17TH CONGRESS
EUROPEAN SOCIETY FOR PHOTOBIOLOGY

PROGRAMME
AND
BOOK OF ABSTRACTS

Pisa, Italy
4 – 8 September, 2017

The detection of the yellow spot (macula lutea) in the retina and the finding that it is solely composed of lutein and zeaxanthin suggest that it plays a special role in visual performance. Lutein and zeaxanthin accumulate in the Henle fibre layer of the central retina (fovea). They are entirely of dietary origin and found mainly in green vegetables (e.g. kale, spinach). The absorption maximum is at about 460 nm. Lutein and zeaxanthin act as blue light filter: after the transit of light through the macula lutea, only about 5% of short-wave light (400-500 nm) reaches functional structures. Besides optical mechanisms, both xanthophylls also possess biological functions including lipophilic antioxidant capacity. As oxidative stress causes photoreceptor cell death and retinal degeneration, a protective role of lutein and zeaxanthin seems plausible.

Several recently conducted and ongoing human intervention studies in Jena demonstrated that an uptake of lutein and zeaxanthin, either as supplement or as complex food, already after four weeks of intervention significantly elevated antioxidant capacity in plasma, circulating xanthophyll levels in plasma as well as the macular pigment optical density. Therefore, food rich in lutein and zeaxanthin can be recommended as advantageous to AMD patients.

Some of the questions to be answered by further investigations are which dose of carotenoids is needed, whether a food extract is more preventive than whole food and how visual acuity is affected by food rich in lutein and zeaxanthin.

IL226

Photo-biotechnology for stress-tolerant and environmentally friendly crop plants based on phytochrome photoreceptors

Pill-Soon Song[1], Hyo-Yeon Lee[1], Jeong-Il Kim[2], Ganesan Markkandan[3]

[1]Jeju National University, Jeju, Republic of Korea; [2]Chonnam National University, Gwangju, Republic of Korea; [3]Presidency University, Kolkata, India

The photomorphogenic phenotypes such as the suppressed shade avoidance response and de-etiolation provide the potential for significant enhancement of crop yields through efficient photosynthesis. Of many light signal transducers and transcription factors involved in the photomorphogenic responses of plants, the transgenic overexpression of the photoreceptor genes at the uppermost stream of the signaling events, particularly phytochromes, crytochromes and phototropins as the transgenes for the genetic engineering of crops leads not only to the improved harvest yields, but also to the environmentally significant reduction of carbon dioxide in the atmosphere in the case of turf grass plants. In promoting the harvest yields of crops, the photoreceptors mediate the light regulation of photosynthetically important genes, and the improved yields often come with the tolerance to abiotic stresses such as drought, salinity and heavy metal ions. As a genetic engineering approach, the term photo-biotechnology has been coined to convey the idea that the greater the photosynthetic efficiency that crop plants can be engineered to possess, the stronger the resistance to biotic and abiotic stresses; so, as they say "Feeding two birds with one scone."

[*Supported by Grants 2015R1D1A3A01018983 (to PSS); 2014R1A1A2057739 (to JIK) and PJ00949901 (to HYL)*]

IL227

UV-B and grapevine: from plant physiology to the quality of berries and wine

Javier Martínez-Abaigar, Encarnación Núñez-Olivera

Universidad de La Rioja, Logroño, Spain

Grapevine is one of the most important crops worldwide, especially under mediterranean climates. This agricultural and economic sector includes table grapes and the production of wine and spirits, and is economically crucial for many countries. In the European Union, wine represents 3.5% of global trade in agricultural food products. Both the quantity and quality of grapes and wines vary each year, mainly determined by the variation in climate factors, such as temperature, solar radiation and water availability. Nevertheless, agricultural procedures, enological techniques and technological tools allow a better control of this climatic dependence. Manipulation of UV-B radiation is one of these tools.

Many studies have demonstrated that UV-B strongly influences the physiology of grapevine leaves at very different scales, from the molecules to the field, but the effects of UV-B on grapes and subsequent wines have been much less studied. In addition, most of these studies have been conducted under conditions difficultly applicable to commercial vineyards.

Here we review the present knowledge on the effects of UV-B on grapevine, particularly focusing on applied aspects of UV-B manipulation that may change the UV-B amount received by the plant, thus impacting on the quality of grapes and wine. Different methods and results will be shown and discussed: leaf removal *vs.* artificial applications of UV-B supplements; the use of filters, lamps and natural UV-B gradients in research; the moment of application; the interactions with other environmental factors in a context of climate change; the molecular tools; the accumulation of secondary metabolites, mainly phenolic compounds and terpenoids; the influence on pathogens; the effect of variety; the postharvest technologies; and the administrative regulations and marketing options. Finally, some future perspectives of UV-B management at a crop scale will be outlined.

IL228

Don't put sunscreen on fruits! UV-B radiation as a precious resource for peach quality

Marco Santin[1], Luigi Lucini[2], Marie-Theres Hauser[3], Antonella Castagna[1], Annamaria Ranieri[1]

[1]DISAAA-a UNIPI, Pisa, Italy; [2]Facoltà di Scienze Agrarie, Alimentari e Ambientali UNICATT Sede di Piacenza, Piacenza, Italy; [3]Institute of Applied Genetics and Cell Biology (IAGZ) BOKU, Wien, Austria

Peach (*Prunus persica* L.) plays a predominant role in the Mediterranean diet, and perfectly matches the consumers' increasing demand of healthy and health-promoting foods.

At low, ecologically-relevant levels, ultraviolet-B (UV-B) radiation (280-315 nm) is able to stimulate the secondary metabolism of plants, possibly increasing the health-promoting value of deriving food

Besides to genetic variability, UV-B effects on plant metabolism also depends on duration and intensity of UV-B radiation. Based on these considerations, the present research aimed to evaluate the impact of different doses of UV-B radiation on the metabolomics of peach fruit through non-targeted LC/MS metabolite profiling coupled with partial least squares discriminant analysis (PLS-DA).

In this study, melting flesh yellow peaches (cv. Fairtime) were exposed for 10 min or 60 min to UV-B radiation (2.31 W m^{-2}). Afterwards, the fruits were kept at room temperature for 24 and 36 hours.

Our work has shown that both the UV-B exposure times, 10 min and 60 min, have determined an effect on several metabolic classes on peach skin. This effect was more pronounced 36 h after exposure than 24 h after exposure.

Regarding the phenolics, the mostly well-known antioxidants and UV-B protective compounds, a general decrease was detected after 24 h in almost all the subclasses detected, maybe due to their consumption after having neutralized the UV-B-induced ROS. However, an overall increase was visible after 36 h, especially for dihydroflavonols, anthocyanins, and tyrosols probably after an upregulation in the biosynthetic genes involved in the phenylpropanoid pathway. Besides, an effect of UV-B radiation was shown also on other metabolic classes such as