ISA NEWSLETTER N°14, December 2022

International Sunflower Association

Contents

Editorial

The year 2022 revealed a world in a multi-dimensional crisis situation, with climate and environmental, health, political, economic, and social crises.

The effects of climate change are becoming increasingly apparent, and since last October, the year 2022 could be classified as one of the four hottest years in the industrial era, with its share of extreme events including devastating floods, intense droughts and fires, generating economic losses in the tens of billions of dollars. Biodiversity loss also continues. Yet awareness is now real, and the world is beginning to work on solutions to preserve a liveable planet.

In terms of health, the world is learning to live with covid 19. This pandemic has caused between 3 and 8 million deaths so far, according to the UN, far beyond the official figures. Its destabilising effect continues, with economic, social, and political consequences. Yet scientific progress has made it possible to provide effective vaccines on an industrial scale in record time.

On the political side, who would have thought that a particularly violent war would return to Europe itself, and that the world would once again be divided into opposing blocs? With no way out after 10 months of intense conflict. However, escalation has so far been avoided. On the climate front, there are signs of greater international solidarity as well as a new regulatory will from certain states.

On the economic side, the supply and demand shocks, linked to the three previous crises, have led to a return of inflation in already fragile economies, with immediate social consequences. Food is experiencing high inflation both through the direct effect of the war on agricultural markets and through the indirect effect of increased production costs (energy, fertilisers, etc.). Some economists predict that inflation will peak in mid-2023, and some agricultural commodities, including oils, have already begun to fall to less speculative levels, which seem to reflect some readjustments.

In this particularly disrupted context, the sunflower world is also adapting. Despite the loss of harvested areas in Ukraine, the world's leading producer, and the intense droughts in a large

part of the production areas, with significant yield reductions, global production is expected to remain at nearly 52.8 million tonnes (source: Oil World Dec16, 2022), i.e., slightly above the 2016/17-2020/21 average (51.3MT).

Concerning ISA, in spite of the political and health uncertainties that limited the number of participants from several countries, despite their willingness, the International Sunflower Conference was finally able to be held in Novi-Sad in June with great success, and once again, showed the strength of the research and innovation community around this crop.

The world has entered transitions that can only accelerate and that pose as many challenges as they offer opportunities for sunflower and its innovation system, starting with a certain sobriety, for which sunflower presents remarkable qualities. Both the oil and protein produced by sunflowers, and perhaps the cellulose in their stems, will be valuable commodities in tomorrow's world. Sunflower R&D still has a lot of work to do to meet today's challenges with both lucidity and optimism.

Merry Christmas.

Etienne Pilorgé, ISA Secretary

Activity and News of the association

20th International Sunflower Conference, Novi Sad, Serbia

The proceedings of the ISC2022 in Novi Sad/Serbia are now available for ISA members in the "Publications" menu in "Conference proceedings". You will find there the recordings of the presentations, as well as the presentations sent by the authors who agreed on sharing their work.
Regarding the posters, the authors, who agree on sharing their poster on the ISA site, can still send their pdf file to the ISA secretariat.

Some pictures of the conference are available for all in the files “Meetings” and “Pustovoit award” in the “Photo library”.

Prof. Dr. Stevan Masirevic

Prof. Dr. Stevan Maširević (1952 – 2022)

We are deeply saddened to inform you that Prof. Dr. Stevan Maširević, long-time member of the ISA board and recent winner of the Pustovoit award, passed away after a short illness on September 24th, 2022, at the age of 71.

Prof. Masirevic was a phyto-pathologist who has, during his 43 year-career, worked both as a scientist and a professor. His research on sunflower encompasses studies on sunflower pathogens (rust, downy mildew, Phoma and Sclerotinia), broomrape. He was involved in breeding of hybrids resistant to dominant diseases, herbicide resistance, research improvement of oil and protein content, introduction of good agricultural practice, and seed treatments. His leadership roles within Serbia, FAO, and ISA have contributed to the advancement of sunflower technology and production in Serbia and around the world.

