



# GCIRC News

International Consultative Group for Research on Rapeseed

*April 2019*

## Table des matières

<b>Editorial</b> .....	2
Growing Opportunities for Rapeseed/Canola Protein .....	2
<b>Activity/News of the association:</b> .....	4
The 15th International Rapeseed Congress, Berlin, June 16-19, 2019 .....	4
Canola Week and GCIRC .....	4
<b>Scientific News</b> .....	6
Brassica 2018 – 21 <sup>st</sup> Crucifer Genetics Conference St Malo, France .....	6
2018 Canola Week's Canola Innovation Day in Saskatoon, Canada .....	8
<b>Publications</b> .....	9
BREEDING & GENETICS .....	9
CROP PROTECTION .....	12
AGRONOMY .....	13
PROCESSING and USES .....	16
ECONOMY and MARKET .....	18
<b>Value chain and Regional news</b> .....	19
<b>Upcoming International and National events</b> .....	21



## 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.

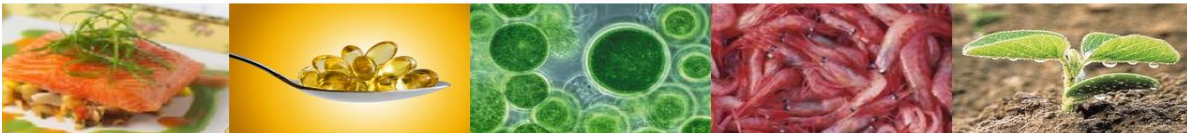




Hegedus's (AAFC) talk focused on the exploration of the diversity of rapeseed and cruciferous proteins, going well beyond the crude division between cruciferin and napine and concluding on the sources of value to be exploited. Samah Garinger's (Avril Group) presentation focused on the processes currently 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. Karunaratna, 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>

Aysha Kiran, Abdul Wakeel, Rod Snowdon, Wolfgang Friedt. Genetic dissection of root architectural traits by QTL and genome-wide association mapping in rapeseed (*Brassica napus*). *Plant Breeding*. <https://doi.org/10.1111/pbr.12665>

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>

Liang Chai, Haojie Li, Jinfang Zhang, Lintao Wu, Benchuan Zheng, Cheng Cui, Jun Jiang, Shangqi Zuo, Liangcai Jiang. 2019. Rapid Identification of a Genomic Region Conferring Dwarfism in Rapeseed (*Brassica napus* L.) YA2016-12. <https://doi.org/10.3390/agronomy9030129>

Hongtao Cheng Jia Liu Mengyu Hao Bingli Ding Wenxiang Wang Rijin Zhou Wen Chu Hui Wang Qiong Hu . Functional characterization of pod shattering related genes in *Brassica napus*. <http://cpfd.cnki.com.cn/Article/CPFDTOTAL-CSSC201810002106.htm>

Liulu Shi, Jurong Song, Chaocheng Guo, Bo Wang, Zhilin Guan, Pu Yang, Xun Chen, Qinghua Zhang, Graham J. King, Jing Wang, Kede Liu. A CACTA-like transposable element in the upstream region of *BnaA9.CYP78A9* acts as an enhancer to increase silique length and seed weight in rapeseed. <https://doi.org/10.1111/tpj.14236>

Harsh Raman, Rosy Raman, Yu Qiu, Avilash Singh Yadav Singh Yadav, Sridevi Sureshkumar, Lauren Borg, Rohan Maheswaran, Dave Wheeler, Ollie Ovens, Ian Menz, Sureshkumar Balasubramanian. 2019. GWAS hints at pleiotropic roles for FLOWERING LOCUS T in flowering time and yield-related traits in canola. <https://doi.org/10.1101/539890>

Yajun He, Dingxue Hu, Jingcan You, Daoming Wu, Yixin Cui, Hongli Dong, Jiana Li, Wei Qian, Genome-wide association study and protein network analysis for understanding candidate genes involved in root development at the rapeseed seedling stage. *Plant Physiology and Biochemistry*, 2019. <https://doi.org/10.1016/j.plaphy.2019.01.028>

