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.

Veronique 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 whole population. It is not something 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% or meal protein 37.4 to 44.4%. Not looking at canola protein means that over 20% of the seed and 40% of the meal is not used. Breeding efforts are needed to break the inverse relationship between oil and protein contents. There is also an effect of conventional processing on the protein quality of the meal, effect of thermo-sensitive amino acids. Then looking at human nutrition and food, the taste of canola proteins is influenced by phenolics and glucosinolates.

Beginning with economics, **David Szisiak**'s (Botaneco) presentation reminded the canola's untapped protein potential: 20 million tonnes canola giving about 4 million tonnes protein (sustainable production). Today, the plant-based food is not a new trend: consumer attitude towards plant protein is changing and an increasing protein consumption in middle class population leads to an increased protein demand. These market demands will likely drive new breeding targets: Canola genomic is well known. Also new process to preserve seed component quality are needed: new products as protein isolate and protein concentrate for new markets as aquaculture (salmon/shrimp), monogastric, human nutrition. Concentrating proteins increases value greatly.

The presentation of **Rob Gulden** (University of Manitoba) exposed the progress in developing models to know what the sources of variation for protein content in Canola are: what can be controlled and what cannot be controlled. Using Canadian producers' data shows that 70% of the protein variation 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 is not explained; number of days over 28°C in the last 7 weeks, precipitation, night temperatures, plant density, nitrogen appear important for protein content. A negative relationship between stand density and seed protein content has been observed, and weather during plant development and N availability play an important role. Interpretation is 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. It 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 specially focus 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 and hybrids dominant, especially in the main production region of Yangse river, and that breeding targets are first on oil content and yield and oleic acid content. Rapeseed is also grown for feed. Works on protein are 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 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, then reduction in fibre and glucosinolates could be a third goal, and that "a goal of 1% increase in protein content each year may be achievable", or in a more realistic vision 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) reported an ambitious study on 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 a negative effect of the protein extracts containing rapeseed on body weight, bone weight and length, especially when fed with plant protein only, and on day gain, feed intake and feed conversion rate. Also, a decrease in indispensable amino acids in the plasma. No effect appeared on glucose, insulin, growth factors, plasma urea and on genes related to growth and protein metabolism. Regarding the protein digestibility rate, a lower speed of digestibility of the protein extracts with rapeseed was observed. This lower digestibility and consumption may have several origins: the feed used is high protein, up to 95% but not pure and there may be a taste issue, or also polyphenols and room taken by fibres in piglets' stomachs, or glucosinolates residues; also, napin contains a lot of sulfo containing amino acids that are known difficult to digest. Piglets are very challenging since they have a limited feed intake capacity and limited amounts of digestive enzymes.

Many things on the taste and nutritional aspects, including removing some antinutritional compounds, still need to be improved through breeding and process improvement

Gertjan Smolders (DSM) reminded that rapeseed has a very good potential as it is sustainable production and 700 million people could get their protein needs with actual production, so that reserving the protein quality during processing is a key issue. A process to produce protein concentrate from rapeseed will be commercialized within one year. This process starts from a cold press cake obtained with temperatures <60°C, which is processed to obtain protein concentrate. CanolaPro™ is a protein isolate higher than 90% protein; the PDCASS is 1 and DIAAS higher than 100, making it an excellent protein source with a good amino-acids balance, not far from potato proteins, with no-off flavour. Regarding functionality, it is soluble over large pH range, like whey protein, and can be extruded. As a result of the process, it is a high price protein, but offering very unique functionalities and nutritional profile. For classical uses, users are happy with soybean standard and CanolaPro™ looks for higher prices for high quality. Also, the protein composition is important - today 60% napin and 40% cruciferin, this ratio may be influenced by the process - and could also interest breeding.

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 about the use of seed with low napin content, eg around 20% of proteins only: on short term, DSM will not use this seeds quality since there is a need for high and stable quality for this new product and new process entering the market. But different choices could be made in future for different targets and 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 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 and European rapeseed around 18, but not up to mustards levels. Glucosinolates are extracted during the process, coming 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, very attractive in Canada. The question today is how to obtain non-GM varieties, still high pro. From the point of view of the process, the priority is to obtain high protein in meals better than high protein in seeds since meals are the starting point for the process. With a high efficiency in oil extraction, you can also get high protein in meal, but there is a kind of coupling between the two. V. Barthet remarked that 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 in fact depends on how it can be crushed afterwards, crushing becoming more difficult. Then regarding feed, the value will increase when removing the fibre, but also a part of the proteins is lost with the hulls: it may 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… It must be more investigated, then new genomic tools and reverse genetics will be useful… Concerning the compound which produces the taste we know about the enzyme involved, but it is a very tiny compound in concentration and maybe preferable to eliminate it by processing. G. Smolders agrees that we have complex issues and that isolating one component is not easy. Another thing is that during the extraction, the polyphenols are not stable, they are active and building slowly intermediates that are even worse and 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 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. It may delay the adoption, but perspectives are considered promising, especially when we consider that the total protein market is growing tremendously, which will facilitate the adoption of new nutrients, notably for specific usages in high value products 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 but when developing and if protein becomes the more valuable component, it will create incentives to increase the protein content in varieties. At the example of whey in milk industry, which changed from a by-product to a key source of value. E. Pilorgé remarked that plant proteins are unbeatable from the point of view of sustainability and that the context of adaptation to climate change open 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 need a regulatory framework, a direction where breeders have to go. Also, markets need to recognize that a breeding target needs compromise and could take 10 years, and breeding is an expensive investment which needs a premium. How to build a strategy for the breeders consistent with the products we will use? 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 keep it as much as possible and to really extend it, knowing that we have serious problems with diseases and pests, etc…

Veronique 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, and there is a missing part on the processing of the seed: what could be done to increase the value of the meal, including the process to produce good quality protein. For a next meeting on processing and meal quality of Canola.

Value chains and regional news

World rapeseed Canola production

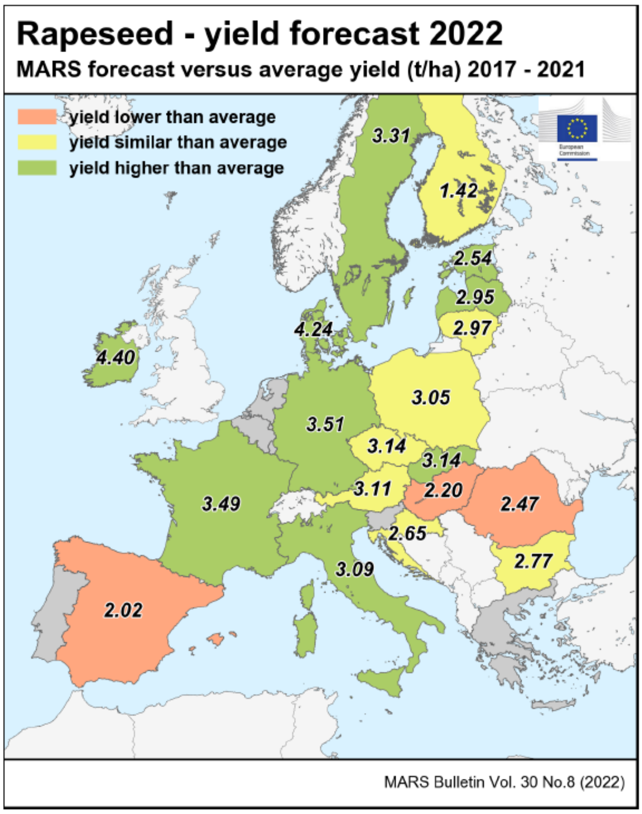
According to the USDA, as reported by UFOP the world rapeseed production would rise to a new record level in 2022, to 82.5 MT, up 14% over 2021/22. With global consumption anticipated to amount to 79.2 million tonnes – 830,000 tonnes more than expected in July and 5.1 million tonnes more than in the 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

Liu, S., Raman, H., Xiang, Y., Zhao, C., Huang, J., & Zhang, Y. (2022). **De novo design** of future rapeseed crops: Challenges and opportunities. The Crop Journal. https://doi.org/10.1016/j.cj.2022.05.003

Valera, H. A., & Luštrek, M. (2022). Machine Learning to **Predict Rapeseed Traits from RNA-seq** Data. https://doi.org/10.3233/AISE220031

