GCIRC News

Global Council for Innovation in Rapeseed and Canola

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

N° 7, May 2020

Contents

Table des matières

Editorial

Rapeseed – a major global oil and protein crop: today, in the near future and beyond

Since the invention of low-erucic rapeseed (0 type) and the subsequent, additional development of very low glucosinolate type (canola, 00) the cultivation of oilseed rape/canola has continuously increased on a global scale. Major growing areas of today are Canada, China, Australia and Western Europe (e.g. France, Germany, Poland, and the UK): Today, thirteen countries have a rapeseed acreage of more than 300,000 ha, led by Canada with an annual canola area of 6 to 9 million ha depending on the annual weather conditions. Further major producers are China and India, the latter mainly growing rapeseed mustard rather than B. napus.. Conspicuous advances in rapeseed cultivation and production have recently been achieved in countries of the near and middle east such as Kazakhstan, Romania, and Russia. In particular, the Russian Federation has a very large potential for rapeseed cultivation, especially in extensive areas of Western Siberia, where large amounts of rapeseed may be harvested in the future despite the current low yield potential. Other regions with high potential are Ukraine, USA, and Australia, despite the strong dependence on annual precipitation in major growing areas of these countries.

Besides climate, other constraints can severely limit rapeseed growing and yield. Major challenges of today are numerous insect pests such as cabbage stem flea beetle, rape stem weevil, pollen beetle, cabbage seed weevil, and brassica pod midge which – depending on the site and year – can cause severe or even complete loss of the crop. In addition, fungal diseases such as blackleg, clubroot, sclerotinia and verticillium continue to damage rapeseed plants and fields. Whereas resistance breeding has led to some improvement by providing resistant or tolerant new cultivars, crop resistance against insects has not been successfully established and will probably do so for the years to come. Intensified future research activities in entomology and crop protection may help to overcome this unsatisfactory situation and improve the yield stability across environments i.e. locations and years.

In addition, the yield performance of rapeseed per se deserves substantial improvement. Intensifying research on yield physiology and broadening genetic diversity is seen as a helpful approach to higher yield of rapeseed varieties under challenging environments. Equally important, the international community in nutrition, both animal and human, will have to continue research for optimizing seed quality as a basis for optimal marketing and economical success of rapeseed production, not the least for the purpose of bioenergy creation and protect the environment.

This short description may point out the multitude of challenges rapeseed research, cultivation and use will be confronted in the near future. GCIRC as a diverse international community for research on rapeseed will be prepared to address these challenges.

Prof Wolfgang Friedt, GCIRC President

Activity/ News of the association:

GCIRC Board meeting… online

Fortunately, the International Rapeseed Congress and GCIRC General Assembly took place in 2019… Most international events and meetings have been cancelled or postponed this year due to the Covid 19 crisis. Nevertheless, the GCIRC board meeting scheduled on March 18 in Paris has been maintained through a video conference, just when Europe was closing everything. With good will of everybody (it was very late in Australia and China, and very soon in Canada), this experience was a success and proved, if needed, that international collaboration may profit a lot from the new communication technologies…

A part of the meeting has been devoted to the debriefing of the IRC15 experience, and several important issues have been treated, after the orientations given by the General Assembly in Berlin. Among these issues, 3 are especially important for the coming year:

- The next GCIRC Technical meeting is scheduled in Poznan, Poland, on May 17-20, 2021, hosted by the IHAR. Please keep the dates.
- Two major topics will be in the foreground: insects pests management strategies, and rapeseed/canola proteins.
- The practical refoundation of GCIRC scientific committees (Genetics and Breeding, Crop Protection, Agronomy and Crop Management, Quality and Products, Economy and Markets), in the perspective of sharing ideas and visions during the Technical Meeting.

Later on-line meetings have permitted to put the basis of an “Innovation and networking” group, and to pass detailed information on the Congress organization experience to the Australian team that will lead the IRC16, in 2023 in Sydney.

Further details will be given soon.

New GCIRC sponsor: NIAB

UK participated actively in the foundation of GCIRC in the 1970’ies, but its participation has been weakening in the 2000’ds. Fortunately, Simon Kightley convinced NIAB to take over, coming back to the period when UK organized a very successful IRC in 1995 in Cambridge, under the presidency of John Mc Leod.

NIAB was founded in 1919 as the National Institute of Agricultural Botany, to promote the improvement of British crops and to assess the merits of varieties and seed quality. It is now a major international research organisation in plant science, crop evaluation and agronomy. See: https://www.niab.com/

After the support in 2019 of SPZO, Union of Oilseed growers and Processors of Czech Republic, and AOF Australian Oilseed Federation, our sponsors are now 7, showing the interest of national professional sectors and research and innovation institutions in the activities of GCIRC. Thanks to the efforts of the GCIRC board members. To better know them, you may pay a visit to their websites.