Yijuan Ding , Jiaqin Mei, Qinan Wu, Zhiyong Xiong, Yuehua Li, Chaoguo Shao, Lei Wang, Wei Qian. Synchronous improvement of subgenomes in allopolyploid: a case of *Sclerotinia* resistance improvement in *Brassica napus*. *Mol Breeding* (2019) 39: 10. <https://doi.org/10.1007/s11032-018-0915-x>

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>

O. L. Klyachenko, L. M. Prysiachniuk, N. V. Shofolova, O. V. Piskova. Polymorphism in spring and winter rapeseed varieties (*Brassica napus* L.) identified by SSR markers <https://doi.org/10.21498/2518-1017.14.4.2018.151898>

Alina Liersch, Jan Bocianowski, Wiesława Popławska, Laurencja Szała, Katarzyna Sosnowska, Teresa Cegielska-Taras, Kamila Nowosad, Marcin Matuszczak, Iwona Bartkowiak-Broda. Creation of gene pools with amplified fragment length polymorphis markers for development of winter oilseed rape (*Brassica napus* L.) hybrid cultivars. *Euphytica* (2019) 215: 22. <https://doi.org/10.1007/s10681-019-2350-4>



- Michelle L. Colgrave, Keren Byrne, Sapna Vibhakaran Pillai, Bei Dong, Antonio Leonforte, Joanne Caine, Lukasz Kowalczyk, Judith A. Scoble, James R. Petrie, Surinder Singh, Xue-Rong Zhou. 2019. Quantitation of seven transmembrane proteins from the DHA biosynthesis pathway in genetically engineered canola by targeted mass spectrometry. *Food and Chemical Toxicology*. <https://doi.org/10.1016/j.fct.2019.02.035>.
- Jun Liu, Wanjun Hao, Jing Liu, Shihang Fan, Wei Zhao, Linbing Deng, Xinfu Wang, Zhiyong Hu, Wei Hua, Hanzhong Wang. A Novel Chimeric Mitochondrial Gene Confers Cytoplasmic Effects on Seed Oil Content in Polyploid Rapeseed (*Brassica napus*). 2019. <https://doi.org/10.1016/j.molp.2019.01.012>.
- Liyun Miao, Hongbo Chao, Li Chen, Hao Wang, Weiguo Zhao, Baojun Li, Libin Zhang, Huaixi Li, Baoshan Wang, Maoteng Li. 2019. Stable and novel QTL identification and new insights into the genetic networks affecting seed fiber traits in *Brassica napus*. <https://doi.org/10.1007/s00122-019-03313-4>
- Ling Xu, Wujing Zeng, Juanjuan Li, Hui Liu, Guijun Yan, Ping Si, Chong Yang, Ying Shi, Qiuling He, Weijun Zhou. Characteristics of membrane-bound fatty acid desaturase (FAD) genes in *Brassica napus* L. and their expressions under different cadmium and salinity stresses. *Environmental and Experimental Botany*, 2019. <https://doi.org/10.1016/j.envexpbot.2019.02.016>
- Raman H., Uppal R.K., Raman R. (2019) Genetic Solutions to Improve Resilience of Canola to Climate Change. In: Kole C. (eds) *Genomic Designing of Climate-Smart Oilseed Crops*. Springer, Cham. [https://doi.org/10.1007/978-3-319-93536-2\\_2](https://doi.org/10.1007/978-3-319-93536-2_2)
- 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:

- Arif Uz Zaman, Muhammad. Delineating Root System Architecture in Rapeseed/Canola (*Brassica napus* L.) through Molecular and Transcriptomic Approaches. North Dakota State University, ProQuest Dissertations Publishing, 2018. 10980707
- Gabur, Iulian. 2018. Genome structural variation associates with fungal quantitative disease resistance in oilseed rape (*Brassica napus* L.). <http://geb.uni-giessen.de/geb/volltexte/2019/14040/>



Habib U. Jan, Mei Guan, Min Yao, Wei Liu, Dayong Wei, Amine Abbadi, Ming Zheng, Xin He, Hao Chen, Chunyun Guan, Richard A. Nichols, Rod J. Snowdon, Wei Hua, Lunwen Qian. Genome-wide haplotype analysis improves trait predictions in Brassica napus hybrids. Plant Science, 2019, <https://doi.org/10.1016/j.plantsci.2019.02.007>