Moebes, M., Kuhlmann, H., Demidov, D., & Lermontova, I. (2022). **Optimization** of quantitative **reverse transcription PCR method** for analysis of weakly expressed genes in crops based on rapeseed. https://doi.org/10.3389/fpls.2022.954976

Waseem, M., Yang, X., Aslam, M. M., Li, M., Zhu, L., Chen, S., ... & Liu, P. (2022). Genome-wide identification of long **non-coding RNA**s in two contrasting rapeseed (*Brassica napus L.*) genotypes subjected to cold stress. Environmental and Experimental Botany, 201, 104969. https://doi.org/10.1016/j.envexpbot.2022.104969

Nakazato, I., Okuno, M., Zhou, C., Itoh, T., Tsutsumi, N., Takenaka, M., & Arimura, S. I. (2022). Targeted base editing in the **mitochondrial genome** of *Arabidopsis thaliana*. Proceedings of the National Academy of Sciences, 119(20), e2121177119. https://doi.org/10.1073/pnas.2121177119

Schilbert, H.M., Glover, B.J. Analysis of **flavonol regulator evolution** in the Brassicaceae reveals MYB12, MYB111 and MYB21 duplications and MYB11 and MYB24 gene loss. BMC Genomics 23, 604 (2022). https://doi.org/10.1186/s12864-022-08819-8

Liu, Y., Ce, F., Tang, H., Tian, G., Yang, L., Qian, W., & Dong, H. (2022). Genome-wide analysis of the **serine carboxypeptidase-like (SCPL) proteins** in *Brassica napus L.* Plant Physiology and Biochemistry, 186, 310-321. https://doi.org/10.1016/j.plaphy.2022.07.020

Ahmad, N., Su, B., Ibrahim, S., Kuang, L., Tian, Z., Wang, X., ... & Dun, X. (2022). Deciphering the Genetic Basis of **Root and Biomass Traits** in Rapeseed (*Brassica napus L.*) through the Integration of GWAS and RNA-Seq under Nitrogen Stress. International journal of molecular sciences, 23(14), 7958. https://doi.org/10.3390/ijms23147958

Li, B., Liu, X., Guo, Y., Deng, L., Qu, L., Yan, M., ... & Wang, T. (2022). BnaC01. BIN2, a GSK3-like kinase, modulates plant height and yield by regulating **cell elongation** in *Brassica napus*. https://doi.org/10.21203/rs.3.rs-1714627/v1

Zhang, K., Zhang, J., Cui, C., Chai, L., Zheng, B., Jiang, J., ... & Tu, J. (2022). Genome-wide identification and expression profiling of the YUCCA gene family in *Brassica napus*. Oil Crop Science. https://doi.org/10.1016/j.ocsci.2022.07.001

Ping, X., Ye, Q., Yan, M. et al. Integrated genetic mapping and transcriptome analysis reveal the BnaA03.IAA7 protein regulates plant architecture and gibberellin signaling in Brassica napus L.. Theor Appl Genet (2022). https://doi.org/10.1007/s00122-022-04196-8

Tang, J., Liu, H., Quan, Y., Yao, Y., Li, K., Tang, G., & Du, D. (2022). Fine mapping via QTL-seq, Target-seq and RNA-seq of a novel QTL controlling early **flowering time** in spring *B. napus*. https://doi.org/10.21203/rs.3.rs-1867930/v1

Wang, X., Rehmani, M. S., Chen, Q., Yan, J., Zhao, P., Li, C., ... & Jiang, Y. Q. (2022). Rapeseed NAM transcription factor positively regulates **leaf senescence** via controlling senescence-associated gene expression. Plant Science, 323, 111373. https://doi.org/10.1016/j.plantsci.2022.111373

Cheng, Q., Zhao, G., Yang, L., Amdouni, A., Mu, B., Ye, C., ... & Yang, B. (2022). Oilseed rape MPK1 mediates reactive oxygen species-dependent cell death and jasmonic acid-induced **leaf senescence**. Environmental and Experimental Botany, 105028. https://doi.org/10.1016/j.envexpbot.2022.105028

Schilbert, H. M., Pucker, B., Ries, D., Viehöver, P., Micic, Z., Dreyer, F., ... & Holtgräwe, D. (2022). Mapping-by-Sequencing Reveals Genomic Regions Associated with **Seed Quality** Parameters in *Brassica napus*. Genes 2022, 13, 1131. https://doi.org/10.3390/genes13071131

Hao, R. O. N. G., YANG, W. J., Tao, X. I. E., Yue, W. A. N. G., WANG, X. Q., JIANG, J. J., & WANG, Y. P. (2022). Transcriptional profiling between **yellow-and black-seeded** *Brassica napus* reveals molecular modulations on flavonoid and fatty acid content. Journal of Integrative Agriculture, 21(8), 2211-2226. https://doi.org/10.1016/S2095-3119(21)63656-0

Chao, H., Li, H., Yan, S. et al. Further insight into decreases in seed **glucosinolate content** based on QTL mapping and RNA-seq in *Brassica napus* L. Theor Appl Genet (2022). https://doi.org/10.1007/s00122-022-04161-5

Zhao, C., Xie, M., Liang, L., Yang, L., Han, H., Qin, X., ... & Huang, X. (2022). Genome-Wide Association Analysis Combined With Quantitative Trait Loci Mapping and Dynamic Transcriptome Unveil the Genetic Control of **Seed Oil Content** in *Brassica napus L.* Frontiers in Plant Science, 13. https://doi.org/10.3389/fpls.2022.929197

Zhang, K., He, J., Yin, Y. et al. Lysophosphatidic acid acyltransferase 2 and 5 commonly, but differently, promote **seed oil accumulation** in *Brassica napus*. Biotechnol Biofuels 15, 83 (2022). https://doi.org/10.1186/s13068-022-02182-2

Kumari, N., Avtar, R., Singh, V. K., Kumar, N., Bishnoi, M., & Singh, M. (2022). Assessment of **oil quality traits** in some important exotic and indigenous collections of *Brassica* species. Crop and Pasture Science. https://doi.org/10.1071/CP21506

Chang T, Wu J, Wu X, Yao M, Zhao D, Guan C, et al. (2022) Comprehensive evaluation of **high-oleic rapeseed** (*Brassica napus*) based on quality, resistance, and yield traits: A new method for rapid identification of high-oleic acid rapeseed germplasm. PLoS ONE 17(8): e0272798. https://doi.org/10.1371/journal.pone.0272798

KHAN, W., RAUF, A., RAZIUDDIN, M. I., KUMAR, T., ZIA, M. A., & ARIF, M. INHERITANCE PATTERN AND GENE ACTION OF BIOCHEMICAL ATTRIBUTES IN RAPESEED (*Brassica napus L.).* Pak. J. Bot, 55, 2. REFERENCE

Xin, S., Dong, H., Cui, Y., Liu, Y., Tian, G., Deng, N., ... & Qian, W. (2022). Identification of a candidate QTG for **seed number per silique** by integrating QTL mapping and RNA-seq in Brassica napus L. The Crop Journal. https://doi.org/10.1016/j.cj.2022.07.012

MUSTAFA, H., MAHMOOD, T., BASHIR, H., HASAN, E., DIN, A., HABIB, S., ... & SALIM, J. (2022). GENETIC AND PHYSIOLOGICAL ASPECTS OF **SILIQUE SHATTERING** IN RAPESEED AND MUSTARD. SABRAO Journal of Breeding and Genetics, 54(2), 210-220. REFERENCE

Fu, H., Chao, H., Zhao, X. et al. Anthocyanins identification and transcriptional regulation of **anthocyanin biosynthesis** in purple *Brassica napus*. Plant Mol Biol (2022). https://doi.org/10.1007/s11103-022-01285-6

Hao, P., Liu, H., Lin, B., Ren, Y., Huang, L., Jiang, L., & Hua, S. (2022). BnaA03. ANS Identified by Metabolomics and RNA-seq Partly Played Irreplaceable Role in **Pigmentation of Red Rapeseed** (*Brassica napus*) Petal. Frontiers in Plant Science, 13. https://doi.org/10.3389%2Ffpls.2022.940765

