GCIRC News

Global Council for Innovation in Rapeseed and Canola

"Building a World community for Innovation on Rapeseed and Canola"

N° 13, October 2022

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Editorial

Greetings and welcome to GCIRC Newsletter #13, October 2022.

With the war in Ukraine entering its ninth month, we continue to see constraints on oilseeds supplies in that region. Our thoughts are with our colleagues in Ukraine who are resiliently maintaining supply chains for oilseeds and veg oils under the most challenging conditions.

With harvest all but wrapped up in the Northern hemisphere the final production numbers of rapeseed/canola are expected to be close to forecast numbers from the June report.
Reports from the Northern grain zone of Western Australia, canola harvest has begun with good yields and oil from these early crops. Expectations are that will continue across all growing regions in Australia as harvest ramps up over the coming weeks. I look forward to seeing country crop reports in this newsletter.

It is pleasing to see many regions of the world getting back to a more normal post COVID environment which is very good news for everyone who have been keen to participate in face-to-face conferences, rather than on-line as it has been for the past two years. I hope this trend continues as we move into 2023 and September for IRC-16 in Sydney.
Personally, I am looking forward to seeing many delegates come down under.

At our last GCIRC board meeting (19th September) Terres Inovia presented their formal application to host IRC-17 in Paris in 2027. I must congratulate and commend them on a comprehensive presentation that will deliver an excellent Congress four years after Sydney.
It was also pleasing to hear that Canada is keen to host IRC-18 in 2031 in Winnipeg. Imagine what will be front and centre in the research space for rapeseed / canola in 9 years' time, no matter what the challenges may be, I have no doubt the outcomes will be exciting and cutting edge. Can we dare to dream "flying to IRC-18 on planes fuelled by rapeseed oil".

Robert Wilson, GCIRC President

Activity/News of the association

IRC-16 Sydney 2023 – September 24-27, Australia

It is now only 11 months until IRC-16 Congress. Planning and execution have certainly ramped up, and *'Global Crop – Golden Opportunities'* is progressing well.

Congress Executive Committee - meeting regularly, hitting timelines for activities.

- Congress venue booked
- Key major Sponsors secured
- Early Bird Registration going live this month
- Budget (ongoing)
- Plenary and Keynote topics defined, and Keynote Speakers being considered (Government, Industry etc.)
- Website live
  https://www.ircsydney2023.com

Thematic Committee Chairs - (Australia) finalised, local committee members on-board and international participants being engaged. These Committees will prepare the program including list of potential plenary speakers and manage the review of submitted abstracts.

- GENETICS, GENOMICS and BREEDING Chair: Prof Wallace Cowling
- CROP PROTECTION Chair: Prof Jacqui Batley
- AGRONOMY, PHYSOLOGY & CROP MANAGEMENT Chair: Dr John Kirkegaard
- QUALITY & PRODUCTS Chair: Dr Allan Green
  Science and technical focus on oil and protein for food, feed & industrial
- END USE / CONSUMPTION Chair: Nick Goddard
  Current needs from end users for - food, feed, and fuels
- ECONOMY & MARKETS Chair: Rosemary Richards
  Big picture on global oils and fats markets/climate/policies

Call for Abstracts: This will open in the coming weeks – watch your inbox for notifications.

Pre-congress Field Tour Committee – Core members engaged, planning underway.

We look forward to welcoming as many friends and colleagues as possible to Australia in September 2023. Remember, Sydney ***– "it's closer than you think."***

For further info go to https://www.ircsydney2023.com

Welcome to New GCIRC members

Since last June we have welcomed seven new members:

MEENA	**Prabhu Dayal**	ICAR	INDIA
VISSCHER	**Brittany**	Alberta Canola	CANADA
LINDENBACK	**Kayla**	Univ Saskatoon	CANADA
TIKOO	**Surinder Kumar**	Tierra Agrotech Ltd	INDIA
GUO	**Liangxiao**	Huazhong Agricultural University	CHINA
SAMENOVA	**Gulmira**	Osterras	KAZAKHSTAN
BRAND	**René**	Norddeutsche Pflanzenzucht Hans-Georg Lembke KG	GERMANY

You may visit their personal pages on the GCIRC website directory, to better know their fields of interest. We take this opportunity to remind all members that they can modify their personal page, especially indicating their fields of interest to facilitate interactions.