## CROP PROTECTION

Nicholas E. Korres, Nilda R. Burgos, Stephen O. Duke. Weed Control: Sustainability, Hazards, and Risks in Cropping Systems Worldwide. Chapter by PJW Lutman: Sustainable weed control in oilseed rape. CRC Press, 19 déc. 2018 - 664 pages

Xiaorong Zheng, Daniel Teshome Lopisso, Alice Bisola Eseola, Birger Koopmann, Andreas von Tiedemann. 2019. Potential for seed transmission of Verticillium longisporum in oilseed rape (Brassica napus L.). <https://doi.org/10.1094/PDIS-11-18-2024-RE>

B. D. Gossen, F. Al-Daoud, T. Dumonceaux, J. A. Dalton, G. Peng, D. Pageau, M. R. McDonald. 2019 Comparison of techniques for estimation of resting spores of Plasmodiophora brassicae in soil. <https://doi.org/10.1111/ppa.13007>

David Lane Matthew Denton-Giles Mark Derbyshire Lars G. Kamphuis. Abiotic conditions governing the myceliogenic germination of Sclerotinia sclerotiorum allowing the basal infection of Brassica napus. Australasian Plant Pathol. (2019) 48: 85. <https://doi.org/10.1007/s13313-019-0613-0>

Juliana Soroka, Larry Grenkow, Boyd Mori, Lars Andreassen. 2019. Injury by Contarinia (Diptera: Cecidomyiidae) to early-seeded and late-seeded canola in northeastern Saskatchewan, Canada, and assessment of seed treatments for midge control. <https://doi.org/10.4039/tce.2018.68>

Chaminda De Silva Weeraddana, Maya L. Evenden. 2019. Herbivore-induced plants do not affect oviposition but do affect fitness of subsequent herbivores on canola. <https://doi.org/10.1111/eea.12762>

Mori, B., Andreassen, L., Heal, J., Dupuis, J., Soroka, J., & Sinclair, B. (2019). A new species of Contarinia Rondani (Diptera: Cecidomyiidae) that induces flower galls on canola (Brassicaceae) in the Canadian prairies. The Canadian Entomologist, 1-18. <https://doi.org/10.4039/tce.2018.63>

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

A. Zwolińska, K. Krawczyk, N. Borodynko-Filas, H. Pospieszny. Non-crop sources of Rapeseed Phyllody phytoplasma ('Candidatus Phytoplasma asteris': 16Srl-B and 16Srl-(B/L)L), and closely related strains. Crop Protection, <https://doi.org/10.1016/j.cropro.2018.11.015>

Rong Lei, Jun Kong, Yanhong Qiu, Naizhong Chen, Shuifang Zhu, Xinyi Wang, Pinshan Wu. Rapid detection of the pathogenic fungi causing blackleg of Brassica napus using a portable real-



time fluorescence detector. Food Chemistry.  
<https://doi.org/10.1016/j.foodchem.2019.02.089>.