Ma, S., Zheng, L., Liu, X., Zhang, K., Hu, L., Hua, Y., & Huang, J. (2022). Genome-Wide Identification of Brassicaceae Hormone-Related Transcription Factors and Their Roles in **Stress Adaptation and Plant Height Regulation** in Allotetraploid Rapeseed. International Journal of Molecular Sciences, 23(15), 8762. https://doi.org/10.3390/ijms23158762

Xue, Y., Zhang, C., Shan, R., Li, X., Tseke Inkabanga, A., Li, L., ... & Chai, Y. (2022). Genome-Wide Identification and Expression Analysis of nsLTP Gene Family in Rapeseed *(Brassica napus*) Reveals Their Critical Roles in **Biotic and Abiotic Stress Responses**. International Journal of Molecular Sciences, 23(15), 8372. https://doi.org/10.3390/ijms23158372

Jiang, J. J., Li, N., Chen, W. J., Wang, Y., Rong, H., Xie, T., & Wang, Y. P. (2022). Genome-Wide Analysis of the **Type-B Authentic Response Regulator Gene** Family in *Brassica napus*. Genes, 13(8), 1449. https://doi.org/10.3390/genes13081449

Chao, W. S., Li, X., Horvath, D. P., & Anderson, J. V. (2022). Genetic loci associated with **freezing tolerance** in a European rapeseed *(Brassica napus L.)* diversity panel identified by genome-wide association mapping. Plant Direct, 6(5), e405. https://doi.org/10.1002/pld3.405

Ruan, Ying and Tan, Chengfang and Du, Hong and Huang, Yong and Liu, Chun-lin, Bnasdg8s-Mediated H3k36me3 is Required for ***Freezing Tolerance*** in *Brassica Napus.* Available at SSRN: https://ssrn.com/abstract=4193809 or http://dx.doi.org/10.2139/ssrn.4193809

Alahakoon, A.Y., Tongson, E., Meng, W. et al. Overexpressing *Arabidopsis thaliana* ACBP6 in transgenic rapid-cycling *Brassica napus* confers **cold tolerance**. Plant Methods 18, 62 (2022). https://doi.org/10.1186/s13007-022-00886-y

Liu, Z., Dong, X., Cao, X., Xu, C., Wei, J., Zhen, G., ... & Mi, W. (2022). QTL mapping for **cold tolerance** and higher overwintering survival rate in winter rapeseed (*Brassica napus*). Journal of Plant Physiology, 153735. https://doi.org/10.1016/j.jplph.2022.153735

Pengfei Xu, Wenting Zhang, Xuan Wang, et al. Multi-omics analysis reveals a link between Brassica -specific miR1885 and rapeseed **tolerance to low temperature**. Authorea. July 01, 2022. https://doi.org/10.22541/au.165665716.60363594/v1 (under reviiew)

Qin, M., Li, H., Zhao, N., Zhang, Y., Zhang, B., Liang, F., ... & Xu, A. (2022). Integrated genomics, QTL mapping, and co-expression analyses identifying candidates of **low-temperature tolerance** in *Brassica napus L.* Industrial Crops and Products, 187, 115437. https://doi.org/10.1016/j.indcrop.2022.115437

Mohsenzadeh Golfazani, M., Taghvaei, M.M., Samizadeh Lahiji, H. et al. Investigation of proteins' interaction network and the **expression pattern of genes** involved in the ABA biogenesis and antioxidant system under methanol spray in **drought-stressed rapeseed**. 3 Biotech 12, 217 (2022). https://doi.org/10.1007/s13205-022-03290-4

Shamloo-Dashtpagerdi, R., Razi, H., Alemzadeh, A. et al. Further insights into the association of the protein phosphatase gene ABI1 with **drought and salinity stres**s responses in *Brassica* species. J. Plant Biochem. Biotechnol. (2022). https://doi.org/10.1007/s13562-022-00786-1

Bakirov, A., Zhang, Y., Zhang, Q., Seitahmetovna, S. A., Yu, X., Shii, Y., ... & Huang, Z. (2022). Screening of **salt tolerance** traits and the salt tolerance evaluation method in Brassica napus at the seed germination stage. Italian Journal of Agronomy, 17(2). https://doi.org/10.4081/ija.2022.2011

Zhang, Y., Zhang, Q., Wang, H., Tao, S., Cao, H., Shi, Y., ... & Huang, Z. (2022). Discovery of common loci and candidate genes for controlling **salt-alkali tolerance** and yield-related traits in *Brassica napus L*. https://doi.org/10.21203/rs.3.rs-1778607/v1

Li, J., Xie, T., Chen, Y., Zhang, Y., Wang, C., Jiang, Z., ... & Zhang, J. (2022). High-throughput UAV-based **phenotyping** provides insights into the dynamic process and genetic basis of rapeseed **waterlogging response** in the field. Journal of Experimental Botany. https://doi.org/10.1093/jxb/erac242 or REFERENCE

Guo, Y., Kuang, L., Xu, Y. et al. Construction of a worldwide core collection of rapeseed and association analysis for **waterlogging tolerance**. Plant Growth Regul (2022). https://doi.org/10.1007/s10725-022-00862-5

Ding, LN., Liu, R., Li, T. et al. Physiological and comparative **transcriptome** analyses reveal the mechanisms underlying **waterlogging tolerance** in a rapeseed anthocyanin-more mutant. Biotechnol Biofuels 15, 55 (2022). https://doi.org/10.1186/s13068-022-02155-5

Xie, Q., Zhao, Y., Liu, Y., Han, F., Liu, W., & Li, Z. (2022). Genetic Diversity and DNA Fingerprinting in Broccoli Carrying Multiple **Clubroot Resistance** Genes Based on SSR Markers. Applied Sciences, 12(9), 4754., https://doi.org/10.3390/app12094754

Zhan, Z., Shah, N., Jia, R., Li, X., Zhang, C., & Piao, Z. (2022). Transferring of **clubroot-resistant** locus CRd from Chinese cabbage (*Brassica rapa*) to canola (*Brassica napus*) through interspecific hybridization. Breeding Science, 72(3), 189-197. https://doi.org/10.1270/jsbbs.21052

Balesdent, M. H., Gautier, A., Plissonneau, C., Le Meur, L., Loiseau, A., Leflon, M., ... & Rouxel, T. (2022). 20-years of ***Leptosphaeria maculans*** population survey in France suggest **pyramiding** Rlm3 and Rlm7 in rapeseed is a risky resistance management strategy. Phytopathology, (ja). https://doi.org/10.1094/PHYTO-04-22-0108-R

Singh, K., Akhtar, J., Shekhawat, N., Meena, V. S., Gupta, A., Meena, B. R., ... & Gupta, V. (2022). Identification of new source of **resistance against white rust**. Journal of Oilseed Brassica, 13(2), 100-104. http://www.srmr.org.in/ojs/index.php/job/article/view/537

Klimenko, I. A., Volovik, V. T., Antonov, A. A., Dushkin, V. A., Shamustakimova, A. O., & Mavlyutov, Y. M. Y. M. (2022). Investigation of **genetic polymorphism** of Russian rape and turnip rape varieties using SSR and SRAP markers. Vavilov Journal of Genetics and Breeding, 26(4), 349. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9259662/

Daurova A.K / Даурова, А. К., Волков, Д., Дауров, Д., Жапар, К., Сапахова, З., Гриценко, Д., ... & Жамбакин, К. (2022). PRODUCTION **MUTANT LINES** OF TURNIP RAPE (*Brassica rapa*) AND ITS INTERSPECIFIC HYBRIDS IN THE ISOLATED MICROSPORE CULTURE. Вестник КазНУ. Серия биологическая, 91(2), 100-108. https://bb.kaznu.kz/index.php/biology/article/view/1797/1534 or https://doi.org/10.26577/eb.2022.v91.i2.08

Ahmed, H. M. ., & Ahmed, K. (2022). DEVELOPMENT OF A NEW OILSEED **RAPE VARIETY** NIFA SARSON-T20 THROUGH PHYSICAL **MUTAGENESIS**. Pakistan Journal of Agriculture, Agricultural Engineering and Veterinary Sciences, 38(1), 24–30. https://doi.org/10.47432/2022.38.1.4

Meena, R. K., Koli, D. K., Koli, G. K., Meena, R. K., & Kumar, D. (2022). Canola Breeding in India. Biotica Research Today, 4(5), 385-387. REFERENCE