GCIRC Technical Meeting 2021: Proteins session

On September 28th and 29th, 2021, the GCIRC held online its Technical Meeting initially scheduled to be in Poznan (Poland). It focussed on two thematic issues: «insect pest management in rapeseed, technical situation and research progress towards sustainable control» (see GCIRC Newsletter N°12) and «rapeseed protein production and added value: research issues from agronomy to product quality and process».

This session on rapeseed protein was coordinated and moderated by **Dr Veronique Barthet**, of the Canadian Grain Commission. Here is the report of this session.

Véronique Barthet introduced the session by reminding the context for Rapeseed/ Canola and protein production: the FAO predicts an increase in protein need by 50-80% in the next decade to feed the entire world population. This is not new, but we have not been able to solve this issue until now. Looking at the Canadian canola 10-year average (dry basis): oil seed content progressed from 47.6 to 49.4% and protein from 21.3 to 23.3% for a meal protein range from 37.4 to 44.4%. Not taking into account canola protein means that over 20% of the seed or 40% of the meal is not used. Breeding efforts are needed to break the inverse relationship between oil and protein contents. Conventional canola processing has also an effect on the protein quality of the meal, especially on thermo-sensitive amino acids. Furthermore, when looking at canola protein for human nutrition and food, the taste of canola proteins is influenced by phenolics and glucosinolates.

On an economic point of view, **David Szisiak** (Botaneco)'s talk presented the canola's untapped protein potential: 20 million tonnes canola giving about 4 million tonnes protein (in a sustainable production). Today, the plant-based food is not a new trend: consumer attitude towards plant proteins is changing with an increasing protein consumption in middle class population leading to an increase protein demand. These market demands will likely drive new breeding targets: canola genomic being well known, there is a tremendous potential for this crop. New process to preserve seed component quality are also needed to develop new products such as protein isolates or protein concentrates for new markets, e.g. aquaculture (salmon/shrimp), monogastric or human nutrition. As in soybean, concentrating proteins will increase greatly the value of the products.

The presentation of **Rob Gulden** (University of Manitoba) exposed the progress in developing models to know the sources of variation for protein content in canola: what can be controlled and what cannot be controlled. Using Canadian producer data shows that 70% of the protein variations could not be explained by variety, year and location, and explanatory data are missing to develop a good model. Using small plots data, still 30% of the protein content variation could not be explained. Number of days over 28°C in the last 7 weeks, precipitation, night temperatures, plant density, nitrogen appeared important parameters in the regulation of protein content. A negative relationship between stand density and seed protein content has been observed but weather during plant development and N availability played an important role in the seed protein content. Interpretation is still difficult with environmental interactions, controlled or not.

Richard Meyer presented the current situation of research and opportunities in Australia for canola meal as a protein source. At present, Canola meal in Australia is 65% solvent extracted and 35% cold pressed. Canola meal is used for poultry (35%), dairy (26%), pigs (19%), layers (7%) and beef and lamb (6%). Beyond the assessment of Australian brassica germplasm to improve canola meal protein and characterisation of cultivars for oil and protein over different environments, the works on meal quality focuses on the survey of protein fraction of canola meals to establish the true rumen undegradable protein and on assessing the effect of canola meal as a supplement for grazing animals. Increasing canola meal as feed in domestic livestock is a first target, and perspectives concern the use of canola meal and canola oil to reduce methane production by livestock, and the development of value-added products to support human protein nutrition.