## AGRONOMY

- Xiu-li Tian, Cheng-bao Wang, Xing-guo Bao, Ping Wang, Xiao-fei Li, Si-cun Yang, Guo-chun Ding, Peter Christie, Long Li. Email author. Crop diversity facilitates soil aggregation in relation to soil microbial community composition driven by intercropping. *Plant Soil* (2019).  
<https://doi.org/10.1007/s11104-018-03924-8>
- Tang Tang, GuiMin Chen, FuXia Liu, CuiPing Bu, Lei Liu, XiangXiang Zhaà. 2019. Effects of transgenic glufosinate-tolerant rapeseed (*Brassica napus* L.) and the associated herbicide application on rhizospheric bacterial communities.  
<https://doi.org/10.1016/j.pmpp.2019.03.004>.
- M Galic, M Mesic, A Percin, I Sestak, Z Zgorelec . Sulphur Balance in Agroecosystem. *Bulgarian journal of Soil Science*. [http://www.bsss.bg/issues/Issue2\\_2018/BJSS\\_2018\\_2\\_3.pdf](http://www.bsss.bg/issues/Issue2_2018/BJSS_2018_2_3.pdf)
- Li Wang, Qiuxia Liu, Xiaoyan Dong, Yi Liu, Jianwei Lu. Herbicide and nitrogen rate effects on weed suppression, N uptake, use efficiency and yield in winter oilseed rape (*Brassica napus* L.). <https://doi.org/10.1016/j.gecco.2019.e00529>
- Victor R. Bodnar, Josh Lofton, Misha R. Manuchehri and Anna D. Zander. 2019. Impact of Late-Season Herbicide Applications on Winter Canola Yield and Seed Quality.  
<https://doi.org/10.2134/age2018.10.0053>
- Rozhgar Mustafa Ahmed . Oil Percent and Unsaturated Fatty Acid Response of Rapeseed Cultivars to Nitrogen and Phosphorus Fertilizers in Two Different Sowing Dates.  
<https://www.iasj.net/iasj?func=article&aid=155313>
- Bao-Luo Ma, Zhiming Zheng, Joann K. Whalen, Claude Caldwell, Anne Vanasse, Denis Pageau, Peter Scott, Hugh Earl, Don L. Smith. 2019 Uptake and nutrient balance of nitrogen, sulfur, and boron for optimal canola production in eastern Canada. *Journal of Plant nutrition and Soil Science*. <https://doi.org/10.1002/jpln.201700615>
- Katrin Drastig, Teresa Suárez Quiñones, Mohammad Zare, Karl-Heinz Dammer, Annette Prochnow. Rainfall interception by winter rapeseed in Brandenburg (Germany) under various nitrogen fertilization treatments. *Agricultural and Forest Meteorology*, 2019.  
<https://doi.org/10.1016/j.agrformet.2019.01.027>
- Bieker, S.; Riester, L.; Doll, J.; Franzaring, J.; Fangmeier, A.; Zentgraf, U. Nitrogen Supply Drives Senescence-Related Seed Storage Protein Expression in Rapeseed Leaves. *Genes* 2019, 10, 72. <https://doi.org/10.3390/genes10020072>
- Maryam Kholghi, Mahmoud Toorchi, Ali Bandehagh, Anna Ostendorp, Steffen Ostendorp, Patricia Hanhart, Julia Kehr. Comparative proteomic analysis of salt-responsive proteins in canola roots by 2-DE and MALDI-TOF MS. *Biochimica et Biophysica Acta (BBA) - Proteins and Proteomics*. <https://doi.org/10.1016/j.bbapap.2018.12.009>



- Hashem, H.A.; Mansour, H.A.; El-Khawas, S.A.; Hassanein, R.A. The Potentiality of Marine Macro-Algae as Bio-Fertilizers to Improve the Productivity and Salt Stress Tolerance of Canola (*Brassica napus* L.) Plants. *Agronomy* 2019, 9, 146. <https://doi.org/10.3390/agronomy9030146>
- Catherine Champagne, Jenelle White, Aaron Berg, Stephane Belair and Marco Carrera. 2019. Impact of Soil Moisture Data Characteristics on the Sensitivity to Crop Yields Under Drought and Excess Moisture Conditions. <https://doi.org/10.3390/rs11040372>
- A. Moradi Aghdam, S. Sayfzadeh, A.H. Shirani Rad, S.A. Valadabadi, H.R. Zakerin. The assessment of water stress and delay cropping on quantitative and qualitative traits of rapeseed genotypes. *Industrial Crops and Products*, 2019. <https://doi.org/10.1016/j.indcrop.2019.01.051>.
- Khan, M.N., Zhang, J., Luo, T. et al. Morpho-physiological and biochemical responses of tolerant and sensitive rapeseed cultivars to drought stress during early seedling growth stage. *Acta Physiol Plant* (2019) 41: 25. <https://doi.org/10.1007/s11738-019-2812-2>
- LIU Li-xin XIONG Jun-lan LI Jun CHEN Chang ZHANG Chun-lei . Exogenous application of AM1 improves drought stress tolerance in rapeseed (*Brassica napus* L.). <http://cpfd.cnki.com.cn/Article/CPFDTOTAL-CSSC201811003064.htm>
- Dilip Biswas, Baoluo Ma, Malcolm John Morrison. 2019. Changes in leaf nitrogen and phosphorus, photosynthesis, respiration, growth and resource use efficiency of a rapeseed cultivar as affected by drought and high temperature. <https://doi.org/10.1139/CJPS-2018-0023>
- Ahmar, S., Liaqat, N., Hussain, M., Salim, M. A., Shabbir, M. A., Ali, M. Y., Noushahi, H. A., Bilal, M., Atta, B., & Rizwan, M. (2019). Effect of Abiotic Stresses on Brassica Species and Role of Transgenic Breeding for Adaptation. *Asian Journal of Research in Crop Science*, 3(1), 1-10. <https://doi.org/10.9734/aircs/2019/v3i130037>
- Maliba, B.G., Inbaraj, P.M. & Berner. 2019. The Use of OJIP Fluorescence Transients to Monitor the Effect of Elevated Ozone on Biomass of Canola. *Plants J.M. Water Air Soil Pollut* (2019) 230: 75. <https://doi.org/10.1007/s11270-019-4124-y>
- Uddin, S., Parvin, S., Löw, M. et al. *Plant Soil* (2019). Water use dynamics of dryland canola (*Brassica napus* L.) grown on contrasting soils under elevated CO<sub>2</sub>. <https://doi.org/10.1007/s11104-019-03987-1>
- Justyna Boniecka, Karolina Kotowicz, Edyta Skrzypek, Kinga Dziurka, Monika Rewers, Iwona Jedrzejczyk, Emilia Wilmowicz, Julia Berdychowska, Grażyna B. Dąbrowska. Potential biochemical, genetic and molecular markers of deterioration advancement in seeds of oilseed rape (*Brassica napus* L.). *Industrial Crops and Products*. <https://doi.org/10.1016/j.indcrop.2018.12.098>
- S Schwabe, E A Weber, S Gesell, S Gruber, W Claupein. Overcoming seed dormancy in oilseed rape (*Brassica napus* L.) with exogenous compounds. *Weed Research*. <https://doi.org/10.1111/wre.12346>
- Marine PORET, Balakumaran CHANDRASEKAR, Sylvain DECHAUMET, Alain BOUCHEREAU, Tae-Hwan KIM5, Bok-Rye LEE, Flavien MACQUART, Ikuko HARA-NISHIMURA, Renier A. van DER HOORN, Jean-Christophe AVICE. A genotypic comparison reveals that the improve-