CROP PROTECTION

Balesdent, M. H., Gautier, A., Plissonneau, C., Le Meur, L., Loiseau, A., Leflon, M., ... & Rouxel, T. (2022). 20-years of ***Leptosphaeria maculans*** population survey in France suggest pyramiding Rlm3 and Rlm7 in rapeseed is a risky resistance management strategy. Phytopathology, (ja). https://doi.org/10.1094/PHYTO-04-22-0108-R

Jiquel, A., Gay, E. J., Mas, J., George, P., Wagner, A., Fior, A., ... & Rouxel, T. (2022). "Late" effectors from ***Leptosphaeria maculans*** as tools for identifying novel sources of resistance in Brassica napus. Plant Direct, 6(8), e435. https://doi.org/10.1002/pld3.435

Cevallos, F., Pena-Zuniga, L., Ochoa-Corona, F., & Damicone, J. (2022). Frequency and genetic variability of the avirulence gene AvrLm4-7 among ***Leptosphaeria maculans*** isolates collected in Oklahoma, USA. Canadian Journal of Plant Pathology, (just accepted). https://doi.org/10.1080/07060661.2022.2077449

Serdyuk, O. A., Trubina, V. S., & Gorlova, L. A. (2022, June). Effect of **Fusarium blight**, Phoma rot, and Sclerotinia blight on rapeseed and mustard plant productivity. In IOP Conference Series: Earth and Environmental Science (Vol. 1045, No. 1, p. 012152). IOP Publishing. https://iopscience.iop.org/article/10.1088/1755-1315/1045/1/012152/meta

Ding, Y., Chen, Y., Wu, Z., Yang, N., Rana, K., Meng, X., ... & Qian, W. (2022). SsCox17, a copper chaperone, is required for pathogenic process and oxidative stress tolerance of ***Sclerotinia sclerotiorum.*** Plant Science, 322, 111345. https://doi.org/10.1016/j.plantsci.2022.111345

Choudhary, C. S., Singh, R. S., Arun, A., Bharati, V., Minnatullah, M., & Choudhary, R. K. (2022). Effect of different dates of sowing on incidence of **Sclerotinia rot** disease of Indian mustard in Bihar. https://www.thepharmajournal.com/archives/2022/vol11issue8S/PartA/S-11-7-654-998.pdf

Bhandari, S., Shrestha, S. M., Manandhar, H. K., Bhattarai, B., & Aryal, L. (2022). Evaluation of Rapeseed Genotypes against **Alternaria Blight** under Field Conditions in Nawalparasi-West, Nepal. Journal of Agriculture and Environment, 44-55. https://doi.org/10.3126/aej.v23i1.46865

Zhao, Y., Chen, X., Cheng, J., Xie, J., Lin, Y., Jiang, D., ... & Chen, T. (2022). Application of Trichoderma Hz36 and Hk37 as **Biocontrol** Agents against Clubroot Caused by ***Plasmodiophora brassicae.*** Journal of Fungi, 8(8), 777. https://doi.org/10.3390/jof8080777

Samal, I., Singh, N., Bhoi, T. K., & Dhillon, M. K. (2022). Elucidating effect of different photosynthetic pigments on ***Lipaphis erysimi*** preference and population build-up on diverse *Brassica juncea* genotypes. Annals of Applied Biology., https://doi.org/10.1111/aab.12774

Mamoon-ur-Rashid, M., Wajhi-ul-Abbas, S., Ali, H. et al. **Bionomics and management of aphid**, *Brevicoryne brassicae (Homoptera: Aphididae)* on canola (*Brassica napus*) using *Chrysoperla carnea*. Int J Trop Insect Sci (2022). https://doi.org/10.1007/s42690-022-00808-4

Semerenko, S. A., & Bushneva, N. A. (2022, June). The **biological control** of pests in sowings of spring rapeseed *Brassica napus L.* In IOP Conference Series: Earth and Environmental Science (Vol. 1045, No. 1, p. 012019). IOP Publishing. https://iopscience.iop.org/article/10.1088/1755-1315/1045/1/012019/meta

Shpanev, A.M., Smuk, V.V. Phytosanitary Risks of Spring Rape Cultivation in Leningrad Oblast. Russ. Agricult. Sci. 48, 174–179 (2022). https://doi.org/10.3103/S1068367422030156

Mashilingi, S. K., Zhang, H., Garibaldi, L. A., & An, J. (2022). Honeybees are far too insufficient to supply optimum **pollination services** in agricultural systems worldwide. Agriculture, Ecosystems & Environment, 335, 108003. https://doi.org/10.1016/j.agee.2022.108003

AGRONOMY & CROP MANAGEMENT

Nelson, M. N., Nesi, N., Barrero, J. M., Fletcher, A. L., Greaves, I. K., Hughes, T., ... & Kirkegaard, J. A. (2022). Strategies to improve field establishment of canola: A review. Advances in Agronomy. REFERENCE

Zuo, Q., You, J., Wang, L., Zheng, J., Li, J., Qian, C., ... & Leng, S. (2022). A Balanced **Sowing Density** Improves Quality of Rapeseed **Blanket Seedling**. Agronomy, 12(7), 1539. https://doi.org/10.3390/agronomy12071539

Wang, C., Xu, M., Wang, Y., Batchelor, W. D., Zhang, J., Kuai, J., & Ling, L. (2022). **Long-Term** Optimal **Management** of Rapeseed Cultivation Simulated with the **CROPGRO-Canola Model**. Agronomy, 12(5), 1191. https://doi.org/10.3390/agronomy12051191

Shchuklina, O., Afanasiev, R., Gulevich, A., Baranova, E., Kvitko, V., & Kvitko, O. (2022). Using data of optic sensors and pigment content in leaves for efficient d**iagnostics of nitrogen nutrition**. https://doi.org/10.15159/ar.22.048

Feng, J., Shi, C., Hafiz, A. H., Liu, Y. B., Liu, T. P., Li, Y. H., ... & Wang, L. C. (2022). Effects of Mulching and **Slow-release Fertilizer** Application Reduction on Soil Microbial Community Structure in Rapeseed Field Under Two Different Rainfall Conditions. Huan jing ke xue= Huanjing kexue, 43(8), 4322-4332. https://doi.org/10.13227/j.hjkx.202111134

Shirani Rad, A. H., Eyni-Nargeseh, H., Shiranirad, S., & Heidarzadeh, A. (2022). Effect **of Potassium** Silicate on Seed Yield and Fatty Acid Composition of Rapeseed (*Brassica napus L.*) Genotypes Under Different Irrigation Regimes. Silicon, 1-12. https://doi.org/10.1007/s12633-022-01915-0

Singh, M. K., Singh, S. K., Kumar, A., & Kanojia, S. K. (2022). Performance of mustard [*Brassica juncea (L.*) czern & Coss] as affected by various levels of **sulphur and zinc**. https://www.thepharmajournal.com/archives/2022/vol11issue8/PartJ/11-7-587-932.pdf

Hu, Yue and Javed, Hafiz Hassan and Du, Yong-Li and Arslan, Muhammad and Liao, Qi-Wen and Raza, Ali and Tahir, Muhammad and Ye, Wen and Zhou, Jing and Peng, Xiao and Wu, Yong-Cheng, Improving Lignin Metabolism, **Lodging Resistance** and Yield of Brassica Napus L. By Applying Fermented Straw Organic Fertilizer. Available at SSRN: https://ssrn.com/abstract=4189886

Wu, W., Shah, F., & Ma, B. L. (2022). Understanding of **crop lodging** and agronomic strategies to improve the resilience of rapeseed production to climate change. Crop and Environment. https://doi.org/10.1016/j.crope.2022.05.005

Salamati, N., Moayeri, M., & Abbasi, F. (2023). Evaluation of Physical and Economic **Productivity of Irrigation Water in Canola** Cultivation (Case study of Behbahan). Water and Soil Science. https://water-soil.tabrizu.ac.ir/article_14623.html?lang=en

Shahhoseini, H. R., & Kazemi, H. (2022). Evaluation of **sustainability of rainfed rapeseed** production in Gorgan county using Emergy analysis. Agriculture, Environment & Society, 2(1), 61-70. https://dx.doi.org/10.22034/aes.2022.337172.1031

Canal, S. B., Bozkurt, M. A., & Yilmaz, H. Effects of Humic Acid and EDTA on **Phytoremediation,** Growth and Antioxidant Activity in Rapeseed *(Brassica napus L.)* Grown under Heavy Metal Stress. Polish Journal of Environmental Studies. https://doi.org/10.15244/pjoes/148120