Jun Zou, from Huazhong Agricultural University, China, presented the works on the genetic variation for seed protein in a novel gene pool of *Brassica napus*. A new gene pool has been obtained by crossing *B. rapa* (ArAr) and *B carinata* (BcBcCcCc) to create a new *B. napus* (ArArCcCc), adding diversity by crossing with *B juncea* (AjAjBbBb) cultivars, then screening of the various lines by selection and extensive phenotyping. The genetic loci accounting for the seed quality traits (protein) have been identified and compared with conventional *B napus*. Additional cycles of phenotypic and genotypic selection will increase the gene pool allowing to increase the protein. Answering a question about the rapeseed breeding situation in China, Jun Zou specified that in China open pollinated are present, but hybrids are dominant, especially in the main production region of the Yangse river. The primary breeding targets are oil content, yield and oleic acid content. In China, rapeseeds are also grown for feed and works on protein is just starting.

Amine Abbadi (NPZ) presented the situation of rapeseed/canola breeding for quality traits, between re-invention and innovation. Rapeseed protein is not a new topic: in 1970, RK Downey insisted on the need to reduce glucosinolate, fibre, sinapin and polyphenols; 1976, BR Stefanson showed the negative correlation of oil and protein contents and the need to breed for increase protein + oil; and in 1978, G. Rakow worked on reducing fibre content to increase protein content leading to the development of yellow seed canola. By that time, in the early 2000, many works have been initiated on meal and protein quality, antinutrient…a lot of work on the metabolic pathway of sinapin and identifying variations has developed concerning sinapin, and more attention was given to fibre analysis and structure and reducing the content. Either yellow or black seed can present low fibre content, and this has been confirmed by the study of the genetic structure of the trait, with a major QTL on chromosome 9 collocating for fibre compounds, proanthocyanidins, seed colour and phenolic acids. So, breeding for protein content is now made easier without other penalties. For food uses, taste is a major issue. The rapeseed protein taste has a bitter and stringent characteristic, due to kaempherol derivatives. On protein composition, the depletion of napin compared to cruciferin in modern “00” cultivars is associated with low glucosinolates, confirmed by genetic studies. In the last years the protein content and protein yield have been neglected in selection, as it appears in varieties registration trials. Protein content selection is complex, with genetic-environment interactions, and with need genomic selection. Genomics and omics tools which exist now will help accelerate breeding for protein yield and offer new tools for selection of different qualities for food and feed. During the IRC15 in 2015, it was stated that it would be prudent to target improvements in protein content first and then look at protein types and their ratio. Reduction in fibre and glucosinolates could be a third goal resulting in a breeding target of 1% increase in protein content each year (may be achievable), or in a more realistic vision an increase in 1% in protein yield yearly. There is a large variability in protein content in released cultivars and pre-breeding populations, so that 20-22% protein content in rapeseed looks achievable, but we must look to protein yield too, disease resistance…

Soren Krogh Jensen (Aarhus University, Denmark) reported an ambitious study with sensitive animals, on the replacement of milk protein by rapeseed or rice protein concentrates. In fact, this study was both a model study for human diet, and a piglet study. Piglets fed with milk, milk-rice, milk-rapeseed, and rapeseed-rice. The study showed negative effects of the protein extracts containing rapeseed on body weight, bone weight and length, especially when the animals were fed with plant protein only. There was also a decrease in indispensable amino acids in the plasma. No effects were observed on glucose, insulin, growth factors, plasma urea and on genes related to growth and protein metabolism. A lower protein digestibility rate was observed for the protein extracts. This lower digestibility and consumption may have several origins: the feed used was a high protein one, up to 95%, but not pure and there may have been a taste issue, glucosinolates residues or polyphenols issues plus some filling made by the fibres in piglets' stomachs; It was also observed that napin contains a lot of sulfo containing amino acids which are known to be difficult to digest. Piglets are very challenging as animal models as they have a limited feed intake capacity and limited amounts of digestive enzymes. It was concluded that more work is needed on the taste and the nutritional aspects of the canola proteins, including removing some antinutritional compounds, this improvement could be done through breeding and/or process development.