ment in nitrogen remobilization efficiency in oilseed rape leaves is related to specific patterns of senescence-associated protease activities and phytohormones. *Front. Plant Sci.* | <https://doi.org/10.3389/fpls.2019.00046>

KA Wynne – 2018. A Systems-Based Approach to Improve Expanding Canola Production in Texas. Texas A&M university Libraries. <https://oaktrust.library.tamu.edu/handle/1969.1/174612>

Jenelle White, Aaron A. Berg, Catherine Champagne, Jon Warland, Yinsuo Zhang. 2019. Canola yield sensitivity to climate indicators and passive microwave-derived soil moisture estimates in Saskatchewan, Canada. <https://doi.org/10.1016/j.agrformet.2019.01.004>

Julianne M. Lilley, Bonnie M. Flohr, Jeremy P.M. Wish, Imma Farre, John A. Kirkegaard. 2009. Defining optimal sowing and flowering periods for canola in Australia. *Field Crops Research*. <https://doi.org/10.1016/j.fcr.2019.03.002>

Tássia C. Confortin, Izelmar Todero, Luciana Luft, Gustavo A. Ugalde, Marcio A. Mazutti, Zandra B. Oliveira, Eduardo L. Bottega, Alberto E. Knies, Giovani L. Zobot, Marcus V. Tres. Oil yields, protein contents, and cost of manufacturing of oil obtained from different hybrids and sowing dates of canola. *Journal of Environmental Chemical Engineering*, 2019, <https://doi.org/10.1016/j.jece.2019.102972> (Brazil)

Pieter M.F. Elshout, Rosalie van Zelm, Marijn van der Velde, Zoran Steinmann, Mark A.J. Huijbregts. Global relative species loss due to first-generation biofuel production for the transport sector. *Global Change Biology BIOENERGY*. <https://doi.org/10.1111/gcbb.12597>

Groenbaek M, Tybirk E, Neugart S, Sundekilde UK, Schreiner M and Kristensen HL (2019) Flavonoid Glycosides and Hydroxycinnamic Acid Derivatives in Baby Leaf Rapeseed From White and Yellow Flowering Cultivars With Repeated Harvest in a 2-Years Field Study. *Front. Plant Sci.* 10:355. <https://doi.org/10.3389/fpls.2019.00355>