Canola Council of Canada	SFO	TERRES INOVIA
Canada	Sweden	France

UFOP	SPZO	NIAB	AOF
Germany	Czech republic	United Kingdom	Australia

GCIRC Website: New design and new functions!

The GCIRC launched its new website mid-March. Through this investment, the GCIRC wishes to go ensuring its traditional services of its website, to improve easiness and add new functionalities. The target is to favor easier interactions between the users of the website - GCIRC members… or not yet members- and GCIRC, and also between the members themselves. This new website will offer work-spaces for the GCIRC permanent thematic committees and for potential new thematic working groups. It also allows to directly modify one's personal page and to pay membership online with a credit card secured system.

We also considered this moment as a good opportunity to open a LinkedIn page for the GCIRC.

Our webmaster Laetitia Devedeux prepared of notice to make the best use of the main novelties and give some tips and tricks. You will find it as a top new at https://www.gcirc.org/news-events/news/article/presentation-of-our-new-website

We only report here the novelties:

NOVELTIES:

Member's profile

Now possible online modifications of your profile information: upload new cv, new photo, identification of your centers of interest, activity...

We advise GCIRC members to check and correct their profile and pay a special attention in expressing their fields of interest (several choices possible): it will favor easier interactions within the GCIRC community, notably to look for projects partners or organize working groups.

The information that appear on one's profile will be open to all, members, and non-members, except for the detailed CV that will be available only for members.

Online payment by credit card.

New members

Now possible online registration: cv, photo, interests, activity...

Online payment by credit card.

Workgroups/Collaborative activities

New collaborative spaces available for our members to work on specific subjects.

Search box

Improved research engine that searches in all site contents.

Our Newsletter

You can register your e-mail address to receive our Newsletter.

You can also read our Newsletter on-line or download the pdf file.

Our sponsors

Sponsors' logos carrousel on our Home page.

REMINDERS:

Publications

In the Archives, open to all, you will find former GCIRC Bulletins and IRC Proceedings until 2015.

GCIRC members have access to the latest IRC proceedings, Seminars/Symposia proceedings and Students thesis/reports and General Assemblies reports.

Board members can read all our Board Meetings reports.

Online directory

Members' directory & Institutions and Companies' directory

You can search Members, Institutions and Companies by:

Name, Countries, Main fields of interest, Main activity, or Type of Institution/Company.

The lists of all GCIRC members and many Institutions and Companies are also available here.

Photo library

More pictures now available. Do not hesitate to share yours so we can add them.

… Last but not least: we also need some pictures to illustrate rapeseed/canola in the different countries of the world, notably for the top parts of the website pages: this is a call for volunteers.

Collecting the 15th IRC presentations…

To the attention of the participants to the 15th IRC in Berlin, it is not too late to send us your presentations or posters as pdf files. They will be published on the new GCIRC website, coming soon.