His most significant contribution is in the discovery and the first description in the world of the previously unknown phenomenon - Phomopsis stem canker of sunflower (*Phomopsis* spp.). As a sign of appreciation for this finding, a group of scientists from Australia have paid homage to Stevan Maširević by naming one fungus from this genus *Phomopsis masirevici* and *Diaporthe masirevici*.

He was a professor at undergraduate, master's and doctoral studies at the Faculty of Agriculture in Novi Sad, mentor of many bachelor's and master's theses and a large number of doctoral dissertations, manager, and participant of domestic and foreign scientific projects. He has authored or co-authored over 300 scientific publications during his career and has been involved with 20 book chapters, including the Sunflower Disease chapter in the 1997 monograph “Sunflower Science and Technology” as well as the Compendium of Sunflower Diseases (2016). Professor Stevan Maširević was the co-author of three sunflower hybrids registered in the European Union.

In addition to his experience and contributions in research, he has been continuously involved in ten different advisory councils and committees and was the Assistant of the Federal Minister of Agriculture of Serbia for six years and has been the Serbian representative on the ISA board for eight years. While working with the Institute of Field & Vegetable Crops, Novi Sad, he spent considerable time in Pakistan and India, assisting the Institute’s effort to introduce sunflower hybrids into those countries.

For his outstanding contribution to research and improvement of sunflower cultivation in the world, at the 20th International Sunflower Conference in 2022 in Novi Sad, he was awarded by the ISA with the Academician Pustovoit Award.

ISA General Assembly

As announced in the previous issue of this newsletter, the General Assembly held in Novi Sad, Serbia, at the time of the Sunflower Conference, did not reach the necessary quorum for effective decisions. Another General Assembly session had to be scheduled on September 16th, with the same agenda, online and without legal mandatory quorum. This session was successful with 66 members present or represented, who voted the resolutions, appointed the new Executive Board team, and validated the evolutions of the Articles of Association of ISA.
The report of the General Assembly is available for ISA members on the ISA website (under your login, go to “Publications/General Assembles reports.)

Students’ reports on ISA conference

The ISA supported 5 five students from different countries to attend the ISC in Novi Sad. We asked them to share with us this experience. Here are their reports.

Phrasia Mapfumo's story (South Africa)
I am a third year PhD student in Plant Science at the University of Pretoria, South Africa. My primary investigator is Dr Creux NM. Our study aims to investigate how planting date and environments influence sunflower development, yield and *Sclerotinia* head rot progression. This is our second cropping season, that means we are still in the process of data collection. During our first cropping season (2020/21), we had five plantings. We have two study sites, Innovation Africa @ University of Africa (IA @UP) and Agricultural Research Council, Potchefstroom, South Africa. We planted a single hybrid that is widely used by commercial farmers. Our trial is rainfed, with a control treatment at IA @UP, which is irrigated.

Phenotyping was done from week four after planting to week 13, weekly. Sampling for above ground biomass was done from day 54 after planting until harvesting. To investigate how planting date and environments influence sunflower pollination, stigma receptivity, pollen viability and pollen counts were taken. To investigate how planting date and environments influence sunflower yield components and yield, we assessed seed yield/plant, grain filling %, head diameter, number of filled seeds and unfilled seeds among other components. During the 2020/21 cropping season we observed *Sclerotinia* head rot on our November planting, which enabled us to do an artificial inoculation trial. *Sclerotina* head rot is a significant fungal disease in South Africa, which causes a significant reduction in sunflower yield.

For the International Sunflower Conference 2022, my presentation focused on how planting date and environments influence sunflower development, yield and *Sclerotinia* head rot progression using one season data. The results are interesting and tell a wonderful story, refer to poster 10.1. The last part of our study will be to modify a prediction model with a disease factor and try to predict the factors that influence optimal planting date for the two study sites. During the ISA hosted Sunflower-pollinator interactions webinar in 2021, the conference was announced. Dr Creux encouraged us to work hard and have work to present. She played a crucial role for me to attend. Together Dr Creux and ISA funded my attendance, stay and travel to and from Serbia. I had an opportunity to interact with my celebrities in science, Dr Langlade, and Dr Debaeke, seeing them and chatting with them was amazing. I had an opportunity to interact with a lot of experts in research. Every moment I spent at the conference and Novi Sad is a treasure to me. The food, tours and dinner were awesome. My fellow students were warm and welcoming. I will never forget the times we interacted. Thank you, Laetitia, and all board members, for funding my stay in Serbia. Thank you, Dr Creux, for funding my travel and other costs in Serbia.