### **Modelling:**

Dong Li ; Xiujuan Wang ; James C Trask ; Baogang Lin ; Dongqing Zhang. The variability of plant branching and structural properties: data analysis and modeling investigation of winter oilseed rape (*Brassica napus*). <https://doi.org/10.1109/PMA.2018.8611620>

Lian Wu, Xuan Zhu, Roger Lawes, David Dunkerley & Heping Zhang (2019) Comparison of machine learning algorithms for classification of LiDAR points for characterization of canola canopy structure, *International Journal of Remote Sensing*, <https://doi.org/10.1080/01431161.2019.1584929>

Chipanshi AC, Qi D, Zhang Y, Lin H, Newlands NK (2019) Prediction of canola and spring wheat yield based on the Canadian Meteorological Centre's monthly forecasting system. *Clim Res* 77:155-165. <https://doi.org/10.3354/cr01547>

Niedbała, G. Application of Artificial Neural Networks for Multi-Criteria Yield Prediction of Winter Rapeseed. *Sustainability* 2019, 11, 533. <https://doi.org/10.3390/su11020533>

Anna Sikorska, Marek Gugala, Krystyna Zarzecka. RESPONSE OF WINTER RAPESEED TO BI-OSTIMULATOR APPLICATION AND SOWING METHOD PART I. FIELD ARCHITECTURE ELE-



MENTS. PART II. SEED YIELD COMPONENTS.  
<http://actatest.utp.edu.pl/index.php/agricultura/article/view/127>  
&  
<http://www.agricultura.acta.utp.edu.pl/index.php/agricultura/article/view/128>

## PROCESSING and USES

### Processes, oil, proteins

- Zhigao Wang, Rui Xue Zhang, Cheng Zhang, Caixia Dai, Xingrong Ju, and Rong He. Fabrication of stable and self-assembling rapeseed protein nanogel for hydrophobic curcumin delivery. *J. Agric. Food Chem.*, Just Accepted Manuscript <https://doi.org/10.1021/acs.jafc.8b05572>
- Kalaydzhev, H., Ivanova, P., Stoyanova, M. et al. Valorization of Rapeseed Meal: Influence of Ethanol Antinutrients Removal on Protein Extractability, Amino Acid Composition and Fractional Profile Waste Biomass Valor (2019). <https://doi.org/10.1007/s12649-018-00553-1>
- Nitzia Thalía Flores-Jiménez, José Armando Ullo, Judith Esmeralda Urías, Silvas José Carmen Ramírez Ramírez, Petra Rosas Ulloa, Pedro Ulises Bautista Rosales, Yessica Silva Carrillo, Ranferi Gutiérrez Leyva. Effect of high-intensity ultrasound on the compositional, physicochemical, biochemical, functional and structural properties of canola (*Brassica napus* L.) protein isolate. *Food Research International*. <https://doi.org/10.1016/j.foodres.2019.01.025>
- G Yadavalli, H Lei, Z Yang, Y Zhang. Alkaline Separation of Protein from Canola Meal and Its Kinetic Study. <https://scienceforecastoa.com/Articles/SJMCE-V2-E1-1011.pdf>
- Chloé Amine, Adeline Boire, Alice Kermarrec, Denis Renard. Associative properties of rapeseed napin and pectin: Competition between liquid-liquid and liquid-solid phase separation. *Food Hydrocolloids*. <https://doi.org/10.1016/j.foodhyd.2019.01.026>
- Rong He, Yi-Jie Yang, Zhigao Wang, Chang-rui Xing, Jian Yuan, Li-Feng Wang, Chibuike Udenigwe & Xing-Rong Ju. Rapeseed protein-derived peptides, LY, RALP, and GHS, modulates key enzymes and intermediate products of renin-angiotensin system pathway in spontaneously hypertensive rat. <https://doi.org/10.1038/s41538-018-0033-5>
- Xiao Andreas Fetzer, Thomas Herfellner, Peter Eisner. 2019. Rapeseed protein concentrates for non-food applications prepared from pre-pressed and cold-pressed press cake via acidic precipitation and ultrafiltration. <https://doi.org/10.1016/j.indcrop.2019.02.039>
- yangXia, Xia Xiang, Fenghong Huang, Zhen Zhang, Ling Han. Dietary canolol induces apoptosis in human cervical carcinoma HeLa cells through ROS-MAPK mediated mitochondrial signaling pathway: In vitro and in vivo. <https://doi.org/10.1016/j.cbi.2019.01.016>
- Mohamed.A.Fouad.M.Gaber, Francisco J.Trujillo, Maged Peter Mansour, Cheryl Taylor, Pablo Juliano. 2019. Megasonic-assisted aqueous extraction of canola oil from canola cake. <https://doi.org/10.1016/j.ijfoodeng.2019.02.017>