Gertjan Smolders (DSM, Netherlands) reminded us that rapeseed has a very good potential as it is sustainable production. 700 million people could fulfil their protein needs with the actual rapeseed production, so preserving the protein quality during processing is a key issue. A process to produce protein concentrate from rapeseed will be implemented for a commercialized production within one year. This process starts from a cold press cake obtained with processing temperatures <60°C, which is treated to obtain protein concentrate. CanolaPro™ is a protein isolate containing more than 90% protein; its PDCASS is 1 and its DIAAS higher than 100, making CanolaPro™ an excellent protein source with a good amino-acids balance, similar to potato proteins and with no-off flavour. Regarding its functionalities, it is soluble over large pH range as whey protein, and it can be extruded. Due to the process, it is a high price protein, but offering very unique functionalities and nutritional profile. For classical uses, users will turn to standard soybean extract, but CanolaPro™ will target higher price products with high quality. The protein composition is also important, as of now the composition is60% napin and 40% cruciferin, this ratio may be influenced by the process, but it could become a breeding interest.

Regarding the question of the value for the canola producers, there could be a premium for high protein varieties, since it really changes the value of the processing. The minimum technical threshold is 18% protein in seeds, but high protein seeds make the things much easier. A complementary question was asked regarding the use of seeds with low napin content, eg around 20% of proteins: the answer was that on the short term, DSM will not use this type of seeds, as this is a new process entering the market and there is a need for high and stable quality for this new product. However, in the future, different choices could be made for different protein extracts with different targets and end-products.

Amine Abadi remarked that if the breeders have to lower the ratio cruciferin/napin, there will be a problem with glucosinolates, since we know that there is a linkage track between cruciferin and glucosinolates. Some varieties higher in napin content already exist, but is there a compromise with glucosinolates acceptable from the process point of view? G. Smolders considers that glucosinolates are quite easy to remove up to 20 micromoles/g in seeds, when the canola cultivars are around 12 µmol/g and European rapeseed around 18 µmol/g, but not up to mustards levels. Glucosinolates are extracted during the process, coming out with the water. V. Barthet remarked that glucosinolates have also interesting properties and could potentially be valorised in future.

Referring to the previous works in Canada for low fibre varieties as GMO (Dow / Corteva), Veronique Barthet asked about using this system for this protein extract project, or if the GM status prevents to use it. Gertjan Smolders answered that it is a matter of choice, which is very clear for Europe, since GM are not allowed, even if limiting the choice in protein varieties. The question today is how to obtain non-GM varieties, still high protein. From the point of view of the process, the priority is to obtain high protein in meals more than high protein in seeds, since meals are the starting point for the process. With a high efficiency oil extraction, you can also get high protein in meal, but there is a kind of coupling between the two. V. Barthet remarked that actually there are differences in the DSM processing and the one in Canada, which starts from the seed, possibly leading to different answers. A question was asked about the possibility of dehulling seeds before processing to decrease fibre content, but the effect depends on how it can be crushed afterwards, crushing becoming more difficult with dehulled seeds. For feed, the canola meal value will increase when removing the fibre, but also a part of the proteins is lost with the hulls: it might be less favourable as it looks at first.

A question was asked about possible priorities in eliminating antinutrients for the CanolaPro™ process: G. Smolders identifies the polyphenols: even if they are not really an antinutritional factor, they have the nasty characteristic to bind to the proteins during the process. Then come glucosinolates and fibres. Amine Abadi remarked that concerning the reduction of polyphenols, there is a large diversity in the polyphenol's family, and the metabolic pathway is still under study to know the final product to eliminate. A recent study showed that 13 genes were involved for just one enzyme… There is a need for more research on this subject, new genomic tools and reverse genetics will be useful… Concerning the compound which produces the taste we know about the enzyme involved, it is a very tiny compound in concentration, and it might be preferable to eliminate it by processing than breeding. G. Smolders agrees that we have complex issues and that isolating one component is not easy. Another issue is that during the extraction, the polyphenols are not stable, they are active and building slowly intermediates that are even worse than the parent compounds, they make a moving target difficult to analyse. Reducing the levels of polyphenols will help but there is no guarantee that it will solve the problem.

Answering to a question of the taste of Canola protein, G. Smolders said that the rapeseed protein has a quite peculiar taste, a bit stringent with some bitterness, and also a sweetening “liquorous” taste, but it can be totally removed for applications.