Jelena Jockovic's story (Serbia)
I am a last-year PhD student at Faculty of Science, Department of Biology and Ecology, Laboratory for Anatomy and Morphology, Novi Sad, Serbia. My research is focused on applied anatomy in breeding programs of cultivated sunflower. Namely, my PhD deals with the morphological, micro-morphological and anatomical characterization of vegetative and reproductive organs of 23 wild *Helianthus* species. Until now, examinations of wild sunflower species, from the aspect of breeding, were mainly performed at the genetical and morphological level, while anatomical and micromorphological analyses of vegetative organs and parts of the reproductive region were insufficiently examined. For this purpose, a more detailed histological analysis of individual plant organs is of significant importance, with special emphasis on the characteristics of the cortical, mechanical, and vascular tissue. By comparing the obtained results, we can get an insight into the structural-functional connection and report adequate conclusions that can be applied in the selection program.

Attending on International Sunflower Conference 2022 allowed me to meet important people in the field of sunflower research, and I had the opportunity to exchange the ideas, results, and contacts.

Finally, I would like to sincerely thank the ISC2022 Organizing Committee for providing me opportunity to attend this conference and present part of our study.

Kevein Ruas de Oliveira's story (Brazil)
I am entering my fourth and last year as a PhD student at the Hungarian University of Agriculture and Life Sciences (MATE) – Department of Integrated Plant Protection, Godollo, Hungary. I started my PhD in Brazil at the São Paulo State University (UNESP) – Faculty of Agricultural and Veterinary Sciences, Jaboticabal, Brazil. When I moved to Hungary in September 2019, I decided that I would try to do my PhD in a Cotutelle. Since then, both of my supervisors, Dr. Katalin Körösi (MATE) and Dr. Priscila Lupino Gratão (UNESP) have been in touch, and we are working together on my PhD research and dissertation. We expect that this partnership will highly contribute to my work since both research groups are prepared to develop different analyses regarding the oxidative stress and antioxidant responses of plants.

I completed my BSc in Agricultural Engineering in Brazil, at the State University of Santa Cruz (UESC), with an Exchange Program at Curtin University, Perth, Australia. My MSc degree in Agronomy (Crop Production) was also obtained in Brazil, at UNESP, where I worked on the antioxidant responses of plants submitted to abiotic stresses. Currently, my research is now focused on the antioxidant responses

of plants to both abiotic and biotic stresses: antioxidant enzymes, the non-enzymatic antioxidant system, and the oxidative metabolism.

For my PhD research I am working on the antioxidant responses of sunflower seedlings against two major diseases and important pathosystems, *Plasmopara halstedii* (downy mildew) and *Sclerotinia sclerotiorum* (white rot). Both the chosen crop and the pathogens in question are of economic importance to Hungary and Brazil. Thy research can provide a better understanding of plant defence mechanisms that can lead to better management practices when controlling diseases in the field, as well as the development of new resistant sunflower cultivars.

When I found out about the 20th International Sunflower Conference, I thought it would be an amazing opportunity for me to attend this event, since the various thematic sessions which were held at the conference were of much importance for my PhD research. Besides that, I believe that attending this conference gave me the chance to meet prominent scientists in sunflower research. Overall, the experience of attending the 20th ISC was extremely exciting and valuable for both my professional and personal development. Finally, I would like to thank ISA (all board members) for the conference grant provided to me and that made it possible for me to attend this amazing event.

Rim Gubaev's story (Russia)
I am a fourth-year PhD Student at the Skolkovo Institute of Science, Moscow, Russia. I do my research in applied sunflower genetics. Namely, my study is related to the associated mapping of the agronomically important traits in sunflowers. I analyse high-throughput sequencing and phenotype data to scan for genetic markers for oil quality, fertility restoration and seed-related traits. Additionally, as our research group works in the applied field, we established a start-up called "OilGene" to develop marker-assisted selection solutions for sunflower breeders in Russia and worldwide.