CANAL, S. B., BOZKURT, M. A., & YILMAZ, H. The effect of humic acid on rapeseed (*Brassica napus L.*) plant growth, heavy metal uptake, **phytoremediation** parameters (BCF, TF and TI), and antioxidant activity in heavy metal polluted soil. Yuzuncu Yıl University Journal of Agricultural Sciences, 32(2), 237-248. https://doi.org/10.29133/yyutbd.997850

Lee, S., & Kim, K. W. (2022). Effects of temperature on soil geochemical properties and accumulation of **heavy metals** in *Brassica napus.* https://doi.org/10.21203/rs.3.rs-1843160/v1

Dikšaitytė, A., Kniuipytė, I., Žaltauskaitė, J., Asard, H., & AbdElgawad, H. Enhanced **Cadmium Phytoextraction** by Rapeseed (*Brassica Napus*) Under Future Climate Conditions as a Consequence of Better Photosynthetic Performance. Available at SSRN 4169502. http://dx.doi.org/10.2139/ssrn.4169502

Zhang, H., Tao, R., Nie, J., Zhou, X., Wang, W., Han, F. X., & Ma, Y. (2022). **Cadmium** Distribution, Availability, and Translocation in Soil-Oilseed Rape (*Brassica napus L*.) System and Its Risk Assessment. ACS Earth and Space Chemistry. https://doi.org/10.1021/acsearthspacechem.2c00118

Verocai, M., Castro, M., Manasliski, S., & Mazzilli, S. R. **Frost risk** in *Brassica napus L*. and *Brassica carinata A. Braun* as a function of sowing date in the agricultural central region of South America. Agronomy Journal. https://doi.org/10.1002/agj2.21154

El-Badri, A. M., Batool, M., Mohamed, I. A., Wang, Z., Wang, C., Tabl, K. M., ... & Zhou, G. (2022). Mitigation of the **salinity stress** in rapeseed (*Brassica napus L.)* productivity by exogenous applications of bio-selenium nanoparticles during the early seedling stage. Environmental Pollution, 119815. https://doi.org/10.1016/j.envpol.2022.119815

Ghassemi-Golezani, K., & Abdoli, S. (2022). Alleviation of **salt stress** in rapeseed (*Brassica napus L.*) plants by **biochar-based rhizobacteria**: new insights into the mechanisms regulating nutrient uptake, antioxidant activity, root growth and productivity. Archives of Agronomy and Soil Science, 1-18. https://doi.org/10.1080/03650340.2022.2103547

Liu, M., Linna, C., Ma, S., Ma, Q., Song, W., Shen, M., ... & Wang, L. (2022). **Biocha**r Combined with Organic and Inorganic Fertilizers Promoted the Rapeseed Growth and Improved the Soil Quality in Purple Soil. https://doi.org/10.21203/rs.3.rs-1883568/v1

Kazemi, S., Rafati Alashti, M., & Khodabin, G. (2022). Evaluation of the effect of foliar application of b**rassinosteroid** on physiological characteristics and yield of rapeseed genotypes under late-season **drought stress**. Journal of Crops Improvement. https://jci.ut.ac.ir/article_88354.html?lang=en

Qasemi, S. H., Mostafavi, K., Khosroshahli, M., Bihamta, M. R., & Ramshini, H. (2022). Genotype and environment interaction and **stability of grain yield** and oil content of rapeseed cultivars. Food Science & Nutrition. https://doi.org/10.1002/fsn3.3023

Rosa, W. B., Júnior, J. B. D., Tomm, G. O., da Costa, A. C. T., & Abraão, P. C. (2022). Phenometric characteristics and agronomic performance of canola at different sowing times. Brazilian Journal of Development, 8(5), 34002-34018. REFERENCE

Zhang, J., Zhang, S., Li, J., Cai, C., Gu, W., Cheng, X., ... & Xue, X. (2022). Effects of Different **Pollination Methods** on Oilseed Rape (*Brassica napus*) Plant Growth Traits and Rapeseed Yields. Plants, 11(13), 1677. https://doi.org/10.3390/plants11131677

Jiang, M., Xu, P., Wu, L., Zhao, J., Wu, H., Lin, S., ... & Hu, R. (2022). Methane emission, methanogenic and methanotrophic communities during rice-growing seasons differ in diversified rice rotation systems. Science of The Total Environment, 842, 156781. https://doi.org/10.1016/j.scitotenv.2022.156781

PHYSIOLOGY

WANG, Y. Q., CHAO, C. S., Jing, D. A. I., SHEN, X. J., LI, Y. S., GU, C. M., ... & Xing, L. I. A. O. (2022). Difference in **carbon and nitrogen metabolism** of rapeseed (*Brassica napus L.*) with contrasting nitrogen efficiency at seedling stage. CHINESE JOURNAL OF OIL CROP SCIENCES, 44(3), 589. http://www.jouroilcrops.cn/EN/abstract/abstract2137.shtml

Liang, G., Hua, Y., Chen, H., Luo, J., Xiang, H., Song, H., & Zhang, Z. (2022). Increased **nitrogen use efficiency** via amino acid remobilization from source to sink organs in *Brassica napus*. The Crop Journal. https://doi.org/10.1016/j.cj.2022.05.011

Shen, X., Yang, L., Han, P., Gu, C., Li, Y., Liao, X., & Qin, L. (2022). Metabolic Profiles Reveal Changes in the Leaves and Roots of Rapeseed (*Brassica napus L.)* Seedlings under **Nitrogen Deficiency**. International Journal of Molecular Sciences, 23(10), 5784.https://doi.org/10.3390/ijms23105784

Gholami, M., Siadat, S. A., Koochakzadeh, A., Moradi Telavat, M. R., & Rrafiei, M. (2022). Survey of **Azotobacter inoculation** and cessation of irrigation on yield and some physiological characteristics of rapeseed cultivars. Environmental Stresses in Crop Sciences. https://escs.birjand.ac.ir/article_2054.html

Wang, Y., Zhao, Z., Wang, S., Shi, L., Ding, G., & Xu, F. (2022). **Boron** mediates nitrogen starvation-induced leaf senescence by regulating ROS production and C/N balance in *Brassica napus*. Environmental and Experimental Botany, 104905. https://doi.org/10.1016/j.envexpbot.2022.104905

Bo, Z. H. U., & XU, Q. W. (2022). Effect of **potassium deficiency** on endogenous hormones, photosynthesis and characteristics of chlorophyll fluorescence in Brassica napus under drought stress. CHINESE JOURNAL OF OIL CROP SCIENCES, 44(3), 570. http://www.jouroilcrops.cn/EN/10.19802/j.issn.1007-9084.2021133

Tian, T., Wang, J., Wang, H., Cui, J., Shi, X., Song, J., ... & Xu, T. (2022). **Nitrogen** application alleviates **salt stress** by enhancing osmotic balance, ROS scavenging, and photosynthesis of rapeseed seedlings (*Brassica napus*). Plant Signaling & Behavior, 17(1), 2081419. https://doi.org/10.1080/15592324.2022.2081419

Khan, M. N., Li, Y., Fu, C., Hu, J., Chen, L., Yan, J., ... & Li, Z. (2022). **CeO2** Nanoparticles **Seed Priming** Increases Salicylic Acid Level and ROS Scavenging Ability to Improve Rapeseed Salt Tolerance (Global Challenges 7/2022). Global Challenges, 6(7), 2270071. https://doi.org/10.1002/gch2.202270071

Zhang, K., Khan, Z., Wu, H. et al. Gibberellic Acid **Priming** Improved Rapeseed **Drought Tolerance** by Modulating Root Morphology, ROS Homeostasis, and Chloroplast Autophagy. J Plant Growth Regul (2022). https://doi.org/10.1007/s00344-022-10718-x

Mandal, A. (2022). Study of **Freezing Tolerance** After Cold Acclimation Followed by Deacclimation in Winter and Spring Canola (Brassica napus L.) (Doctoral dissertation, North Dakota State University). REFERENCE

Chugh, P., & Sharma, P. (2022). Terminal **heat stress** in Indian mustard (*Brassica juncea L.):* Variation in dry matter accumulation, stem reserve mobilization, carbohydrates translocation and their correlation with seed yield. http://nopr.niscpr.res.in/handle/123456789/59843