The DSM process targets human nutrition, when the Canadian one will be part for aquaculture and human nutrition. Regarding the development of the product, even if the quality of rapeseed protein is known from the 1980ies, food industries are generally reluctant to change their process adapted to standard ingredients, unless a new product brings new functionalities. There may be a delay in the adoption of canola protein by industry, but perspectives are considered promising, especially when we consider that the total protein market is growing tremendously. This will facilitate the adoption of new nutrient sources, notably for specific usages in high value products such as ice creams, senior nutrition and sports nutrition. Sport nutrition needs new products where industry can set new formulation. So far, no rapeseed protein product has been commercialized, it will take time. When/if proteins become a more valuable component, it will create incentives for breeders to increase the protein content in varieties. It could follow the example of whey for the milk industry, which changed from a by-product to a key source of product of high value. E. Pilorgé remarked that plant proteins are unbeatable from the point of view of sustainability and within the background of adaptation to climate change canola protein show very promising perspectives. Wolfgang Friedt asked about the future trends of plant proteins markets between concentrates and isolates. G. Smolders answered that it is a lasting question, especially if we consider that when using the concentrates for food products, we add again oil, fibres, components which were originally present… so why purify so much to obtain isolates? Application of concentrates may be more difficult since they must be tailormade for a specific segment, for example different for uses for a “meat” and an ice cream. For canola specially, it is very difficult to make a concentrate without taste, because you need to remove these antinutritional factors to reach a good product, and for a 70% protein concentrate, it is not so simple to be acceptable for a food market. It is different for feed. Also, for economic reasons, it is necessary to target high value market niche with isolates.

Concerning breeding, **Amine Abadi** concludes that for rapeseed breeding the first priority is protein content, at least for the meal fraction, and then the other things. Breeding takes years, a compromise between protein and oil is needed and there is a need for a regulatory framework and a direction where breeders have to go. Moreover, markets need to recognize that a breeding target needs compromise and could take 10 years. Breeding is an expensive investment which needs a premium. There is a need to develop strategies for the breeders consistent with the products that will be used. We see breeding companies working for many different types of rapeseed canola for small markets: is it a good strategy?

Wolfgang Friedt reminded that it would be good to have different uses because it will also be a prerequirement for genetic diversity. The genetic diversity in rapeseed is already very small and we need to maintain it as much as possible, in reality we need expand it, knowing that we have serious problems with diseases and pests, etc…

Véronique Barthet concluded the session observing that rapeseed canola proteins is a complex issue. Today we look at the breeding and at the processing of the protein, but there is a missing part: the processing of the seed - what could be done to increase the value of the meal, including the process to produce good quality protein. That will be the discussion for a next meeting on Canola processing and Canola meal quality.

Value chains and regional news

World rapeseed Canola production

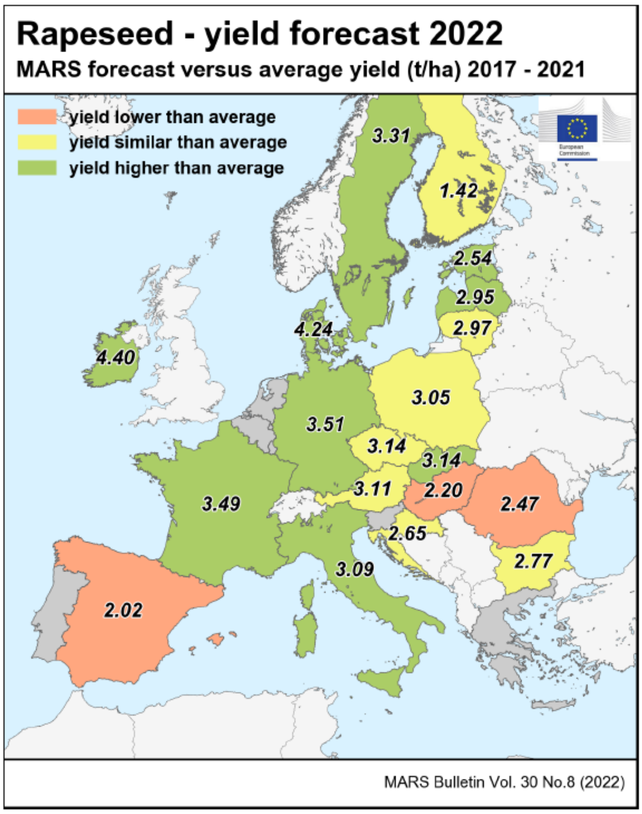
According to the USDA, as reported by UFOP the world rapeseed production would rise to a new record level in 2022, to 82.5 MT, up 14% over 2021/22. With global consumption anticipated to amount to 79.2 million tonnes – 830,000 tonnes more than expected in July and 5.1 million tonnes more than in the previous season – there will be a 3.3 million tonne surplus for the first time in three years and global 2022/23 ending stocks are likely to increase significantly. (See https://www.ufop.de/english/news/chart-week/#kw34_2022)