I planned to go to the Sunflower conference two years ago (in the first half of my PhD program) as our university is quite new (less than 10 years) and thus our omics and data analysis group sought new collaborations and connections. Unfortunately, this conference has been postponed twice and I am very glad that I finally got a chance to connect to the people whom we read and cite. It is a great pleasure, to communicate with the high professionals to discuss top-level sunflower-related research.

As I am a last-year PhD student one of the aims was to find international members for the PhD defence committee. And thanks to the organizing committee and to Dr. Yakov Demurin I found potential candidates who agreed to participate, and I am very grateful to them. I am also grateful to the organizers for providing me with the oral talk as it was a great honour for me to talk about my research. As a result, I got very nice feedback from my colleagues and constructive and valuable critiques on how to improve the research and talk in general! This is quite important for young scientists.

The overall impression of the conference is excellent! Besides the professional and scientific part, the entertainment activities were well organized. Here I would like to highlight a wonderful city tour which was finished with wine at the beautiful fortress of Novi Sad! The gala dinner was also excellent, fun, and tasty, and was a pleasant place to communicate in an informal setting! Also, I was quite impressed with the field day as it was the first time, I visited such an event, and I must say that for bioinformatician lab mice like me it is quite important to go to the field and see how beautiful the object of study is! Especially if it is served with great Balkan food and music!

And finally, I would like to sincerely thank ISC2022 Organizing Committee for providing me with the travel grant as otherwise, this would not have been possible due to the conflict which my country is involved in. In conclusion, I was very happy to visit the ISC2022 in Novi Sad and met a very friendly and supportive sunflower community. This was a fruitful and enjoying event!

Hüdaverdi Gurkan's story (Turkey)
I was a student when this conference was announced in 2019 and I finished my Ph.D. and now I am an early carrier scientist. My research is about the impacts of climate change on sunflower production. We used 2 years of field experimental data in Konya - Turkey conditions as material. We used the FAO Aquacrop crop simulation model and DSSAT Cropgro Sunflower model to the assessment of climate change for future periods. Results showed us that sunflower production which is mainly applied under rainfed conditions will be adversely affected by climate change. Contrastly it could be possible to adapt

to climate change and could be possible higher yield under irrigated conditions. This conference is the best stage to introduce my research to the sunflower committee. I would like to thank ISC2022 Organizing Committee for the grant opportunity to attend this conference.
I had the opportunity to make both a poster and a short oral presentation at the conference. The experience of explaining the study as a short presentation in 3 minutes was the first time for me and it was a very good experience. I would also like to thank the whole committee for being deemed worthy of the best poster award. I am very honoured to receive this award as a young researcher and this award has increased my energy and willingness for my future studies.

Also, I could be able to meet with scientists and colleagues who have an interest in my research subjects thanks to the grant opportunity. Besides, this conference provided me with possibilities for future collaborations. I added several new contacts.

The technical and social activities were very well organized. The city tour was a great opportunity to see the beautiful Novi Sad. I've definitely already started giving advice to my friends to visit Novi Sad.
I hope to see you all again in China in 2024.

YouTube channel

A YouTube Channel was created for ISA, by our website manager Laetitia, to host videos from the ISA events.
For free events (like the 1st Sunflower-Pollinator interactions Web conference), the videos are available, for ISA members, in the Publications section of the website: https://www.isasunflower.org/publications/seminars-and-symposia
For non-ISA members, the videos can be found on the ISA YouTube Channel that has just been created: https://www.youtube.com/channel/UCWBTS9FBzA4wtUb1_H6xLUg/playlists
For events submitted to registration fees (like Sunflower Conference), the videos are available for members only.

ISA has a new beneficent member: Argensun

Argensun is the largest confection sunflower company of Argentina, as well as a relevant player in the worldwide business for more than 30 years. The company is involved in all the activities in the value chain, such as genetic breeding, field production, processing, manufacturing, exporting, and roasting. Moreover, Argensun is also the major company selling confection sunflower hybrid seeds, exporting raw material, and selling roasted product at the retail level in Argentina.