Elahifard, E., & Derakhshan, A. (2022). Determining the effect of **drougth stress** on the values of critical temperature thresholds for **seed germination of volunteer** rapeseed (*Brassica napus L.)* using hydrothermal time model. Environmental Stresses in Crop Sciences. https://escs.birjand.ac.ir/article_2070.html?lang=en

Salami, M., Heidari, B., & Tan, H. (2022). Comparative profiling of polyphenols and antioxidants and analysis of antiglycation activities in rapeseed (*Brassica napus L*.) under different moisture regimes. Food Chemistry, 133946. https://doi.org/10.1016/j.foodchem.2022.133946

Luo, T., Lin, R., Cheng, T., & Hu, L. (2022). Low Temperature Rather Than Nitrogen Application Mainly Modulates the **Floral Initiation** of Different Ecotypes of Rapeseed (Brassica napus L.). Agronomy, 12(7), 1624. https://doi.org/10.3390/agronomy12071624

Hou, J., Riaz, M., Yan, L., Lu, K., & Jiang, C. (2022). Effect of exogenous l-aspartate nano-calcium on root growth, calcium forms and cell wall metabolism of *Brassica napus L*. NanoImpact, 100415. https://doi.org/10.1016/j.impact.2022.100415

REMOTE SENSING

Mouret, F., Albughdadi, M., Duthoit, S., Kouamé, D., Rieu, G., & Tourneret, J. Y. (2022). Reconstruction of **Sentinel-2** derived time series using robust Gaussian mixture models—Application to the detection of **anomalous crop development**. Computers and Electronics in Agriculture, 198, 106983. https://doi.org/10.1016/j.compag.2022.106983

Zhang, J., Sun, B., Yang, C., Wang, C., You, Y., Zhou, G., ... & Xie, J. (2022). A novel **composite vegetation index** including solar-induced chlorophyll fluorescence for seedling rapeseed net photosynthesis rate retrieval. Computers and Electronics in Agriculture, 198, 107031. https://doi.org/10.1016/j.compag.2022.107031

Han, J., Zhang, Z., Cao, J., & Luo, Y. (2022). **Mapping rapeseed planting areas** using an automatic phenology-and pixel-based algorithm (APPA) in **Google Earth** Engine. The Crop Journal. https://doi.org/10.1016/j.cj.2022.04.013

Chen, S., Li, Z., Ji, T., Zhao, H., Jiang, X., Gao, X., ... & Zhang, W. (2022). Two-Stepwise Hierarchical Adaptive Threshold Method for **Automatic Rapeseed Mapping** over Jiangsu Using Harmonized **Landsat/Sentinel-2**. Remote Sensing, 14(11), 2715. https://doi.org/10.3390/rs14112715

Bognár, P., Kern, A., Pásztor, S., Steinbach, P., & Lichtenberger, J. (2022). Testing the Robust **Yield Estimation Method** for Winter Wheat, Corn, Rapeseed, and Sunflower with Different **Vegetation Indices** and Meteorological Data. Remote Sensing, 14(12), 2860. https://doi.org/10.3390/rs14122860

Xie, Z., Chen, S., Gao, G. et al. Evaluation of **rapeseed flowering dynamics** for different genotypes with **UAV** platform and machine learning algorithm. Precision Agric 23, 1688–1706 (2022). https://doi.org/10.1007/s11119-022-09904

PROCESSING, QUALITY & PRODUCTS

Voća, N., Pezo, L., Jukić, Ž., Lončar, B., Šuput, D., & Krička, T. (2022). Estimation of the **storage properties** of rapeseeds using an artificial neural network. Industrial Crops and Products, 187, 115358. https://doi.org/10.1016/j.indcrop.2022.115358

Bunin, E. S., Kalashnikov, G. V., Litvinov, E. V., & Makeev, S. V. (2022, July). Biochemical and physicochemical changes of rapeseeds during combined **microwave drying** in the production of rapeseed oil. In IOP Conference Series: Earth and Environmental Science (Vol. 1052, No. 1, p. 012091). IOP Publishing. https://iopscience.iop.org/article/10.1088/1755-1315/1052/1/012091/meta

Moradi, M., Osloob, F., & Niakousari, M. Cold Plasma: A Novel Pretreatment Method for the **Drying of Canola Seeds**: Kinetics Study and Superposition Modeling. REFERENCE

Mazroei Seydani, L., Gharachorloo, M., & Asadi, G. Use of **pulsed electric field** to **extract rapeseed oil** and investigation of the qualitative properties of oils. Journal of Food Process Engineering, e14149. https://doi.org/10.1111/jfpe.14149

Oprescu, E. E., Enascuta, C. E., Radu, E., Ciltea-Udrescu, M., & Lavric, V. (2022). Does the **ultrasonic** field improve the **extraction** productivity compared to classical methods–maceration and reflux distillation?. Chemical Engineering and Processing-Process Intensification, 109082. https://doi.org/10.1016/j.cep.2022.109082

Yao, Y., Xuan, P., Xiong, W., Zhao, L., Xu, X., & Liang, Q. (2022). Chlorophylls, lutein and β-carotene play great but different roles in **colour of rapeseed oil**. Coloration Technology. https://doi.org/10.1111/cote.12627

Sousa, D., Salgado, J. M., Cambra-López, M., Dias, A., & Belo, I. Biotechnological valorization of oilseed cakes: substrate optimization by simplex centroid mixture design and scale-up to tray bioreactor. Biofuels, Bioproducts and Biorefining. https://doi.org/10.1002/bbb.2428

Gołębiewska, K., Fraś, A., & Gołębiewski, D. (2022). Rapeseed meal as a feed component in **monogastric animal nutrition**–a review. Annals of Animal Science. https://sciendo.com/es/article/10.2478/aoas-2022-0020

Chinnasamy, S., Senthil Murugan, S., Rajkumar, S., Akkara, S. S., Ashitha, K., & Nayar, R. (2022). Effects of oil source on breast muscles of **broiler chicken**. REFERENCE

Chinnasamy, S., Senthil Murugan, S., & Juliet, S. Effects of Replacing Palm Oil With Rapeseed Oil on Fatty Acid Concentration of **Broiler Chicken**. REFERENCE

Pirgozliev, V. R., Mansbridge, S. C., Kendal, T., Watts, E. S., Rose, S. P., Brearley, C. A., & Bedford, M. R. (2022). Rapeseed meal processing and dietary enzymes modulate excreta inositol phosphate profile, nutrient availability and production performance of **broiler chickens**. Poultry Science, 102067. https://doi.org/10.1016/j.psj.2022.102067

Mirzapour, Z., Ariaii, P., Safari, R. et al. Evaluation the Effect Hydrolyzed Canola Meal Protein with Composite Coating on Physicochemical and Sensory Properties of **Chicken** Nugget. Int J Pept Res Ther 28, 97 (2022). https://doi.org/10.1007/s10989-022-10403-3

Wengerska, K., Czech, A., Knaga, S., Drabik, K., Próchniak, T., Bagrowski, R., ... & Batkowska, J. (2022). The Quality of Eggs Derived from **Japanese Quail** Fed with the Fermented and Non-Fermented Rapeseed Meal. Foods, 11(16), 2492. https://doi.org/10.3390/foods11162492

Taranu, I., Marin, D., Pistol, G. C., Untea, A., Vlassa, M., Filip, M., ... & Anghel, A. C. (2022). Assessment of the ability of dietary **yeast-fermented rapeseed meal** to modulate inflammatory and oxidative stress in **piglets** after weaning. Journal of Animal and Feed Sciences, 31(2), 109-122. https://doi.org/10.22358/jafs/148055/2022

Quiñones, J., Díaz, R., Beltrán, J. F., Velazquez, L., Cancino, D., Muñoz, E., ... & Farías, J. G. (2022). Analysis of Muscle Lipidome in Juvenile **Rainbow Trout** Fed **Rapeseed Oil** and Cochayuyo Meal. Biomolecules, 12(6), 805. https://doi.org/10.3390/biom12060805

Sierżant, K., Korzeniowska, M., Półbrat, T., Rybarczyk, A., & Smoliński, J. (2022). The use of an optimised concentration of quercetin limits peroxidation of lipids in the meat of **broiler chickens** fed a diet containing flaxseed **oil** rich in omega-3. animal, 16(8), 100603. https://doi.org/10.1016/j.animal.2022.100603