Europe

In Europe, winter crops have been moderately affected by the hot and dry conditions which prevailed since the beginning of May in many regions. That is the case for rapeseed which is harvested in June and July. It will be different for summer crops heavily affected by the summer drought and very hot temperatures in most EU countries in July and August, of which sunflower whose yield was estimated down 12% in EU compared to 5 years average.

The yield estimates for rapeseed as reported in the JRC MARS Bulletin Vol30 N08, August 2022 (https://publications.jrc.ec.europa.eu/repository/handle/JRC127964 for detailed information per country) are the following:

Country	Rape and turnip rape (t/ha)				
	Avg 5yrs	2021	MARS 2022 forecasts	%22/5yrs	%22/21
EU	3.07	3.19	**3.15**	+ 2.4	– 1.5
AT	3.00	3.04	**3.11**	+ 3.6	+ 2.2
BE	—	—	—	—	—
BG	2.72	2.84	**2.77**	+ 1.7	– 2.8
CY	—	—	—	—	—
CZ	3.16	2.99	**3.14**	– 0.5	+ 4.9
DE	3.33	3.50	**3.51**	+ 5.6	+ 0.3
DK	4.00	4.01	**4.24**	+ 6.0	+ 5.7
EE	2.41	2.74	**2.54**	+ 5.3	– 7.4
EL	—	—	—	—	—
ES	2.14	2.18	**2.02**	– 5.3	– 7.2
FI	1.39	1.20	**1.42**	+ 2.1	+ 18
FR	3.28	3.35	**3.49**	+ 6.3	+ 4.1
HR	2.76	2.42	**2.65**	– 3.8	+ 9.4
HU	2.96	2.81	**2.20**	– 26	– 22
IE	4.22	4.56	**4.40**	+ 4.3	– 3.6
IT	2.80	3.05	**3.09**	+ 10	+ 1.1
LT	2.89	2.91	**2.97**	+ 2.5	+ 1.8
LU	—	—	—	—	—
LV	2.77	2.90	**2.95**	+ 6.8	+ 1.8
MT	—	—	—	—	—
NL	—	—	—	—	—
PL	2.95	3.21	**3.05**	+ 3.5	– 4.9
PT	—	—	—	—	—
RO	2.61	3.09	**2.47**	– 5.4	– 20
SE	3.18	3.24	**3.31**	+ 4.1	+ 2.3
SI	—	—	—	—	—
SK	3.01	3.09	**3.14**	+ 4.3	+ 1.6



According to USDA grain report October 2022, the total EU rapeseed production would be down 200 K tons, at 5500 Ktons.

Canada

In its October release “World agricultural production” USDA <<estimates Canada rapeseed production for marketing year 2022/23 at 19.5 million metric tons (mmt), up 42 percent from last year and 2 percent above the 5-year average. Harvested area is estimated at 8.6 million hectares down 4 percent from last year, and 3 percent below the 5-year average. Yield is estimated at 2.27 metric tons per hectare (t/ha), up 47 percent from last year’s crop which struggled under historic drought.