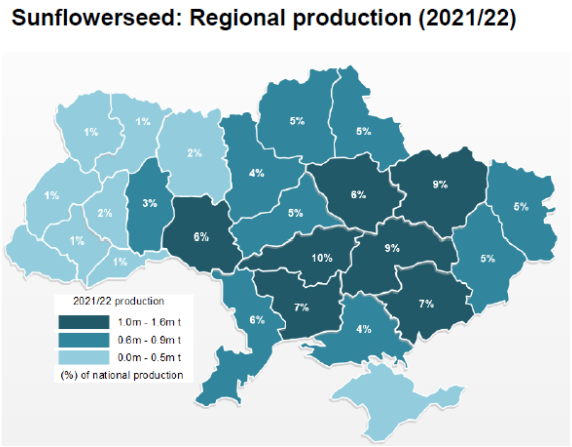
Furthermore, in line with its mission of becoming “the bridge that links the world of agricultural raw materials with the world of food supplies", Argensun is also a supplier of multiple agricultural specialties, including tenderized prunes, popcorn, and chia, among other.

Value chains and regional news

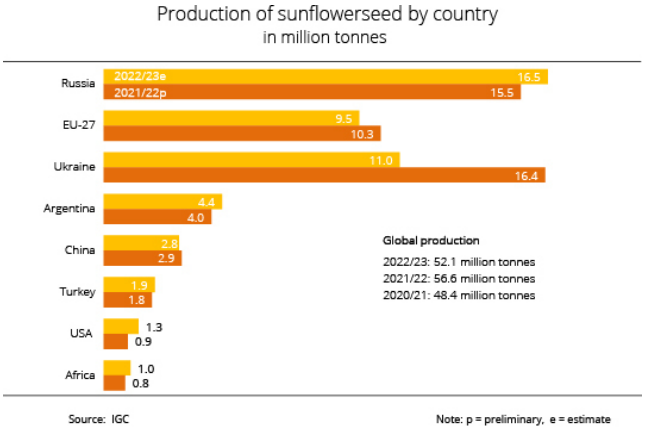
Sunflower production: under pressure of climate and war in Ukraine

According to information published by the International Grains Council (IGC), the 2022/23 sunflower crop would reach around 52.1 million tonnes of sunflower seed, 7.9% short of the previous year's volume.

The Ukrainian sunflower production is directly affected by the war, since in 2021 more than 25% of the production acreage is in the Southern part of the country, notably in the provinces of Kharkiv, Luhansk, Donetsk, Zaporizh, and Kherson. Furthermore, regarding trade, two of the major grain export ports, Mariupol and Berdyansk, fell under control of Russia, and the 5 remaining ones can be easily blockaded.



