing genetics to increase the feasibility of dehulling as a first step in recovering high quality protein. The Canola Council of Canada ([www.canolacouncil.org](http://www.canolacouncil.org)) is actively supporting research initiatives to improve canola protein quality and thereby increasing the overall value of the crop.

Addressing the challenges and opportunities in developing a rapeseed/canola protein industry will most certainly require international cooperation and collaboration. This could represent an opportunity for future meetings sponsored by the GCIRC and, of course, at future International Rapeseed Congresses. Rapeseed/canola protein opportunities will be, of course, discussed at the upcoming International Rapeseed Congress in Berlin ([www.irc2019-berlin.com](http://www.irc2019-berlin.com)).

**Dr Wilfred KELLER**

Member of the GCIRC board and former president

President & CEO of Ag-West Bio Inc., Saskatoon, Canada



## Activity/News of the association:

### The 15th International Rapeseed Congress, Berlin, June 16-19, 2019

Venue: Berlin Congress Center (bcc), Alexanderplatz, Berlin; "Flowering for the Future".  
<https://www.irc2019-berlin.com/>

Latest News from the 15th International Rapeseed Congress 2019 (IRC 2019):

The Program Committee has finished the review process regarding the abstracts submitted for the following topics: 1) Genetics, Genomics and Breeding; 2) Diseases and Pests, Plant Protection; 3) Agronomy and Crop Science; 4) Analysis, Use of Products; 5) Rapeseed/Canola for Human Nutrition; 6) Rapeseed/Canola for Animal Nutrition; 7) Economy and Market; 8) Mustard and other cruciferous oilseed crops.

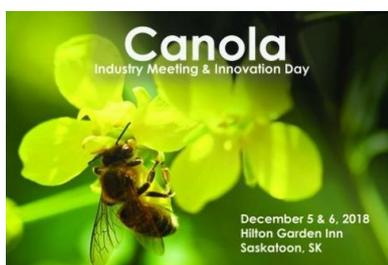
The organizers are pleased to inform the rapeseed/canola community that 178 papers have been nominated for oral presentation and 350 for poster presentation. The final program will be published by end of April. In the meantime, please find an overview of the IRC 2019 program status online: <https://www.irc2019-berlin.com/program>.

The IRC congress will come up with several workshops in addition to the parallel thematic sessions, to go deeper into the discussion. The workshop topics include: Agronomy, Blackleg, Clubroot, Sclerotinia, Insects and Rapeseed protein. If you are interested in participating, please let us know.

So far, 700 participants are registered for IRC 2019 – with large delegations from China, Canada, France, Poland, UK, USA and Australia. Registration is still possible and very welcome, please follow the link: <https://register.irc2019-berlin.com/IRC2019>.

For information/Local Organizing Committee : [info@irc2019-berlin.com](mailto:info@irc2019-berlin.com)

### Canola Week and GCIRC



Canola Week, held in Saskatoon, Canada, on December 4-6, 2018, provided an opportunity for Prof Wolfgang Friedt, president of GCIRC, to present the GCIRC and introduce the next Rapeseed Congress in Berlin to the Canadian Canola community during the international session of the Canola Industry Meeting. Other international guests that delivered presentations about canola in their countries were Dale Thorenson from US Canola Association, and Rod Mailer on



the Australian Oils research. Canola week was also an opportunity for the general secretary Etienne Pilorgé to make the GCIRC better known by the researchers and actors of the Canadian canola value chain, thanks to the help of Dr Wilf Keller, former president of GCIRC, and his team.



*Lunch and discussion between GCIRC board members during the Canola Week. From right to left: Rod mailer (Australia), Wolfgang Friedt (Germany), Wilf Keller (Canada), Etienne Pilorgé (France)*

Short reports of the Canola Industry Meeting is available in the “Value Chain and Regional News” section and the Canola Innovation Day in the “Scientific News” section.