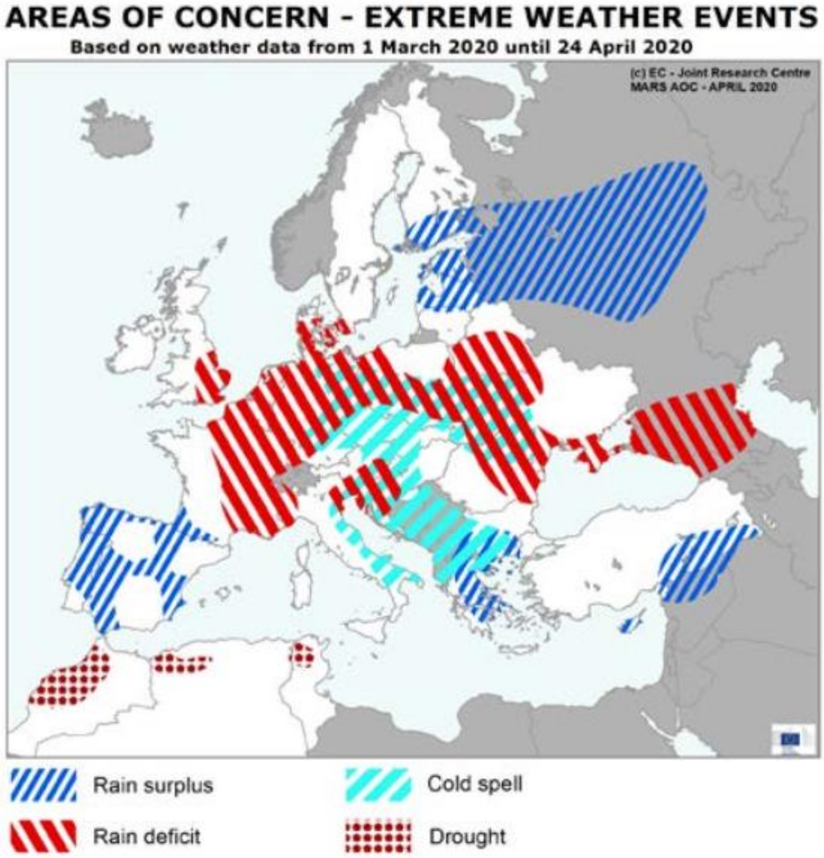
Value chains and regional news

Crops

The last report of Statistics **Canada** on principal field crop areas (Issued May 7; see https://www150.statcan.gc.ca/n1/daily-quotidien/200507/dq200507a-eng.htm) mentions that "At the national level, farmers expect to seed fewer acres of canola in 2020 compared with one year earlier, decreasing 1.6% to 20.6 million acres in 2020 *(8,33 Million ha).* If realized, this would be the second consecutive year of decrease in canola seeded area at the national level and the lowest seeded area since 2013 as farmers shift away from oilseeds to other crops.”. Acreage would be down 2.3% from 2019 in Saskatchewan, 2.8% in Alberta and 3% in Manitoba.

In Europe, The European Commission estimates the rapeseed acreage to 5,3 million ha, up 2,7% compared to 2018/19, but still10% below the five-year acreage: as in 2018, the unfavorable weather conditions impeded rapeseed sowings in the autumn of 2019, especially in France, where some land had to be ploughed up.

According to the European Commission winter crops are still in good conditions despite lack of rain: Western Europe experienced one of the driest starts to spring since 1979 - after a very wet winter - with almost no rain since mid-March. (see details in https://ec.europa.eu/jrc/sites/jrcsh/files/jrc-mars-bulletin-vol28-no4.pdf),



These elements will impact international trade: rapeseed availability is expected to be very low next year in Europe. A significant import flow will certainly be necessary, first from Ukrainian rapeseed and then Canadian canola. In Ukraine, a drop in production is also expected and therefore a decrease in export capacities. Concerning Canada, exports to China restart, after being almost stopped since March 2019, more than 370,000 tons of canola were sent in March 2020. The sustained recovery in Chinese demand would be a positive factor for prices in the next season.

Covid 19 Crisis

Most sources of information report that concerning the agricultural sector, the main sources of uncertainties due to the coronavirus pandemic were logistics, and for some sectors (fruits and vegetable, labor availability). According to the EU Commission MARS Bulletin "While labour availability remains a key concern, to date we have no evidence of major COVID-19 driven impacts on the spring and summer crop sowings. The pandemic has also brought uncertainty and concerns about inputs (e.g. seeds, fertilizer, agro-chemicals) related to disruptions in logistics. So far, the supply of seed, fertilizer and pesticides seems to be adequate and no immediate disruptions are expected."
According to the EU Short term outlook (https://ec.europa.eu/info/sites/info/files/food-farming-fisheries/farming/documents/short-term-outlook-spring-2020_en.pdf) "in the grains and oilseeds market, ample global stocks, sizeable 2019/2020 harvest in the EU and neighboring countries, and good prospects in the Americas for the next crop should allow a satisfactory supply of the market in the coming months" except perhaps in case that key exporters put barriers to exports, like recently Russia did for cereals.
The main disturbances on the European oilseeds market is linked to the drop of petroleum prices which directly impacted vegetable oils prices, and the drop of biodiesel demand which is a key outlet for rapeseed and impacts the supply of local proteins.

Quality of harvest 2019

NB: note that the results presented in the two studies in Canada and France are not expressed on the same basis of calculation.

Quality of western Canadian Canola - 2019

Weather and production review

In the prairies, seeding started early May and progressed steadily. By the end of May and the first week of June, it was completed in the three provinces. Cooler temperatures in May and June, associated with a lack of moisture, led to a much-delayed canola seed germination. Finally, germination was patchy in many fields, leading to uneven fields.

Cooler than normal temperatures (average 2 to 3°C lower) persisted during summer for most of the three provinces. In general, crops were one two weeks behind for most of the growing season due to the delayed germination in the three provinces. In Manitoba, during June, days were quite warm with temperatures reaching over 30°C; however, nights were quite cool with overnight lows in the single digit range. After the spring drought, above normal precipitation was the norm for the summer months in the prairies. However, this precipitation was uneven. During most of the growing season, the reported main causes of crop damages were either localized flooding due too much moisture or lack of moisture and high winds and hail.