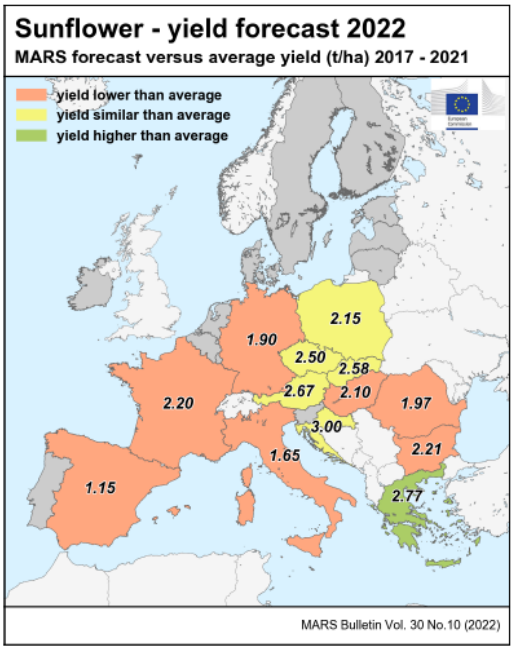
Source IGC



Source UFOP

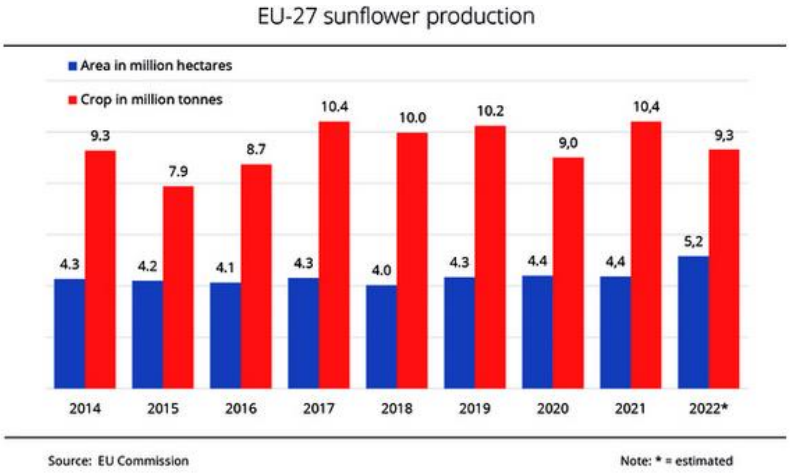
The UFOP “chart of the week 43/2022” reports the forecasts on the evolution of sunflower production comparing 2022/23 to 2021/22, clearly showing a drop of the production in Ukraine from 16,4 Mt to 11 Mt due to the continuing war and decline in sunflower area. “Just less than half the Ukrainian area was reportedly harvested by 14 October 2022. However, rain has recently delayed harvest operations and exacerbated concerns about a considerable drop in quality.” (Read more at https://www.ufop.de/english/news/chart-week/#kw43_2022).

Country	Sunflower (t/ha)				
	Avg 5yrs	2021	MARS 2022 forecasts	%22/5yrs	%22/21
EU	2.34	2.38	**1.97**	- 16	- 17
AT	2.71	3.01	**2.67**	- 1	- 11
BE	—	—	—	—	—
BG	2.31	2.38	**2.21**	- 4	- 7
CY	—	—	—	—	—
CZ	2.54	2.90	**2.50**	- 2	- 14
DE	2.20	2.60	**1.90**	- 14	- 27
DK	—	—	—	—	—
EE	—	—	—	—	—
EL	2.65	2.53	**2.77**	+ 5	+ 10
ES	1.24	1.22	**1.15**	- 7	- 6
FI	—	—	—	—	—
FR	2.39	2.74	**2.20**	- 8	- 20
HR	3.05	3.04	**3.00**	- 2	- 1
HU	2.87	2.70	**2.10**	- 27	- 22
IE	—	—	—	—	—
IT	2.40	2.40	**1.65**	- 32	- 31
LT	—	—	—	—	—
LU	—	—	—	—	—
LV	—	—	—	—	—
MT	—	—	—	—	—
NL	—	—	—	—	—
PL	2.13	2.38	**2.15**	+ 1	- 10
PT	—	—	—	—	—
RO	2.61	2.54	**1.97**	- 25	- 22
SE	—	—	—	—	—
SI	—	—	—	—	—
SK	2.65	2.66	**2.58**	- 3	- 3



Source: JRC MARS Bulletin October 2022 (Baruth, B.et al, doi: https://doi.org/10.2760/23690)

In Europe, yields for summer crops were substantially reduced due to continued hot and/or dry weather conditions in large parts of Europe. At EU level, the yield forecasts for grain maize, sunflowers and soybeans were most markedly reduced (by 8 to 9%), well below the 5-year average. The final figures (JRC Mars bulletin October) estimate a 16% decrease compared to 5 years average of sunflower yields.