Plata-Pérez, G., Angeles-Hernandez, J. C., Morales-Almaráz, E., Del Razo-Rodríguez, O. E., López-González, F., Peláez-Acero, A., ... & Vieyra-Alberto, R. (2022). **Oilseed Supplementation** Improves Milk Composition and Fatty Acid Profile of **Cow Milk**: A Meta-Analysis and Meta-Regression. Animals, 12(13), 1642. https://doi.org/10.3390/ani12131642

Sharif, M., Hanif, A. R., Shahid, M. S., Ahmad, S., Bilal, M. Q., Riaz, M., & Khalid, M. F. (2022). Effects of dietary substitution of **canola meal with yeast fermentative** biomass on growth performance, blood metabolites, hematological index and serum minerals in **buffalo** male calves. https://doi.org/10.21203/rs.3.rs-1437114/v1

Vahedifar, A., & Wu, J. (2022). Extraction, nutrition, functionality and commercial applications of **canola proteins** as an underutilized plant protein source for human nutrition. Advances in food and nutrition research, 101, 17-69. https://doi.org/10.1016/bs.afnr.2022.04.001

Ahlström, C., Thuvander, J., Rayner, M., Matos, M., Gutiérrez, G., & Östbring, K. (2022). The Effect of Precipitation pH on Protein Recovery Yield and Emulsifying Properties in the **Extraction of Protein** from Cold-Pressed Rapeseed Press Cake. Molecules, 27(9), 2957. https://doi.org/10.3390/molecules27092957

Sentís-Moré, P., Ortega-Olivé, N., Mas-Capdevila, A., & Romero-Fabregat, M. P. (2022). Impact of centrifugation and vacuum filtration step on the yield and molecular weight distribution of **protein hydrolysates** from rapeseed and sunflower meals. LWT, 165, 113741. https://doi.org/10.1016/j.lwt.2022.113741

Zhang, N., Xiong, Z., Xue, W., He, R., Ju, X., & Wang, Z. (2022). Insights into the effects of dynamic high-pressure microfluidization on the structural and rheological properties of rapeseed **protein isolate**. Innovative Food Science & Emerging Technologies, 103091. https://doi.org/10.1016/j.ifset.2022.103091

Kaugarenia, N., Beaubier, S., Lesage, F., Kapel, R., & Durand, E. (2022). Optimization of potent mineral chelating **peptides production** from Rapeseed meal proteins proteolysis and peptide characterizations. AOCS. https://agritrop.cirad.fr/601405/

Durand, E., Villeneuve, P., Barouh, N., Kaugarenia, N., Beaubier, S., & Kapel, R. (2022). Antioxidant chelating **peptides production** from Rapeseed meal proteins proteolysis. AOCS. https://agritrop.cirad.fr/601404/

Wang, Y., Cao, K., Li, H., Sun, H., & Liu, X. (2022). Improvement of **active peptide yield**, antioxidant activity and anti-aging capacity of rapeseed **meal fermented** with YY-112 pure fermentation and co-fermentation. Food Bioscience, 101938. https://doi.org/10.1016/j.fbio.2022.101938

Silventoinen, P., Kortekangas, A., Nordlund, E. et al. Impact of Phytase Treatment and Calcium Addition on **Gelation of a Protein-Enriched Rapeseed Fraction**. Food Bioprocess Technol 15, 1422–1435 (2022). https://doi.org/10.1007/s11947-022-02810-7

Aguado, R., Espinach, F. X., Vilaseca, F., Tarrés, Q., Mutjé, P., & Delgado-Aguilar, M. (2022). Approaching a **Zero-Waste Strategy in Rapeseed** (*Brassica napus*) Exploitation: Sustainably Approaching Bio-Based Polyethylene Composites. Sustainability, 14(13), 7942. https://doi.org/10.3390/su14137942

Mandviwala, C., González-Arias, J., Seemann, M. et al. Fluidized bed steam **cracking of rapeseed oil**: exploring the direct production of the molecular building blocks for the **plastics industry**. Biomass Conv. Bioref. (2022). https://doi.org/10.1007/s13399-022-02925-z

Dushkova, M. A., Simitchiev, A. T., Kalaydzhiev, H. R., Ivanova, P., Menkov, N. D., & Chalova, V. I. Comparison and modeling of moisture sorption isotherms of deproteinized rapeseed meal and model extrudate. Journal of Food Processing and Preservation, e16978. https://doi.org/10.1111/jfpp.16978

Bichi, A. H., Zhang, K., Yang, J., & Chen, D. (2022). Analysis of the properties of alkaline-treated **rape straw** and stalk polyvinyl chloride **composites**. Textile Research Journal, 00405175221098586. https://doi.org/10.1177/00405175221098586

El Gharrak, A., Essamlali, Y., Amadine, O., Aboulhrouz, S., Hafnaoui, A., Ghalfi, H., & Zahouily, M. (2022). Tunable physicochemical properties of lignin and rapeseed oil-based polyurethane **coatings** with tailored release property of coated NPK fertilizer. Progress in Organic Coatings, 170, 106982. https://doi.org/10.1016/j.porgcoat.2022.106982

Gaide, I., Makareviciene, V., Sendzikiene, E., & Gumbyte, M. (2022). Application of dolomite as solid base **catalyst for transesterification** of rapeseed oil with butanol. Sustainable Energy Technologies and Assessments, 52, 102278. https://doi.org/10.1016/j.seta.2022.102278

Kyrychenko, V. I., Kyrychenko, V. V., & Nezdorovin, V. P. (2022). SYSTEMATIZATION AND TECHNICAL AND ECONOMIC ANALYSIS OF METHODS AND TECHNOLOGIES CONVERSION OF TECHNICAL OILS INTO **ALTERNATIVE FUELS**. Energy Technologies & Resource Saving, (2), 17-32. https://doi.org/10.33070/etars.2.2022.02

Yong, K. J., & Wu, T. Y. (2022). **Second-generation bioenergy** from oilseed crop residues: Recent technologies, techno-economic assessments and policies. Energy Conversion and Management, 267, 115869. https://doi.org/10.1016/j.enconman.2022.115869

Gupta, R., McRoberts, R., Yu, Z., Smith, C., Sloan, W., & You, S. (2022). **Life cycle assessment** of **biodiesel** production from rapeseed oil: Influence of process parameters and scale. Bioresource Technology, 360, 127532.https://doi.org/10.1016/j.biortech.2022.127532

Mukhametov, A., & Utelbayeva, A. (2022). Greenhouse gas emissions from rapeseed oil ethyl and methyl esters. Biofuels, 1-6. https://doi.org/10.1080/17597269.2022.2103903

NUTRITION and HEALTH

Gogna, S., Kaur, J., Sharma, K., Bhadariya, V., Singh, J., Kumar, V., Rasane, P. and Vipasha, V. (2022), "A systematic review on the role of **alpha linolenic acid** (ALA) in combating non-communicable diseases (NCDs)", **Nutrition** & Food Science, Vol. ahead-of-print No. ahead-of-print. https://doi.org/10.1108/NFS-01-2022-0023

Di Miceli, M.; Martinat, M.; Rossitto, M.; Aubert, A.; Alashmali, S.; Bosch-Bouju, C.; Fioramonti, X.; Joffre, C.; Bazinet, R.P.; Layé, S. Dietary **Long-Chain n-3 Polyunsaturated Fatty Acid Supplementation** Alters Electrophysiological Properties in the Nucleus Accumbens and Emotional Behavior in Naïve and Chronically Stressed Mice. Int. J. Mol. Sci. 2022, 23, 6650. https://doi.org/10.3390/ijms23126650

Altinoz, M.A. Could **dietary erucic acid** lower risk of brain tumors? An epidemiological look to Chinese population with implications for prevention and treatment. Metab Brain Dis (2022). https://doi.org/10.1007/s11011-022-01022-4

Han, R., Álvarez, A. J. H., Maycock, J., Murray, B. S., & Boesch, C. (2022). Differential effects of **oilseed protein hydrolysates** in attenuating **inflammation** in murine macrophages. Food Bioscience, 49, 101860. https://doi.org/10.1016/j.fbio.2022.101860