### **Clare Youngs passing**

October 23, 1926 - February 18, 2019

Clarence George YOUNGS, October 23, 1926 - February 18, 2019

Clarence Youngs passed peacefully February 18, 2019, in Saskatoon. He was born on a farm near Didsbury, Alberta, and attended Melvin Country School and high school in Didsbury. He received a scholarship to attend the University of Alberta, where he graduated from Chemical Engineering. After graduation, he took a position with the newly formed National Research Council (NRC) in Saskatoon in 1948, where he subsequently received his Master's and PhD in Chemical Engineering.

During his 35 years with the NRC, he and his colleagues developed canola as an edible oil. He was instrumental in the introduction of pulse crops to Canada, and their milling and processing around the world. After his retirement from the NRC, he sustained a keen interest in science, learning and theorizing about the cosmos, astrophysics, and the universe.



## Scientific News

### Brassica 2018 – 21<sup>st</sup> Crucifer Genetics Conference St Malo, France



This Conference organized in St-Malo (1-4 July 2018) included in 5 sessions and 2 workshops (Nitrogen use efficiency, clubroot). More than 200 participants from 20 countries attended. Here are some highlights.

The first session was devoted to the genome organization and genome editing. It was introduced by a description by D. Edwards on the recent advances in plant genomics and bioinformatics, and how these technologies can be used.

Works on Pangenome are developing compiling several sequenced genomes gradually replaces the reference genomes, and the genome cores. The pangenomes are more informative and offer possibilities to better understand the diversity of the Brassica species.

A part of the session was devoted to new genomic techniques: applications of CRISPR/CAS9, TDTP / GDTP (Transcriptome / Genome Display Tile Plots) developed by an English team (Zhesi He / Lenka Havlickova) to visualize the structural variations of the genome in *B.napus*, comparison of sequencing techniques.

The session on Genetic Diversity, Epigenetics, Selection and Biotechnology paid attention to increasing the genetic diversity of rapeseed. It began with two presentations by INRA IGEPP, France, on the use and interest of the triploid pathway in rapeseed breeding (A Pelé, A-M Chèvre). From the AAC pathway (AA X AACC), the presence of the C genome makes it possible to modify the rate and the distribution of cross overs (CO) on the A genome, 3 to 4 times more, and more at the level of centromeres, usually low in CO. Similar conclusions seem to be confirmed for the CCA pathway. Both pathways are likely to produce fertile AACC plants, and thus select genes of interest in areas where there was little CO. AAFc populations (from *B. rapa*) were more fertile than CCAs. The obtained material is already used by breeders for NUE, diseases, pests ...

Several presentations focused on epigenetics. Of particular note, Liégard presented a demonstration of a natural epimutation, which impacted the sensitivity / resistance of *Arabidopsis* to cruciferous clubroot. It thus contributed to a diversity of quantitative responses to the pathogen. Identified epialleles were stable, common in the natural population, and hypomethylated

epiallels were recessive, and conferred broad-spectrum resistance. Other studies examined *L. maculans*.

Genetic studies about winterization were also present. Among them, a poster Alahakoon *et al.* showed that an overexpression of the ACBP6 gene in rapeseed (by genetic modification), which made rapeseed more tolerant of cold and freezing even without acclimation to cold.

Gravot *et al.* (poster) investigated phytochemical diversity in rapeseed on the basis of a 250 accessions panel, and analysis of endogenous and volatile secondary compounds, including glucosinolates, phenolic compounds and low molecular weight terpenes. Methodological developments dedicated to the analysis of rare compounds was in progress. A phytochemical map of accessions is expected at the end of the project.

A session and a workshop were devoted to Nitrogen use efficiency (NUE) and abiotic stresses. Poisson *et al.* presented a study on sulfur: environmental policies have reduced industrial emissions in S, resulting in a reduction of S availability. Climate change, with increasing spring temperatures, also raises questions about the management of S fertilization. A model was proposed to simulate the growth and S status of winter rapeseed at spring under different scenarios and climatic conditions in 7 countries (including Dijon for France). The simulations were carried out with the SuMoToRi model from 2015 to 2099 with two contrasts S+ and S- on biomass. They highlighted a shortening crop cycle in relation to increased temperatures, which was associated with a decrease in plant biomass as temperatures increased and that the daily incident radiation decreased, but not the S content of leaves (mainly sulphate). These simulations demonstrated the increased risk of overfertilization by S, which can lead to environmental problems such as S-leaching due to the presence of high S in the senescent leaves.