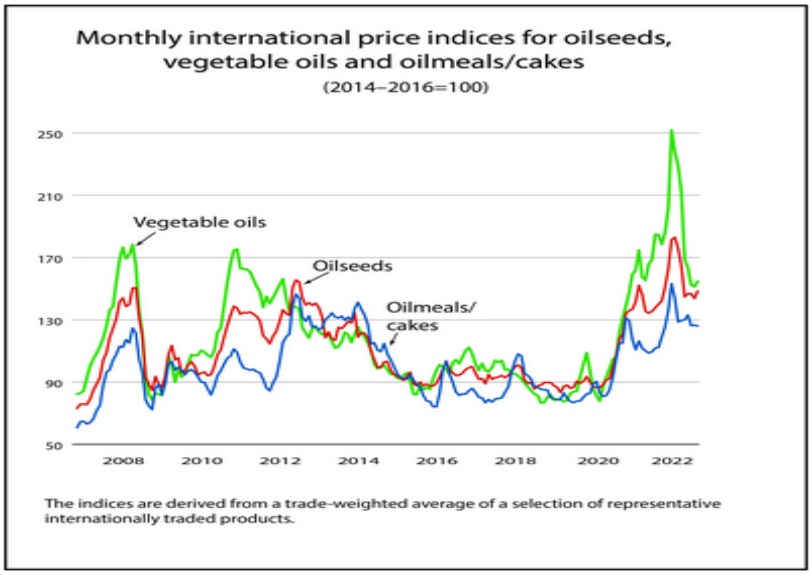


Source EU Commission by UFOP

Due to the increase in acreage in 2022, the production drop is less (see Ufop chart of the week 49/2022): "According to the latest EU Commission's estimate, 9.3 million tonnes of sunflower seeds were harvested in the European Union in 2022.(…) The area planted was expanded around 18 percent to a new record of 5.1 million hectares, but at 1.95 t/ha, yields fell nearly 18 % short of those reached in 2021."

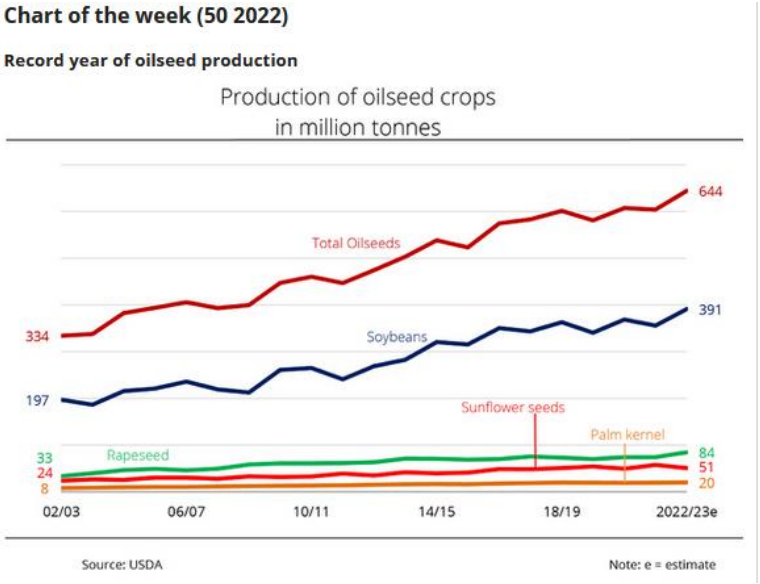
According to the USDA report on oilseeds world markets and trade of December 2022, the production would progress in Argentina, with 4,2Mt (+3,7% compared to 2021/22 and +22% / 2020/21) and in Turkey, wit 1,9Mt (+8,5% compared to 2021/22, +21,7%/2020/21).

FAO vegetable oil price index: come back to high but more reasonable levels



According to the FAO, "in November, the FAO price index* for oilseeds continued to fluctuate within the range observed in recent months, up 4.8 points (3.3 percent) from the previous month, while the oilmeal price index fell marginally (0.5 points or 0.4 percent). Meanwhile, the vegetable oil price index increased by 3.4 points (2.3 percent), after declining for seven consecutive months. "

According to current USDA estimates, global output of oilseeds in the crop year 2022/23 is set to hit a peak of around 644.4 million tonnes, which would be up around 7 per cent year-on-year.