Jin, M., Zhang, M., Wang, G., Liang, S., Wu, C., & He, R. (2022). Analysis and Simulation of Wheel-Track High Clearance Chassis of Rape Windrower. Agriculture, 12(8), 1150. https://doi.org/10.3390/agriculture12081150

ANALYZES

Sun, P., Wang, C., Xu, L. et al. Simultaneous **Determination of Eight Phenolic Acid**s in Rapeseed by Accelerated Solvent Extraction-Solid Phase Extraction Ultra-High-Performance Liquid Chromatography-Tandem Mass Spectrometry. Food Anal. Methods (2022). https://doi.org/10.1007/s12161-022-02310-6

Mocniak, L. E., Elkin, K. R., Dillard, S. L., Bryant, R. B., & Soder, K. J. (2022). Building comprehensive **glucosinolate profiles** for brassica varieties. Talanta, 123814. https://doi.org/10.1016/j.talanta.2022.123814

Platzer M, Kiese S, Asam T, Schneider F, Tybussek T, Herfellner T, Schweiggert-Weisz U, Eisner P. Quantitative Structure-Property Relationship (QSPR) of Plant **Phenolic Compounds in Rapeseed Oil** and Comparison of Antioxidant Measurement Methods. Processes. 2022; 10(7):1281. https://doi.org/10.3390/pr10071281

Kafarski, M., Szypłowska, A., Majcher, J., Wilczek, A., Lewandowski, A., Hlaváčová, Z., & Skierucha, W. (2022). Complex **Dielectric Permittivity** Spectra of Rapeseed in the 20 MHz–3 GHz Frequency Range. Materials, 15(14), 4844. https://doi.org/10.3390/ma15144844

Gu, H., Lv, R., Huang, X., Chen, Q., & Dong, Y. (2022). Rapid quantitative assessment of **lipid oxidation** in a rapeseed oil-in-water (o/w) emulsion by three-dimensional fluorescence spectroscopy. Journal of Food Composition and Analysis, 114, 104762. https://doi.org/10.1016/j.jfca.2022.104762

Bandura, V., Fialkovska, L., Osadchuk, P., Levtrynskaia, Y., & Palvashova, A. (2022). Investigation of properties of sunflower and rapeseed oils obtained by the **soxhlet and microwave extraction methods**. https://doi.org/10.15159/jas.22.17

Bian, X., Wu, D., Zhang, K., Liu, P., Shi, H., Tan, X., & Wang, Z. (2022). Variational Mode Decomposition Weighted Multiscale Support Vector Regression for Spectral Determination of Rapeseed Oil and Rhizoma Alpiniae Offcinarum Adulterants. Biosensors, 12(8), 586. https://doi.org/10.3390/bios12080586

Ahmad, K., Ahmed, H. M., & Shah, A. Classification and Identification of Selected Rapeseed Varieties through Handheld **Near-Infrared Spectrophotometer**. REFERENCE

Sun, P., Wang, C., & Gao, Y. (2022). **Determination of eight Sterols i**n Rapeseed by Accelerated Solvent Extraction Coupled with Gas Chromatography tandem Mass Spectrometry. https://doi.org/10.21203/rs.3.rs-1891914/v1

ECONOMY and MARKET

Jannat, A., Ishikawa-Ishiwata, Y., & Furuya, J. (2022). Does **Climate Change** Affect Rapeseed Production in Exporting and Importing Countries? Evidence from Market Dynamics Syntheses. Sustainability, 14(10), 6051. https://doi.org/10.3390/su14106051

Yahya, M., Dutta, A., Bouri, E., Wadström, C., & Uddin, G. S. (2022). Dependence structure between the international **crude oil market** and the European markets of biodiesel and **rapeseed oil**. Renewable Energy. https://doi.org/10.1016/j.renene.2022.07.112

Klymchuk, O., Khodakivska, O., Kireytseva, O., Podolska, O., & Mushenyk, I. (2022). Prospects of **bio-diesel production**: the place and role of Ukraine in the context of implementation of the EU green course. Independent Journal of Management & Production, 13(3), s225-s240. https://doi.org/10.14807/ijmp.v13i3.1990

Galtier, F. (2022). Intervention on **biofuels** and the Japan WTO rice stock to stabilise world food prices. Perspective, 59, 1-4. http://hal.cirad.fr/cirad-03733988

Bórawski, P.; Holden, L.; Bórawski, M.B.; Mickiewicz, B. Perspectives of **Biodiesel Development in Poland** against the Background of the European Union. Energies 2022, 15, 4332. https://doi.org/10.3390/en15124332

Ershov, M.A., Savelenko, V.D., Makhova, U.A. et al. Current Challenge and Innovative Progress for Producing HVO and FAME **Biodiesel Fuels** and Their Applications. Waste Biomass Valor (2022). https://doi.org/10.1007/s12649-022-01880-0

MUSTARD and Other Brassicae

Blume, R. Y., Rakhmetov, D. B., & Blume, Y. B. (2022). Evaluation of Ukrainian **Camelina sativa** germplasm productivity and analysis of its amenability for efficient biodiesel production. Industrial Crops and Products, 187, 115477. https://doi.org/10.1016/j.indcrop.2022.115477

Stasnik, P., Großkinsky, D. K., & Jonak, C. (2022). Physiological and phenotypic characterization of diverse ***Camelina sativa*** lines in response to **waterlogging**. Plant Physiology and Biochemistry, 183, 120-127. https://doi.org/10.1016/j.plaphy.2022.05.007

Kumar, S., Singh, M., Yadav, A., Prasad, D., Verma, J. P., Singh, P. K., ... & Upadhyay10, A. (2022). Assessment of **Combining Ability and Heterosis** for Quantitative Traits in **Indian mustard** (*Brassica juncea* L. Czern & Coss.). Assessment, 53(05). REFERENCE

Meena, A., & Talekar, N. (2022). **Breeding for quality** in rapeseed-mustard: A review. https://www.thepharmajournal.com/archives/2022/vol11issue7/PartC/11-6-397-719.pdf

Prakash, R., Ankush, A., Devi, S., Rajpaul, R., & Singh, R. (2022). Physiological studies and nutrient accumulation in mustard varieties in response to fertilizer doses under saline condition in semi-arid region of northwestern Haryana. Indian Journal of Experimental Biology (IJEB), 60(08), 628-634. http://op.niscpr.res.in/index.php/IJEB/article/view/40690

Saklani, S., Grover, K., Choudhary, M. et al. Fatty Acid Composition and Oxidative Potential of Food Products Prepared Using Low Erucic Brassica Oils. Proc. Natl. Acad. Sci., India, Sect. B Biol. Sci. (2022). https://doi.org/10.1007/s40011-022-01415-6

MISCELLANEOUS

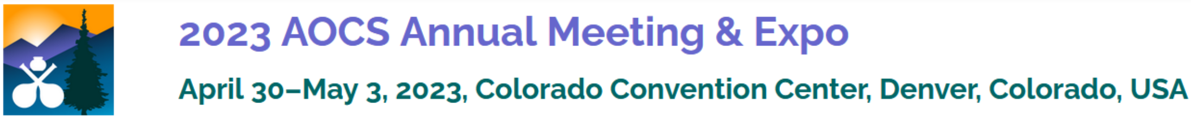
Prodöhl, I. (2022). Deutschlands Ölfelder: Eine Stoffgeschichte der Kulturpflanze Raps (1897–2017). By Sarah Waltenberger. Paderborn: Verlag Ferdinand Schöningh, 2020. 330
pp., $112.00, hardback. ISBN 9783506702586.https://doi.org/10.1215/00021482-9634753

Wilder, M. Canola Development as a 'Resilient Success'. In Policy Success in Canada: Cases, Lessons, Challenges, Chap 15 pp 286-306. REFERENCE

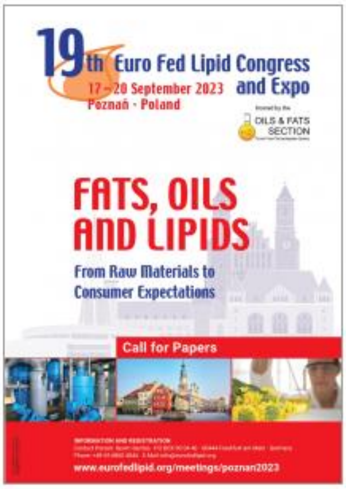
Upcoming international and national events

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



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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