Concerning NUE, Dechaumet *et al.* undertook a metabolomic profiling in rapeseed in relation to leaf development and resource allocation to better understand the metabolome of sink and source organs, as well as the metabolic adjustments associated with senescence operate under different environmental regimes. The study focused on metabolites C and N and showed metabolic adjustments to nutritional stresses: water stress counteracts the traditional pathways of nutrient recycling and there is a strong N \* water interaction in the plant's ability to manage / regulate these stresses.

In the session "New generation phenotyping, plant growth and development", Rolland *et al.* presented the development and validation of an infrared spectroscopy model to predict the nitrogen and carbon content in rapeseed tissues. Fiorani Fabio presented an infrastructure for quantitative 2D, 3D and 4D analyzes, and an overview of advanced methodologies for non-invasive phenotyping in a controlled environment and proximal or remote field detection, with a Focus on EPPN - European Plant phenotyping network. Andrew Sharpe presented the "Plant Phenotyping and Imaging Research Center" (P2IRC) based in Canada (<https://p2irc.usask.ca/>).

In the session on "Seed and product quality", Iwona Bartkowiak-Broda (Poland) presented the Polish-German ProRapeSeed project that aims at creating new rapeseed cultivars for poultry,



high in protein, with less fiber. The first step of the project is the creation of a pool of 200 lines based on the content of nutritional and anti-nutritional compounds, and then association genetic analysis to identify the MQ and candidate genes for selection.

Concerning Clubroot, Gary Peng *et al.* (Canada) presented work on gene sustainability: a selection of 12 lines including 1 to 3 resistance genes tested in controlled conditions to study the durability of these genes. After 5 crop cycles some lines (those with 3 genes) still exhibited partial resistance. The concentration of resting spores was measured in the soil: it decreased for genotypes with several genes but remains constant for those with a single gene. These results raised the question of the impact of the quantitative resistance on these major genes. Also in Canada (Rudolph Fredua-Agyeman *et al.*), the exploration of clubroot resistance in brassica species against different isolates (old and recent) was initiated: *B. nigra* showed 34.9% R resistant and 23.8% MR moderately resistant, *B. oleracea* 6.2% R, 7.7% MR, *B. rapa* 6.2% R, 1.5% MR, *B. napus* 1.5% R, 3.1% MR, *B. carinata* 100% S sensible, *B. juncea* 100% S. Leading to only 1 *rapa*, 1 *napus*, 2 *nigra* with a PI <30% .

The RAPHKORE project (Diederichsen *et al.*, German team) aims to i) identify sources of clubroot resistance in *Raphanus*, ii) better know the isolates present in radish, iii) develop population mapping.

Several works on *L. maculans* were presented in the session "Resistance to pathogens and insects, biocontrol and crop protection", especially in Canada where a strategy is being implemented to better manage the Phoma (blackleg) issue, with the integration of new R genes into varieties, and the creation of a new "resistance" label. Genetics to be used during rotation are recommended to limit resistance degradation.

## 2018 Canola Week's Canola Innovation Day in Saskatoon, Canada

The Genomics and Predictions session was rather rich with presentations on genetics, genomics, and applications with several international speakers. Among the some of the original ideas, C Werner, of the University of Edinburgh, proposed to apply to crop species the principles of predictive selection, which are used in the animal sector. There were also more "classic" presentations on phenotyping devices, an update on regulation, and the Canadian approach to regulating "Novel traits" (which include GMOs) and - by the way - will probably be more appropriate and effective than the European approach for taking care of the outputs of CRISPR/CAS9 type technologies. The use of these technologies is very promising in some key areas for the future: efficiency of photosynthesis (given the short Canadian growing season, the economic interest is high), water use efficiency, and control of crop cycle phases for better adaptation to climatic conditions.

The Protein / Processes / Feed / Food session showed a strong research effort on proteins: the investment made in the Protein Initiative Canola reaches Can \$ 300 million over 5 years. D.