Source: Ufop

Oil seed markets are currently influenced by the still fragile macroeconomic situation. On the one hand, oil prices have come to test the $70/barrel zone on WTI in New York, which is the lowest since October

2021. The easing of anti-covid measures in China nevertheless allowed oil to rebound, returning above $75/bl.

Project: CROPINNO, Sunflower as a model crop in a new Horizon Europe project to develop Innovation capacity for climate resilient crop improvement

Agriculture is one of the "victims" of climate change and one of the most severely affected sectors. It has become evident that as the climate changes, crop production strategies must change as well, including primarily adaptations through breeding and crop management. In the future, it is expected that integrative approaches that combine -omics technologies by using bioinformatic tools will facilitate the identification of target genes and markers for complex traits and facilitate crop adaptation to the changing environment. Within its activities, Twinning project CROPINNO will implement at and validate different phenotyping and multi-omics tools in breeding for improved stress resilience. Sunflower is chosen as a model crop for validation of different tools and approaches since it is considered as potential model crop for adaptation to a changing environment. Activities within CROPINNO are aimed at: i) pre-screening sunflower genotypes from IFVCNS collection using for biotic and abiotic stress resilience using different phenotyping methods; ii) study of effects of drought on sunflower plants at chromatin and transcriptional level; iii) performing whole genome SNP analysis in order to develop SNP-based markers for drought stress resilience; iv) performing integrated data analysis and comparative bioinformatics for drought responses in order to unveil possible direct correlations between stress-induced genes transcriptional variation and histone modification levels and design of networks of candidate genes for sunflower drought tolerance. Models, tools and know-how developed on sunflower will be transferred and implemented in the breeding programs of other main field crops at IFVCNS and Western Balkans region. CROPINNO is funded by HORIZON EUROPE and coordinated by IFVCNS. See information on Horizon Europe

Scientific news

Bioengineering to increase the yield of vegetable oil from plants

In November 2022, the ScienceDaily website reported results (University of Singapore) showing, in the laboratory, the possibility of increasing the yield of oil production by a plant. This method is patent pending. Scientists have successfully bioengineered an important protein in plants to increase the yield of oil from their fruits and seeds -- a holy grail for the global agri-food industry. Their patent-pending method can increase oil content in seeds by 15 to 18 per cent, which is a significant improvement since major oil-producing crops such as soybean, sunflower, rapeseed, and peanut, already have a high percentage of oil in their seeds. This innovation can help the world in its quest for sustainability, helping to reduce the amount of arable land needed for oil-yielding crops while increasing the yield to meet the world's growing demand for vegetable oil.

Read more at https://www.sciencedaily.com/releases/2022/11/221109124301.htm and original article at https://doi.org/10.1126/sciadv.abq1211

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Coming international and national events

17-21 January 2023, Hyderabad, India: ICVO 2023 International Conference on Vegetable Oils 2023, ICRISAT

https://www.icrisat.org/event/international-conference-on-vegetable-oils-2023-icvo-2023/

18-20 January 2023 Paris, France: Journées Chevreul

https://www.sfel.asso.fr/journee-chevreul-2023/

Deadlines: Registration 7-1-2023 / Abstracts deposit 10-12-2022 / Chosen selections oral/poster notification 15-12-2022

These anniversary 'Journées Chevreul' will provide an overview of all the research themes on lipids supported by SFEL/AFECG since its creation 80 years ago.

29-30-21 March 2023, Buenos Aires, Argentina: International Sunflower Seed and Oil Conference 2023

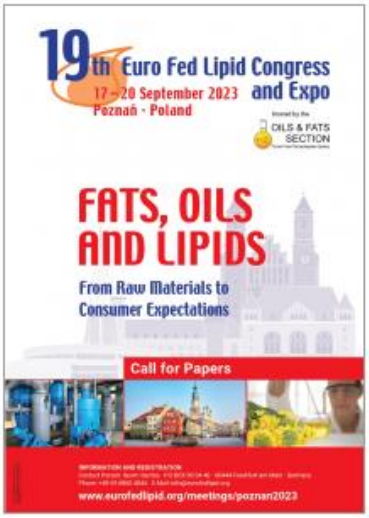
30 april-3 May 2023, Denver, USA: AOCS Annual Meeting and Expo
https://annualmeeting.aocs.org/program-session-topics

2023 AOCS Annual Meeting & Expo

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

3-7 July 2023, Paris, France: 14th Biennial International Society for Seed Science ISSS Conference
https://isss2023.sciencesconf.org/

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



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