

■ Participants' report

An overview of the World Congress on Light and Life 2019

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Currently, I am a Post-Doc researcher at the Department of Agriculture, Food and Environment of the University of Pisa under the supervision of Prof. Annamaria Ranieri. My post-doctoral research work deals with studying the biochemical and molecular effects of UV-B exposure on many fruit and vegetable species, e.g. peach, apple, tomato, and lettuce. The research is mainly addressed at investigating how light quality and intensity might modulate nutraceutical value and both pre- and post-harvest quality and shelf-life of plant-based food. The treatments are mostly performed with UV-B narrowband lamps, but currently, our focus is to introduce UV-A/UV-B LEDs due to their undeniable advantages in terms of efficiency, electricity costs, durability and precision in the wavelengths emitted. Commercial implications of this research (e.g. increasing health-promoting natural compounds, improving resistance to pests and pathogens and extending shelf life of plant food) might be of potential interest for many companies and producers.

I presented my Post-doctoral research in the Congress on Light and Life, which took place in Barcelona (Spain) from the 25th to the 30th of August 2019. This was the first joint congress between the 17th Congress of the International Union of Photobiology and the 18th Congress of the European Society for Photobiology. It was organised in the luxury Hotel Crowne Plaza Barcelona Fira Centre, which provided six excellent meeting rooms where the parallel symposia were

held.

The congress programme consisted of 7 keynote lectures, 2 plenary lectures and 12 symposia per day, with a total of 60 symposia. Two poster presentation areas were also set up, where the participants could go through sipping a coffee or tea and have a closer look at the presented work. The congress included multiple research areas: photomedicine and the photobiological sciences in all their aspects, e.g. chemistry, molecular biology, climatology, and environmental sciences, with a focus on how the ongoing climate change is affecting and will affect life on Earth. Particularly, I found the lecture “Molecular basis of plant responses to UV-B” by Prof. Gareth Jenkins (University of Glasgow) very interesting. The results presented in his talk showed how *Arabidopsis* plants acclimated to low UV-B irradiance responded differently from the non-acclimated plants when exposed to elevated UV-B irradiation. Results presented in a poster by Wei Liu showed that a photo-equilibrium is established between the UVR8 monomer and dimer forms in the UV-B-acclimated plants. However, when exposed to high UV-B, UVR8 monomerization was not enhanced, rather the binding with either COP1 or RUP1 was stimulated to increase the response to UV-B or to promote monomer re-dimerization, respectively, to maintain the photo-equilibrium. Although our group studies UV-B responses on different plant species, this fascinating work provides me many hints about how to in-



Figure 9.1: Rooms at the Hotel Crowne Plaza Barcelona Fira Centre where the parallel symposia took place. Plant Sciences symposia took place in (A) Verdi Room, (B) Rossini Room; environmental sciences symposia took place in (C) Coral + Crystal Room.

interpret some of our results and how to design the next experiments. The keynote lecture presented by Dr. Dongping Zhong, from The Ohio State University, also caught my attention. The talk was focused on deepening the mechanism of UV-B perception by the biologically active tryptophans within the UVR8 molecule. Innovative techniques such as time-resolved spectroscopy and extensive site-directed mutagenesis provided evidence that UV-B radiation triggers an energy flow network from the distal tryptophans to the epicentre tryptophans of the UVR8 photoreceptor. Dr. Zhong showed that mutations on only two epicentre tryptophans, W285 and W233, were critical for UV-B-induced UVR8 monomerization.

Considering the climate change and the increasing average global temperature, with an

impact on patterns of precipitation and solar radiation, the studies on plant responses in their natural environment were of great impact. Particularly, Dr. Matthew Robson from the University of Helsinki presented a study on different Alpine plant species from the Station Alpine du Lautaret, where UV-A and UV-B irradiance is considerably high due to the high altitude. The plants were grown under different plastic filters that cut off specific portions of the solar spectrum: UV-B, UV-A and UV-B, blue and UV. The results indicated that the anthocyanin, which acts as a UV-screening compound, the level differed among the species and showed fluctuations during the daytime, indicating a fine regulation between shielding the high UV irradiance and maintaining the photosynthetic functions.



Figure 9.2: The exhibit area.



Figure 9.3: The Garden Room, during a coffee break.

Later, Prof. Åke Strid from Örebro University moved the attention to the applied research in the horticulture field, presenting the potential use of supplementary UV-B irradiation to improve the production of greenhouse cucumber. This is of great importance particularly in Northern countries, where most crops are cultivated in greenhouses that screen the UV portion of the solar spectrum. As per the literature, UV-B- and UV-A-treated cucumber seedlings showed a reduced height and mass, thicker leaves and stronger plants, with differences attributed to either UV-A or UV-B irradiation. However, no changes were observed in terms of fruit yield when compared to the control. Since transportation and transplantation of cucumber plants represent potentially detrimental stress for the plants, having stronger cucumber plants without affecting cucumber fruit production is exactly what the producers need. For this reason, Prof. Åke Strid underlined clearly that such kind of studies needs a constant and efficient communication between the researchers and the growers/companies, to address the work towards the right direction to match the producers' requirements.

Although the studies presented during the different sessions were very interesting, only a few researchers have focused their attention on the UV effects on crop plants and fruits. Transferring the knowledge of the UV perception mechanisms and responses to crop plants and fruits would be of great interest and importance from an application point of view and more useful for the general public.

In addition to the congress dinner, a separate dinner was arranged at the Ayre Hotel Gran Via by the UV4Plants association for its members. Considering the strict timetable of symposia and lectures of the congress, the dinner provided a great opportunity for the members to get together, discuss work and strengthen collaborations in a more informal setting. Although not members yet, Dr. Paula

Casati and Prof. Janet Bornman were also present at the dinner and it was a great honour for us to have them there.

Overall, this first joint ESP-IUPB World Congress on Light and Life provided a valuable global forum for the dissemination of the latest discoveries and technologies in photobiology, exchanging ideas and establishing fruitful collaborations among researchers worldwide. Moreover, the city of Barcelona, with its warm weather and vibrant atmosphere, provided an ideal setting for this scientific event. I am very pleased to be able to participate in this congress and thankful to the UV4Plants Association for providing me a bursary. I believe that sharing scientific knowledge and establishing global networks among researchers worldwide through such scientific events is the true key to achieve the best results.

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Figure 9.4: The UV4Plants dinner during the Congress on Light and Life in Barcelona. An informal and relaxed atmosphere to strengthen collaborations and friendships among UV4Plants members. Such occasions are always precious not only to discuss about science, future works and careers, but also to make the UV4Plants association a great family.