Hegedus's (AAFC) talk focused on the exploration of the diversity of rapeseed and cruciferous proteins, going well beyond the crude division between cruciferin and napine and concluding on the sources of value to be exploited. Samah Garinger's (Avril Group) presentation focused on the processes currently under patent, whether used or not, and their applications and room for improvement. In terms of challenges and strategies for economic valuation. J. House (University of Manitoba) asked the question of the evaluation of nutritional values, starting with the protein content: what is the real value of the nitrogen and protein conversion coefficient for canola? Also, developments on the subject of improving the quality of cakes by the action of fungies, and the evaluation of the economic interest in the fractionation of cakes, were presented.

## OMEGA-3 SUMMIT 2018

### Global Summit on Nutrition, Health and Human Behaviour - Science, Market and Policy Update



**Omega 3 Summit 2018:** The Omega 3 summit took place on 29-30 October, 2018, in Brussels, Belgium, and was opened by Prof Michael Crawford (London Imperial College) with an overview of the impact of Omega 3 fatty acids on neuronal development and degeneration. Several presentations concerned aquaculture and sustainable omega 3 sourcing. The website of the SFEL – Société Française d'Etude des Lipides (French Society for Lipids Studies) contains a short report of this conference at <http://www.sfel.asso.fr/fr/omega-3-summit-2018,article-109.html>

## Publications

### BREEDING & GENETICS

Smit Shah, Nirosha L. Karunarathna, Christian Jung and Nazgol Emrani. An APETALA1 ortholog affects plant architecture and seed yield component in oilseed rape (*Brassica napus* L.). *BMC Plant Biology* 2018;18:380. <https://doi.org/10.1186/s12870-018-1606-9>

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LI Hai-tao LI Juan-juan SONG Ju-rong ZHAO Bo GUO Chao-cheng WANG Bo ZHANG Qing-hua WANG Jing LIU Ke-de. An auxin signaling gene *BnaA3.IAA7* contributes to the ideal plant



architecture and yield heterosis in rapeseed. <http://cpfd.cnki.com.cn/Article/CPFDTOTAL-CSSC201811003085.htm>

Hongbo Chao, Nadia Raboanatahiry, Xiaodong Wang, Weiguo Zhao, Li Chen, Liangxing Guo, Baojun Li, Dalin Hou, Shi Pu, Lina Zhang, Hao Wang, Baoshan Wang, Maoteng Li. Genetic dissection of harvest index and related traits through genome-wide quantitative trait locus mapping in *Brassica napus* L. <https://doi.org/10.1270/jsbbs.18115>

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Jian Wu, Peipei Chen, Qing Zhao, Guangqin Cai, Yue Hu, Yang Xiang, Qingyong Yang, Youping Wang, Yongming Zhou. Co-location of QTL for *Sclerotinia* stem rot resistance and flowering time in *Brassica napus*. *The Crop Journal*, 2019. <https://doi.org/10.1016/j.cj.2018.12.007>

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- Li Ma, Jeffrey A. Coulter, Lijun Liu, Yuhong Zhao, Yu Chang, Yuanyuan Pu, Xiucun Zeng, Yaozhao Xu, Junyan Wu, Yan Fang, Jing Bai, Wancang Sun. Transcriptome Analysis Reveals Key Cold-Stress-Responsive Genes in Winter Rapeseed (*Brassica rapa* L.). *Int. J. Mol. Sci.* 2019, 20(5), 1071; <https://doi.org/10.3390/ijms20051071>
- Deepika Verma, Neha Lakhanpal, Kashmir Singh. 2019. Genome-wide identification and characterization of abiotic-stress responsive SOD (superoxide dismutase) gene family in *Brassica juncea* and *B. rapa*. <https://doi.org/10.1186/s12864-019-5593-5>
- PREPRINT: Antonis Kioukis, Vassiliki A. Michalopoulou, Laura Briers, Stergios Pirintsos, David J. Studholme, Pavlos Pavlidis, Panagiotis F. Sarris. Draft Genome Sequence and intraspecific diversification of the wild crop relative *Brassica cretica* Lam. using demographic model selection. <https://doi.org/10.1101/521138>