The 2019 canola harvest was one to two weeks behind when compared to previous years. In September, frequent rainfalls and cooler than normal temperatures delayed harvest greatly. By mid-September, barely 10% of the canola crop was harvested compared to over 40% at the same time last year. The first snowfall occurred in Alberta and part of Saskatchewan the last week of September, it was followed by a killer frost couples of days later. Mid-October, there was a significant snowfall in Manitoba, stopping all harvest activities. By the end of October, in Manitoba, canola harvest was considered over, with about 90% of the canola crop harvested. By mid-November, Saskatchewan canola harvest was considered finished with 91% of the canola crop harvested. About 19% of the crop in the east-central region of the province was still in the fields. By the first week of December, the Alberta canola harvest was considered complete with only 84.5% harvested. A large percentage of the crops was still in the fields, including 34% and 20% of the seeded canola respectively in the Peace River and the North-East areas of the province.

Production

As of January 2020, Statistics Canada reported that the estimated 2019 Canadian production was 18.649 million metric tonnes (MT), about 1.7 MT less than last year production and about 2.5 MT less than the record production observed in 2017 (21.328 MT), but similar to the 5-year average production (18.682 MT).

Table 1 - Seeded area and production for western Canadian canola

	Seeded area			Harvested area			Production[1]		
	thousand hectares			thousand hectares			thousand tonnes		
	2019	**2018**	**2014-18**	**2019**	**2018**	**2014-18**	**2019**	**2018**	**2014-18**
Manitoba	1,338.6	1,382.4	1,308.4	1,298.5	1,367.5	1,292.9	3,056.3	3,318.4	2,888.5
Saskatchewan	4,674.1	4,997.9	4,713.0	4,604.2	4,955.0	4,682.1	10,130.5	10,927.1	10,059.8
Alberta	2,401.2	2,755.9	2668.6	2,355.6	2,703.0	2,634.4	5,320.1	5,870.6	6,100.6
British Columbia	34.7	55.4	53.2	30.9	54.3	41.9	72.0	123.9	87.0
Canada	**8,480.6**	**9,232.2**	**8,628.1**	**8.319.2**	**9,119.7**	**8,534.9**	**18,648.8**	**20,342.5**	**18,682.1**

[1] For all production data please consult Statistics Canada. Table 32-10-0359-01 Estimated areas, yield, production, average farm price and total farm value of principal field crops, in metric and imperial units at:
https://www150.statcan.gc.ca/t1/tbl1/en/cv.action?pid=3210035901
DOI: https://doi.org/10.25318/3210035901-eng

Quality of the 2019 canola harvest

This report of quality data for the 2019 harvest is based on analyses of 2,320 individual canola samples. Composites of Canola, No.1 Canada from each crop district from each province were made using these samples. Specialty oil samples, such as high oleic acid, low linolenic acid, and high erucic acid, were excluded from this report. Crop district composites of Canola, No.1 Canada samples were prepared using 1,936 samples. All quality parameters are reported on 8.5% moisture basis, except chlorophyll which is as this.

In 2019, only 85.1% of the samples were graded Canola, No. 1 Canada, compared to 74.4% in 2018 and 87.3% for the 5-year average. Since 2009, this is the 4th lowest percent of samples graded Canola, No.1 Canada, the worst average was obtained last year (74.4%) followed by the 2011 average (75.3%) and the 2012 average (82.0%). The grade distribution of the 2019 canola crop varied greatly between provinces and between crop districts within a province. The main damages were distinctly green seed count (DGR) and admixture. Overall, ddistinctly green seeds (DGR) were 0.39% (0.36% in 2018) in Canola, No. 1 Canada, 3.13% (4.04% in 2018) in Canola, No. 2 Canada, 10.23% (12.01% in 2018) in Canola, No. 3 Canada and 8.52% (32.95% in 2018) in Sample.

The 2019 western Canadian canola (Canola, No.1 Canada) crop was characterized by an oil content average higher than what was observed for the 2018 crop (44.6% in 2019 versus 44.1% in 2018), and a lower protein content average (20.4% in 2019 versus 21.1% in 2018) (Table 2). Samples showing the highest oil content average were from Saskatchewan, while for the protein content, Manitoba showed a higher average than Alberta or Saskatchewan (Table 2).

The chlorophyll content average for Canola, No.1 Canada samples was higher in 2019 than in 2018 (12 versus 10 mg/kg, respectively). Chlorophyll content average (Table 2) was significantly higher in Alberta-BC Peace River (17 mg/kg) than Saskatchewan (11 mg/kg) and Manitoba (5 mg/kg). Some areas in Alberta-Peace River showed chlorophyll content averages higher than 20 mg/kg.

Table 2: 2019 Canadian canola harvest: Canola quality data by grade and province – oil, protein, chlorophyll and glucosinolate contents.