- Kate J Bowen Penny M Kris-Etherton et al 2019. Oleic Acid Canola Oils Lower Atherogenic Lipids and Lipoproteins Compared to a Diet with a Western Fatty Acid Profile in Adults with Central Adiposity. <https://doi.org/10.1093/jn/nxy307>
- Monika Beszterda, Małgorzata Nogala-Kałucka. 2019. Current Research Developments on the Processing and Improvement of the Nutritional Quality of Rapeseed (*Brassica napus* L.). <https://doi.org/10.1002/eilt.201800045>
- Lucia Zeleňáková, Mária Angelovičová, Marek Šnirc, Jana Žiarovská, Stanislav Kráčmar, Branislav Gálik, Simona Kunová. 2019. Thermo-degradative changes of rapeseed and sunflower oils during deep-frying French fries. <https://doi.org/10.5219/1080>
- Miao Zhang, Chang Zheng, Mei Yang, Qi Zhou, Wenlin Li, Changsheng Liu, Fenghong Huang. Primary Metabolites and Polyphenols in Rapeseed (*Brassica napus* L.) Cultivars in China. AOCs 2019. <https://doi.org/10.1002/aocs.12179>
- X Ma, X Li, F Chen, W Chen, X Wan, F Huang. Isolation and characterization of melanin derived from rapeseed meal. OIL CROP SCIENCE, 2019, <https://doi.org/10.3969/j.issn.2096-2428.2019.01.004>
- Yanxia Cong, Ling-Zhi Cheong, Fenghong Huang, Chang Zheng, Chuyun Wan, Mingming Zheng. 2019. Effects of microwave irradiation on the distribution of sinapic acid and its derivatives in rapeseed and the antioxidant evaluation. <https://doi.org/10.1016/j.lwt.2019.03.048>

## Feed

- Malau-Aduli AEO, Nguyen DV, Le HV, Nguyen QV, Otto JR, Malau-Aduli BS, et al. (2019) Correlations between growth and wool quality traits of genetically divergent Australian lambs in response to canola or flaxseed oil supplementation. PLoS ONE 14(1): e0208229. <https://doi.org/10.1371/journal.pone.0208229>
- J.V.Judy, G.C.Bachman, T.M.Brown-Brandl, S.C.Fernando, K.E.Hales, K.J.Harvatine, P.S.Miller, P.J.Kononoff. Increasing the concentration of linolenic acid in diets fed to Jersey cows in late lactation does not affect methane production. Journal of Dairy Science <https://doi.org/10.3168/jds.2018-14608>
- Dervan D.S.L. Bryan, Dawn A.Abbott, Henry L.Classen. Digestion kinetics of protein sources determined using an in vitro chicken model. Animal Feed Science and Technology <https://doi.org/10.1016/j.anifeedsci.2019.01.002>
- C. Muñoz, R. Sánchez, A.M.T. Peralta, S. Espíndola, T. Yan, R. Morales, E.M. Ungerfeld. Effects of feeding unprocessed oilseeds on methane emission, nitrogen utilization efficiency and milk fatty acid profile of lactating dairy cows. Animal Feed Science and Technology, 2019. <https://doi.org/10.1016/j.anifeedsci.2019.01.015>
- Yujia Tian, Xuwei Zhang, Peiqiang Yu. 2019. Protein molecular structure, degradation and availability of canola, rapeseed and soybean meals in dairy cattle diets. <https://doi.org/10.5713/ajas.18.0829>

## Non Food-non Feed



M AKGÜL, I ERDÖNMEZ, M ÇİÇEKLER, A TUTUŞ. The Investigations on Pulp and Paper Production with Modified Kraft Pulping Method from Canola (*Brassica napus* L.) Stalks. Kastamonu Univ., Journal of Forestry Faculty <https://doi.org/10.17475/kastorman.499091>