#### PhD Thesis:

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## CROP PROTECTION

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B. Congdon, P. Matson, F. Begum, T. Dore, M. Kehoe and B. Coutts. <https://www.researchgate.net/publication/331521139> Turnip yellows virus epidemic in 2018 - time to get one step ahead of the green peach aphid

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## AGRONOMY

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## Value chain and Regional News

From the 2018 Canola Week's Canola Industry Meeting in Saskatoon, Canada

### 1) Canada

After a global presentation of the canola sector, the session "Industry Strategy and Updates" was dedicated to the presentations from life-science companies: a communication exercise presenting their activities in service of producers and the canola value-chain. These were of importance in the restructuring context: the purchase of Monsanto by Bayer, the investment by BASF of the Inviofr canola business, the creation of Corteva - which joins Pioneer, Dupont, Dow and Granular - and also the investments of foreign companies in development (Nuseed, DLSeeds). The session was started by Jim Everson (Canola Council of Canada - CCC) who presented the role of the Canola Council and its progress towards its 2025 strategy: 90% of the Canadian production is sold on global market, and CC has a role in advising Canadian negotiators, and works in policy channels. The CCC's crop production team supports the dialogue with China about blackleg contaminations, market access issues and the internal regulations (breeding, seed treatments...). The CCC also coordinates a steering committee on clubroot, blackleg, sclerotinia, crop nutrition and lime to encourage research coordination and developing best management practices on these issues. The CCC spends \$5 million CAN on canola research yearly, but the overall budget was decreasing (5,8M€ in 2018 / 7,8 M€ in 2017) due to the withdrawal of some industrial actors. The promotion of canola is operated in mature markets with a brand strategy and promoted in emerging markets like Korea and Vietnam.

The next session was dedicated reports on the results of the 2018 canola crop in Canada: crop production issues, climatic hazards, quality of production. There was a precise focus on clubroot, which continues to progress, and on the field work aimed to deal with this disease. Bruce Gossen presented an "Agronomy update from the International Clubroot Workshop": Clubroot continues to spread, mainly by soil infested equipment and spreading to nearby fields. From the technical point of view, soil pH>7.5 "reduces clubroot infestation, but the relation is very weak ( $R^2=0,11$ )"; a reduction of 90% of inoculum in 3 years has been observed showing the importance of longer rotations; the fumigation/ solarization works better with a film, but very expensive and the attempts of biocontrol and seed treatments did not work. In fact, no single approach appears to be effective, including genetic resistance. Gary Peng offered a report from the International Clubroot Workshop on genetics works: at least 11 clubroot Resistance (CR) loci have been identified, and 2 have been cloned. The precise location is not clear. Several come from turnip (line Siloga). The International consortium for gene nomenclature deals with a key issue: works in China showed that with the classical tests of William, 4 pathotypes are identified... and 12 can be distinguished with differential sets.

In Canada, the Alberta Agriculture and Forestry works for screening on *B rapa* and *B. nigra*, with 23 isolates/ 300 accessions, and on transcriptomics in *B napus* upon clubroot infection. There are also collaborations developed to work on partial resistance with the French team in Rennes,



France. Gary Peng concluded that there are limited resources as CR genes, there are a number of *P. brassicae* pathotypes, and that there is a need of CR genes deployment strategies.

The session "Special topics" offered perspectives about GMOs: evolution of consumer preferences with a key question on GMOs and food uses of proteins, and issues for international trade (Peter Slade, university of Saskatchewan). There were also interesting presentations on neonicotinoids (between regulation and pressure of professionals), and on the possible accumulation of glyphosate in soils, with quantified results, which is quite rare information (Charles Geddes, AAFC Lethbridge).

## **2) Australia:**

Rod Mailer, Australian Oils Research, gave a talk on some elements of the 2018 canola crop in Australia, at Canola Week. Canola is grown in SW, NW and SE parts of Australia. In 2018, New South Wales experienced huge drought problems, and most of the canola crop was ploughed in or cut as fodder. As a result, the acreage decreased from 2,9Mha in 2017/17 to 1,5Mha in 2018/19. The trend in Australia is to produce high oleic and low linolenic varieties. Canola in Australia includes *B napus*, *B rapa*, and *B juncea* species, and the Australian quality standard is similar to Canada.