		Oil content[1]			Protein content[2]			Chlorophyll content[5]			Glucosinolates[1]		
		(%)			(%)			(mg/kg)			(µmol/g)		
	Number of samples	**mean**	**min.**	**max.**	**mean**	**min.**	**max.**	**mean**	**min.**	**max.**	**mean**	**min.**	**max.**
Canola, No. 1 Canada													
Manitoba	448	43.9	38.3	50.8	21.5	15.7	26.8	5	3	53	9	3	15
Saskatchewan	839	45.1	36.0	51.0	20.0	14.4	27.1	11	3	52	9	4	19
Alberta-Peace River[3]	649	44.2	37.0	51.9	20.5	14.7	27.8	17	3	56	10	4	18
Western Canada[4]	**1936**	**44.6**	**36.0**	**51.9**	**20.4**	**14.4**	**27.8**	**12**	**3**	**56**	**9**	**3**	**19**
Canola, No. 2 Canada													
Manitoba	13	42.7	38.8	48.0	22.0	18.0	24.7	9	4	33	9	4	14
Saskatchewan	63	44.6	39.4	49.2	20.5	15.8	25.6	36	5	91	10	5	15
Alberta-Peace River[3]	114	44.4	38.5	50.6	20.1	16.0	26.8	44	5	87	11	6	17
Western Canada[4]	**190**	**44.4**	**38.5**	**50.6**	**20.4**	**15.8**	**26.8**	**43**	**5**	**91**	**10**	**4**	**17**
Canola, No. 3 Canada													
Manitoba	0												
Saskatchewan	31	44.5	38.9	49.2	20.7	16.0	27.1	69	4	165	11	8	16
Alberta-Peace River[3]	75	44.9	38.1	50.0	20.4	15.7	24.5	79	7	138	11	5	19
Western Canada[4]	**106**	**44.7**	**38.1**	**50.0**	**20.5**	**15.7**	**24.5**	**76**	**4**	**165**	**11**	**5**	**19**
Canola, Sample Canada													
Manitoba	1	45.0			21.0			6					
Saskatchewan	23	44.0	38.5	48.0	19.9	17.0	23.7	45	4	157	8		
Alberta-Peace River[3]	18	43.2	35.4	48.0	20.3	17.2	24.6	97	5	204	11	7	17
Western Canada[4]	**42**	**43.7**	**35.4**	**48.0**	**20.1**	**17.0**	**24.6**	**63**	**4**	**204**	**12**	**8**	**23**

[1] 8.5% moisture basis
[2] N x 6.25; 8.5% moisture basis
[3] Includes part of the Peace River area that is in British Columbia
[4] Values are weighted averages based on production by province as estimated by Statistics Canada
[5] Individual canola samples are analyzed by Near-Infrared Spectroscopy, the accurate limit of quantification for chlorophyll is 4 mg/kg

Total seed glucosinolate averages were very similar to last year (9 µmol/g in 2019 versus 10 µmol/g in 2018 and for the 5-year average). There was no difference between provinces regarding the average of the total glucosinolate contents (Table 2).

The oleic acid content average of the 2019 canola crop was much lower than what was observed in 2018 (62.43% versus 64.3%) or for the 5 year-average (63.1%). The highest oleic acid content average was observed in Manitoba, whereas the lowest average was observed in Alberta (Table 3). This decrease in oleic acid content was accompanied by a sharp increase in α-linolenic acid content (10.0% in 2019 versus 8.7% in 2018), whereas linoleic acid content increased slightly (18.7% in 2019 and 18.3% in 2018) when compared to the 2018 crop. The highest α-linolenic acid content average was observed in Alberta-BC Peace River and the lowest in Manitoba. The 2019 fatty acid composition resulted in a very different iodine value in 2019 when compared to the 2018 canola crop, 113.7 units in 2019 versus 111.0 units for 2018.

Total saturated fatty acid content for the 2019 canola crop was like what was observed in 2018 (6.6% versus 6.7%), with growing conditions having little effect on total saturates content in Canada.

The mean free fatty acids (FFA) average levels in 2019 Canola (0.16%), No.1 Canada seed was like what was observed in 2018 (0.15%) (Table 3). Individual samples showed a range of FFA level as harvest was done in wet conditions for the most part of the prairies.

Table 3 – 2019 Canadian canola harvest: Canola quality data mean by grade and province – free fatty acid content and fatty acid composition of the oil

