Reports from the recipients of the Conference Grant, 20th International Sunflower Conference, June 20-23, 2022, Novi Sad, Serbia

5 students were selected to receive the student conference grant to enable them to participate to the ISC2022 in Novi Sad, Serbia: Rim Faridovich GUBAEV, Hudaverdi GURKAN, Jelena JOCKOVIC, Phrasia MAPFUMO, Kevein RUAS de OLIVEIRA.

You will find below a report of their studies as well as their feedback on the conference.

From left to right: Jelena Jockovic, Laetitia Devedeux (ISA), Phrasia Mapfumo, Rim Faridovich Gubaev, Kevein Ruas de Oliveira and Hudaverdi Gurkan.

Phrasia's story

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. However, from time to time, I analyse the data.

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 PAN7080, which is a hybrid cultivar commercially grown locally, in a split plot with three replications in an open field. Our trial is rainfed, with a control treatment at IA @UP, which is irrigated. Our second cropping season has six plantings.

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 the floral traits of sunflower, stigma receptivity and pollen viability tests were done. Insect visits were monitored. 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. Seeds were assessed for oil quality and quantity using a non-destructive method.

During the 2020/21 cropping season we observed *Sclerotinia* head rot on our November planting, which enabled us to do our artificial inoculation trial. Sclerotina head rot is a significant fungal disease in South Africa which causes a significant reduction in sunflower yield. Our artificial inoculation plants were sown in the field on a split plot with three replications. All six plantings have been inoculated.

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 a 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. ISA and her funded me to attend, 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's story

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 the 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 ISC2022 Organizing Committee for providing me opportunity to attend this conference and present part of our study.

Kevein's story

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. My research skills are focused in physiological analyses such as the determination of pigments (chlorophyll and carotenoid content), quantification of chlorophyll fluorescence - initial (Fo) and maximum (Fm) fluorescence, as well as the quantum efficiency of the photosystem II (Fv/Fm), in addition to the characterization of oxidative stress (lipid peroxidation – malondialdehyde (MDA) and H_2O_2 content) which are combined with total soluble proteins and antioxidant enzymes: superoxide dismutase (SOD, EC 1.15.1.1), catalase (CAT, EC 1.11.1.6), ascorbate peroxidase (APX, EC 1.11.1.11), glutathione peroxidase (GSH-Px, EC 1.11.1.9), guaiacol peroxidase (GPOX, EC1.11.1.7), glutathione reductase (GR, EC 1.6.4.2) and polyphenol oxidase – (PPO, EC 1.10. 3.1), to indicate how plants cope with stressful conditions. The induced tolerance/resistance to both abiotic and biotic stresses is also one of my goals.

Considering that I mainly worked on abiotic stresses before, I decided it was also important for me to get new insights and to be more involved with biotic stresses. In this way, since my arrival to Hungary, I have been giving more emphasis on that, especially the investigation of induced resistance (IR) against sunflower (*Helianthus annuus* L.) diseases. Even though the IR has been examined in several plant-pathogen interactions, the background is still not well known regarding the enzymatic antioxidant system. Therefore, I want to find out more information about the practical aspects of IR in sunflower plants under different plant-pathogen interactions. For my PhD research, in particular, 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. There is evidence in the literature that the induced resistance in plants is associated with the induction of defence-related hormones, changes in cellular redox balance and the levels of reactive oxygen species, defence-related enzymes, as well as non-enzymatic antioxidants. Therefore, my 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. Participating in the 20th ISC was unique. I got even more engaged with different aspects of science and especially my field of research. The various thematic sessions that were given focus at the conference, such as the current status of sunflower crop production, the biotic and abiotic stresses in sunflower cultivation (with new and emerging pests and diseases and the challenges of changing environment) were very important to increase my knowledge in sunflower research. As a young scientist, I must keep up with what is new in the world of science. 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. It was a chance to apply and develop new skills, share, and expand knowledge in sunflower research and certainly a real chance to increase my contact networking. Since I had the opportunity to present some of my research results as a poster and in a short oral presentation, it was possible for me to show my work to top sunflower researchers from different parts of the world. 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. Interacting and chatting with top sunflower researchers was amazing, and every moment I spent at the conference, as well as in the city of Novi Sad were incredible. For me, the 20th ISC was really well organised, scientifically and in terms of entertainment aspects. I really liked the field day tour; it was so nice to see in practice how our research can be applied in the field. The city tour around Novi Sad was also amazing. I felt really welcomed in Serbia.

Rim's story

I am a fourth-year PhD Student at the Skolkovo Institute of Science, Moscow, Russia. I do my research in the area of 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 decided to go to this 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 our collaborator 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 to 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 be 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's story

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 was 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.