Damian Konkol, Ida Szmigiel, Marta Domżał-Kędzia, Marek Kułczyński, Anna Krasowska, Sebastian Opaliński, Mariusz Korczyński, Marcin Łukaszewicz. 2019. Biotransformation of rapeseed meal leading to production of polymers, biosurfactants, and fodder. <https://doi.org/10.1016/j.bioorg.2019.03.039>

#### **Storage:**

Daeung Yu, Bijay Shrestha, Oon-DooBaik . 2019. Computer simulation of heat transfer for disinfestation of red flour beetle, *Tribolium castaneum* (Herbst) in stored canola seeds (*Brassica napus* L.) by radio frequency heating. <https://doi.org/10.1016/j.eaef.2019.02.007>

#### **Analyses :**

Chernova A, Mazin P, Goryunova S, Goryunov D, Demurin Y, Gorlova L, Vanyushkina A, Mair W, Anikanov N, Yushina E, Pavlova A, Martynova E, Garkusha S, Mukhina Z, Savenko E, Khaitovich P. 2019. Ultra-performance liquid chromatography-mass spectrometry for precise fatty acid profiling of oilseed crops. PeerJ 7:e6547 <https://doi.org/10.7717/peerj.6547>

Claire Defaix, Arnaud Aymes, Sara Albe Slabi, Mélody Basselin, Christelle Mathé, Olivier Galet, Romain Kapel. A new size-exclusion chromatography method for fast rapeseed albumin and globulin quantification, 2019. <https://doi.org/10.1016/j.foodchem.2019.01.209>

Lirong Xu, Xu Li, Jianhua Huang, Pan Gao, Qingzhe Jin, Xingguo Wang. 2019. Rapid Measuring Flavor Quality Changes of Frying Rapeseed Oils using a Flash Gas Chromatography Electronic Nose. <https://doi.org/10.1002/ejlt.201800260>

Jun-Ge Song, Chen Cao, Jinwei Li, Yong-Jiang Xu, and Yuanfa Liu. 2019. Development and Validation of a QuEChERS-LC-MS/MS Method for the Analysis of Phenolic Compounds in Rapeseed Oil. <https://doi.org/10.1021/acs.jafc.9b00029>

## **ECONOMY and MARKET**

Carla Caldeira, Omar Sweil, Fausto Freire, Luis C.Dias, Elsa A.Olivetti, Randolph Kirchain. 2019. Planning strategies to address operational and price uncertainty in biodiesel production. <https://doi.org/10.1016/j.apenergy.2019.01.195>

X Zhang, M Hong, L Luo, R Guo. Challenges and suggestions of Chinese rapeseed industry. O11L CROP SCIENCE, 2019, <https://doi.org/10.3969/j.issn.2096-2428.2019.01.001>



## 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.

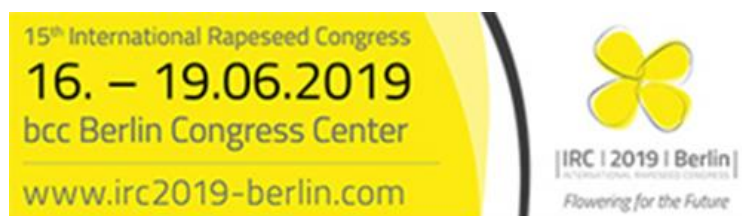
## Upcoming International and national events

**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

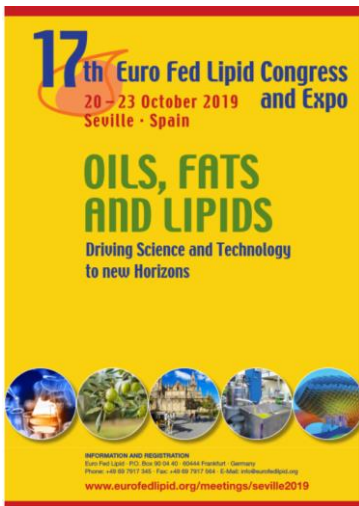
**18-21 September 2019: European Conference on crop diversification**. Budapest, Hungary.

<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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