	Relative fatty acid composition of the oil (%)						Iodine value[4] (Units)	Free fatty acids (%)
	C18:0	C18:1	C18:2	C18:3	C22:1	Total saturates[3]		
Canola, No. 1 Canada								
Manitoba	1.79	63.25	18.66	9.20	0.00	6.75	112.1	0.24
Saskatchewan	1.75	62.88	18.37	9.98	0.00	6.61	113.4	0.13
Alberta-Peace River[1]	1.64	61.36	19.12	10.63	0.00	6.59	115.1	0.17
Western Canada[2]	**1.73**	**62.40**	**18.74**	**10.01**	**0.00**	**6.64**	**113.7**	**0.16**
Canola, No. 2 Canada								
Manitoba	1.70	61.71	19.45	9.83	0.00	6.80	113.8	0.76
Saskatchewan	1.65	60.96	19.37	10.74	0.00	6.59	115.5	0.23
Alberta-Peace River[1]	1.57	59.99	19.70	11.24	0.00	6.65	116.6	0.22
Western Canada[2]	**1.61**	**60.52**	**19.54**	**10.94**	**0.00**	**6.63**	**116.0**	**0.25**
Canola, No. 3 Canada								
Manitoba								
Saskatchewan	1.61	59.94	19.86	10.99	0.00	6.69	116.2	0.30
Alberta-Peace River[1]	1.54	59.86	19.78	11.27	0.02	6.60	116.8	0.25
Western Canada[2]	**1.57**	**59.89**	**19.81**	**11.16**	**0.01**	**6.64**	**116.5**	**0.27**
Canola, Sample Canada								
Manitoba	1.69	63.70	18.80	8.46	0.00	6.73	110.8	0.46
Saskatchewan	1.68	60.20	19.78	10.80	0.09	6.73	115.9	0.33
Alberta-Peace River[1]	1.51	58.12	20.39	11.94	0.20	6.61	118.3	0.72
Western Canada[2]	**1.62**	**59.57**	**19.98**	**11.16**	**0.13**	**6.69**	**116.6**	**0.47**

[1] Includes part of the Peace River area that is in British Columbia
[2] Values are weighted averages based on production by province as estimated by Statistics Canada
[3] Total saturated fatty acids are the sum of palmitic (C16:0), stearic (C18:0), arachidic (C20:0), behenic (C22:0), and lignoceric (C24:0)
[4] Calculated from fatty acid composition

Quality of winter rapeseed in France harvest 2019

Each year in France, the Observatory on the quality of winter rapeseed in France allows to assess the main qualitative criteria of the harvest. Most samples are taken just after harvest, when farmers deliver them to the collecting body, cooperative or merchant. The harvest deals with winter rapeseed as the production of spring rapeseed is very limited in France.

In France, the 2018/19 rapeseed campaign was marked by very dry conditions late summer and autumn until the end of October in most regions, leading to a drop in sown acreages - 40 to 60% in some regions - and late emergence in part of the fields. The mild autumn and winter period allowed growth to catch up and a partial recovery of the crop. Spring was temperate and dry, drought penalized in the crops especially in shallow soils sometimes beginning in flowering times. The campaign was also marked by pest attacks, starting in autumn in the East and in spring in most regions (pollen beetle), with in the background an increasing resistance to insecticides. Overall, rapeseed was found to be very heterogeneous depending on the conditions of emergence and the water reserves of the soils in spring; yields were very variable.

Average quality characteristics Rapeseed in France, 2019 harvest					
	Nber of samples	surface weighted average	Minimum	Maximum	standard deviation on average
Impurities%	387	1,4	0,0	6,8	1,0
Water content %	519	6,2	3,6	10,0	0,8
Oil % on commercial standard basis*	516	43,0	36,8	48,2	1,3
Proteins % of DM	296	20,2	14,9	26	1,4
Proteins % of deoiled DM	296	39,2	31,9	48	2,0
Glucosinolates µmol/g seeds at 9% humidity	108	15,7	9,8	20,8	2,4
DM: Dry Matter					
** commercial standard for oil content: 40% oil on seeds at 9% humidity + 2 impurities*					

The average impurity rate of the 2019 harvest was at the same level as in 2018: 1.4%, with high variability between samples, especially in the South. Again, this year, the water content was well below the marketing standard (9%) with an average value of 6.2%. This value is the lowest recorded since the start of the seed quality survey (1991).

The average oil content was 43%, on commercial standards basis (9.0% moisture), lower than the performance in 2018 and slightly below the five-year average (43.6%). However, in view of the extreme conditions of the 2018/19 campaign, the observed oil content remained satisfactory. Especially since the proportion of samples whose oil content met the marketing standard was significant for all production areas and was better than in 2018.