## **3) USA**

Dale Thorenson, representing the US Canola Association presented the main trends of canola in US.

Canola started in 1992 and reached 2 million acres (approx.; 810 000 ha) in 2018, the crop growth is correlated to Canadian production. The increase in canola consumption has been higher than in production. 75% of the canola crop is grown near the Canadian border, in North Dakota, Montana and Minnesota. The majority of the crop is spring-type cultivars but there are some 200 000 acres of winter canola in the high-plains regions of the US in Kansas and Oklahoma.

In North Dakota, the largest producing canola state, canola is in competition with other oil crops: in 2000, soya, canola and sunflower were quite close. Sunflower acres have decreased because of birds' damage down to 400,000 acres. Soybeans acreage in North Dakota has increased to 6 – 7 million acres in recent years compared to 1.5 million acres for canola. Canola could increase by up to 1 million acres in the US if growers along the Canadian border divert acreage from soybeans and pulse crops because of depressed prices as a result of tariffs.

## **3) France: following the historic fall of rapeseed areas in France and in Europe, upheavals are to be expected for the 2019/2020 marketing campaign. (source: La Lettre des Oléopros Terres Univia, Jan 2019)**

The intense drought in the summer and early autumn has impacted rapeseed sowings, and then the emergence in all the production areas, except for the north-west of the Paris basin. The current national sole of rapeseed, after possible destruction of the fields in the poorest



conditions, would thus be in very strong withdrawal, of 30% compared to the harvest 2018. It would be around 1.1 million ha (against nearly 1, 6 million ha in 2018) according to the estimates of Terres Univia and Terres Inovia from various sources of operators. The situation will have to be evaluated again after winter to refine the 2019 crop projections. Nevertheless, early planting of rapeseed - before August 15th - carried out in association with legume companion plants, seemed to be better off. Perhaps a trail for the future? This technique develops significantly. According to the latest survey on cultivation practices by Terres Inovia (2018 harvest), it would be practiced on about 10% of the national crop, in strong growth compared to the previous survey in 2014.

## Upcoming International and national events

**5-8 May, 2019: AOCs Annual Meeting**, St Louis, Missouri, USA. <http://annualmeeting.aocs.org/>

**5-6 June, 2019 Agri Biostimulants 2019**. Rome, Italy. <https://agribiostimulants.com/>

**16-19 June, 2019 15th International Rapeseed Congress, Berlin, “Flowering for the Future”**

<https://www.irc2019-berlin.com/>



**7-10 July 2019, 9th European Symposium on Plant Lipids** Marseille, France

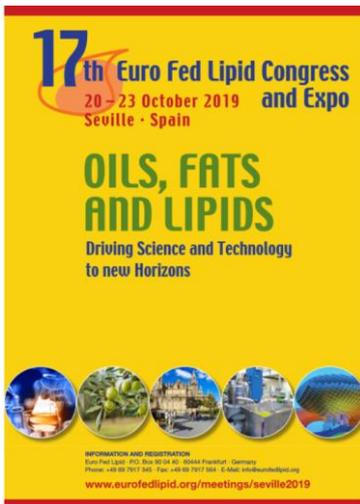
**18-21 September 2019: European Conference on crop diversification**. Budapest, Hungary.

<https://www.cropdiversification2019.net/call-for-abstracts.html>

**20-23 October 2019 17th Euro Fed Lipid Congress and Expo**. Sevilla, Spain

[https://veranstaltungen.gdch.de/tms/frontend/index.cfm?l=8455&sp\\_id=2](https://veranstaltungen.gdch.de/tms/frontend/index.cfm?l=8455&sp_id=2)





9-12 February 2020. World congress on oils and fats 2020. Sidney, Australia.



***We invite you to share information with the rapeseed/canola community: let us know the scientific projects, events organized in your country, crop performances or any information of interest in rapeseed/canola R&D.***

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