The rapeseed crop rebounded substantially from last year. Following a slow start to the season due to excessive dryness in the western Prairie region and excessive moisture in eastern Saskatchewan and Manitoba, conditions improved over the summer throughout most of the rapeseed-growing region. However, in its model-based production estimates, released on September 14, Statistics Canada tempered expectations, indicating overall rapeseed yield would be more than 4 percent below the 2016-2020 5-year average. This lower yield expectation stems primarily from Saskatchewan, which typically accounts for 55 percent of the total Canadian rapeseed production. Statistics Canada expects rapeseed yield in Saskatchewan to be 9 percent below its 2016-2020 5-year average.

See more (maps) on USDA World Agricultural production report Oct 2022

Australia

According to AOF, Expectations remain for Australian canola production to exceed the five-year average of 3.7 million tonnes, considering a record area sown (3.425 Mha) and continuing favourable seasonal conditions. The latest AOF Crop Forecast forecasts another near record crop at 5.5 million tonnes if favourable conditions persist.

(For detailed report: http://www.australianoilseeds.com/about_aof/news/record_canola_planting_heralds_another_bumper_crop)

USA

Based on data from the USDA Farm Service Agency (FAS) released on August 22, 2022, U.S. farmers planted a record 2.237 million acres of canola in the spring of 2022. North Dakota leads the top 10 states with 1.76 million planted acres, followed by Montana (167,267 acres); Washington (118,444 acres); Idaho (69,889 acres); Minnesota (66,759 acres); Oklahoma (16,060 acres); Texas (9,459 acres); Kansas (8,129 acres); Oregon (6,970 acres); and Colorado (5,069 acres).

Source September issue of US Canola Association's Canola Quick Bytes (reworded slightly): https://www.uscanola.com/newsletter/canola-quick-bytes-september-2022/

Scientific news

Publications:

Announcement of Special Issue of the journal Pest Management Science on Integrated Control in Oilseed Crops – Deadline 31st October 2022

This special issue is being guest edited by 2 GCIRC members, Dr Samantha Cook and Prof Malgosia Jedryczka. It is based on the IOBC Working group meeting on Integrated Control in Oilseed Crops held online hosted by University of Rennes1 but is **open to all researchers** working on management of pests, weeds, and diseases of oilseeds! PMS has a strong impact factor of 4.462 and papers in Special Issues usually attract higher citations than those in regular issues, so please consider submitting your work for inclusion. Please follow the link and select our Special issue in the 'paper-type' box (Further Information tab) and include this request in your cover letter to the Editor. https://onlinelibrary.wiley.com/journal/15264998 **Deadline for submissions Oct 31st**

Further info/requests for extensions to: sam.cook@rothamsted.ac.uk

GENETICS & BREEDING

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Upcoming international and national events

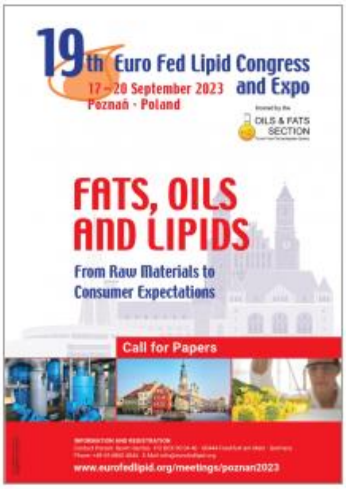
6-8 December, 2022, Saskatoon, Canada: Canola Week 2022.
Will be held as a hybrid event, the in-person aspect will be hosted in Saskatoon.
https://reg.eventmobi.com/2022-canola-week

April 30-May 3, 2023, Denver, Colorado/USA: AOCS Annual Meeting and Expo
https://annualmeeting.aocs.org/program-session-topics

2023 AOCS Annual Meeting & Expo

April 30–May 3, 2023, Colorado Convention Center, Denver, Colorado, USA

17-20 September, 2023, Poznan, Poland: 19th Euro Fed Lipid Congress and Expo
https://veranstaltungen.gdch.de/tms/frontend/index.cfm?l=11215&sp_id=2



24-27 September, 2023: 16th International Rapeseed Congress, Sydney, Australia
www.irc2023sydney.com

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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