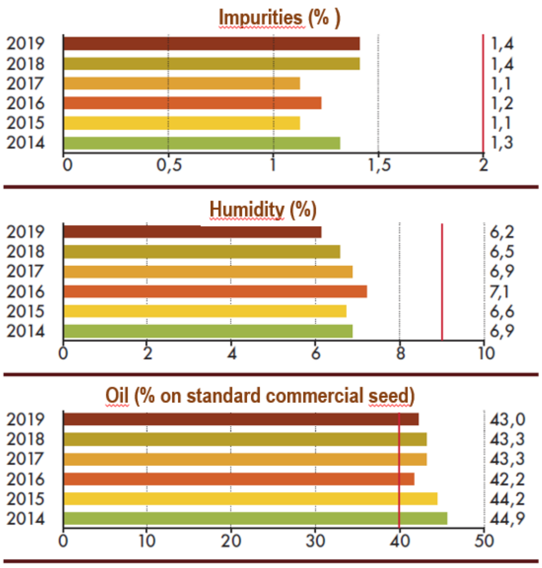
Opposite to oil content, the protein content average, 39.2% (expressed on dry and de-oiled seed), corresponded to the 2nd highest value since 2007. The low variability of the protein contents observed this year resulted from relatively homogeneous climatic conditions at the national level. The noticeable water stress at the time of seed filling led to a concentration of the protein in the seeds at the expense of the oil. It also resulted in a relatively low weight of a thousand grains, which partly explained the low national yields observed this year: 3,1 ton / ha on average according to Agreste (November 2019).

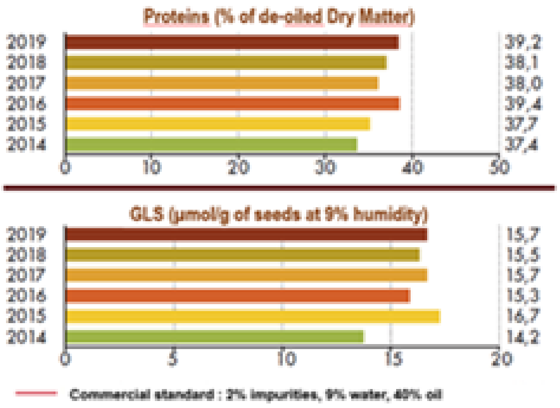
In 2019, the average value for the glucosinolate content was 15.7 µmol / g at 9% moisture; the highest levels were found in the Atlantic coast and the Center-West, which suffered the heaviest stress (weak growth in autumn, strong pressure from pests).

Linolenic acic content (% of total fatty acids)														
Region	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
West Atlantic	8,6	10,0	10,8	9,5	9,7	8,5	9,8	9,4	10,0	9,7	9,1	7,2	9,4	10,1
Center West	7,8	9,8	10,9	9,5	9,4	9,1	9,9	9,4	8,7	8,7	9,5	8,8	8,6	9,7
East	7,7	9,2	10,1	9,1	9,1	9,6	10,2	9,9*	8,3	8,8	9,6	7,2	8,1	8,4

Panel from a multi-year follow-up of 3 variety trials representing the 3 main production basins (West Atlantic, Center-West and East).
** Average composed only of control varieties*

The average linolenic acid (omega-3) content was 9.4% of the total fatty acids out of 105 controlled samples. It is well above the five-year average (8.8%). A significant decrease of more than one point was observed between the Atlantic coast and the East. The Atlantic coast benefited from early flowering, with temperatures, especially at night, relatively low, which favored the accumulation of linolenic acid. Overall, the accumulation of low temperatures, even frost temperatures, observed in the post-flowering period (between flowering and flowering + 60 days), contributed to the improvement of omega-3 contents in 2019.





France: 26e Carrefour de la sélection du colza / 26th Seminar on Rapeseed Breeding. January 22-23, 2020

Since 1977, the French association Promosol has been supporting works on oilseed crops breeding (rapeseed and sunflower) and promoting the dissemination of scientific progress. Promosol members are institutions: Terres Univia (Interprofessional Organization of the French Oil and protein crops sector), Terres Inovia (Technical Institute of the French Oil and protein crops sector), INRAE (National Institute for Agriculture, Food and Environment Research), and UFS (French seed association for seed companies & plant breeders). Promosol defines research priorities of common interest, funds key research programs and disseminates results to breeders and farmers. The association organizes the Carrefour de la Sélection du colza every year in January.

The 26th “Carrefour de la Sélection du Colza”, took place January 22nd and 23rd, 2020 in Orléans (France, Loiret). It brought together 70 participants from public research and higher education sector (INRAE, Agrocampus Ouest, Universities), GEVES (French Variety and Seed Study and Control Group), the industry and private rapeseed breeders.

The Carrefour was co-chaired by Martine Leflon, head of genetics and crop protection department at Terres Inovia, and lead of the Promosol rapeseed commission, and Maria Manzanares-Dauleux, director of the UMR IGEPP (INRAE-AgroCampus Ouest- University of Rennes I) and chair of the Promosol scientific council.

Exchanges on rapeseed genetics and breeding

The “Carrefour de la Sélection du Colza” is mainly an opportunity to take note of the progress of four research projects funded by Promosol (see below) and more widely to discuss the most important challenges of rapeseed breeding.

Experts from Terres Inovia were present: Arnaud Van Boxsom, head of varietal evaluation, presented the work in progress on the evaluation of the rapeseed vigor during autumn; Etienne Pilorgé, in charge of international relations, spoke about the evolution of the GCIRC, Christophe Jestin, in charge of genetics and crop protection, as well as Xavier Pinochet, expert in scientific strategies, were also present and participated in the exchanges.

A workshop, carried out during this event, was the opportunity to share the different visions of breeders, research organizations and actors of the sector (GEVES and technical institutes) on the varietal characteristics and their importance in different production systems and the method to evaluate them.

Update on four projects funded by Promosol

The Carrefour was an opportunity to follow the progress of the four ongoing research projects funded by PROMOSOL:

DELUGE- Unlocking the genetic fight against the winter flea beetle (coordinators: Maxime Hervé & Anne Marie Cortesero (UMR IGEPP, Rennes)

There are concerns that growing rapeseed in France might encounter a deadlock due winter flea beetle (*Psylliodes chrysocephala*) control. This project proposes a genetic strategy with the creation of canola-resistant rapeseed varieties. Three obstacles hamper the development of this approach: the absence of resistance in *B. napus*, the lack of a standardized biotest to assess resistance to larvae and the absence of methodology for rearing the insect, which would allow to work with it in the laboratory all along the year.

The DELUGE project aims to identify a rapeseed related species resistant to the winter flea beetle, which could provide genetic resistance for future introgression in rapeseed. It also looks at complementing the current adults’ resistance biotest, developing larvae resistance tests and working on flea beetle breeding.

SEEDQUAL - Characterization of the genetic diversity of the composition of rapeseed and meal for uses in animal feed (coordinator: Nathalie Nesi, UMR IGEPP, Rennes)

Population growth and rising living standards will increase food consumption of vegetable oils and proteins by 2030. Vegetable oil resources will meet the demand for food and contribute to energy and chemistry demands in the future. On the other hand, the supply of oil cakes will be tight. Reducing the shortage of vegetable protein supplies in Europe is a major challenge for the competitiveness of the agricultural sector.

The main oil and protein crops are sources of vegetable proteins, which have hitherto been valued from oil extraction cakes. However, the quality of rapeseed meal is affected by factors intrinsic to the seed and by the crushing process, which is currently optimized for oil extraction. The challenge for the oil and protein crop sector is therefore to develop, in addition to the "noble" product that is oil, oil cake as a high value-added product.

The SEEDQUAL project therefore aims to provide a detailed description of the composition of rapeseed, in particular in fibers and proteins, to identify the genetic variability available for the various constituents and to develop medium-high speed tools to assess these variables in breeding programs.

SEEDQUAL partners have complementary skills that will allow them to combine quantitative genetics, structural genomics, functional genomics, and analytical biochemistry.

DESCRIBE - Chemotypic diversity in *Brassica napus* (coordinators: Antoine Gravot and Alain Bouchereau (UMR IGEPP, Rennes))

The objective of this project is to carry out, from a large panel of *B. napus* genotypes (winter and spring type), an in-depth chemotypic analysis of a few chemical families of rapeseed secondary metabolism, considered to be determining in the interactions with the biotic environment of plants. Many of these metabolic factors also contribute to the qualitative properties of the products, particularly the seed.

The targeted analytical approach especially considers the chemical constituents of the glucosinolates family, flavonoids, and volatile terpene compounds. The first step is to improve the analytical procedures for the qualitative and quantitative description of these bioactive substances and to adapt them for the establishment of plants phytochemical profiles. The choice to take into account a genetic diversity as wide as possible leads to limit the investigations to a single phenological stage (early vegetative development) and to reduce the number of tissues and organs (seeds, roots and leaves), from plants grown under optimal conditions.

Chemotypic analyses concern a panel of 250 rapeseed accessions representative of the valuable genetic diversity and used for association genetic analyses.

Metaphor- Use of metatranscriptomic data from "LeptoLife" for the identification and monitoring of new sources of phoma resistance in rapeseed (coordinator: Thierry Rouxel, INRAE UMR BIOGER)

The Metaphor project focuses on the interaction between rapeseed and the pathogens responsible for the phoma, *Leptosphaeria maculans* and *L. biglobosa*.

Its objective is to analyse and use the data from the "Leptolife" large-scale sequencing project to:

- Characterize the mechanisms giving resistance in the adult stage and the counteraction mechanisms of the fungus,

- Identify new genes involved in resistance (leaf resistance to ascospore infection, resistance at adult stage),

- Identify new AvrLm genes of the fungus expressed only in ascospores allowing to screen new Rlm genes in rapeseed genotypes,

- Identify candidate genes for screening plant genotypes showing increased adult resistance.

We can therefore hope that this work will provide new tools for the screening of genetic resources based on our previous experience of generation of genetically improved strains for the identification of Rlm genes.

Scientific news

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