

Conference Reports

Nutrient Biofortification and Exclusion of Pollutants in Food Plants

EU COST 859 Workshop at Sede Boqer Campus, Israel, October 23–25, 2007

Bernd Markert^{1*}, Peter Schroeder², Avi Golan-Goldhirsh³ and Jean Paul Schwitzgubel⁴

¹ Internationales Hochschulinstitut, Lehrstuhl für Umweltverfahrenstechnik, 02763 Zittau, Germany.

At present: Fliederweg 17, 49733 Haren/Erika, Germany

² Department Microbe-Plant Interactions, GSF National Research Center for Environment and Health, Neuherberg, Ingolstaedter Landstrasse 1, 85758 Neuherberg, Germany

³ Ben-Gurion University of the Negev, the Jacob Blaustein Institutes for Desert Research, Albert Katz Department of Dryland Biotechnologies, Sede Boqer Campus 84990, Israel

⁴ Laboratory for Environmental Biotechnology (LBE), Swiss Federal Institute of Technology, Lausanne (EPFL), 1015 Lausanne, Switzerland

* Corresponding author (markert@schlundmail.de)

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COST (European CO-operation in the field of Scientific and Technical Research) is an important intergovernmental framework that allows the coordination of nationally funded research on a European level. Herein, COST Action 859 is a network on phytotechnologies to promote sustainable land use and to improve food safety. The activities of COST 859 are divided into 4 interlinking working groups (WGs), in which WG1 is related to plant uptake/exclusion and translocation of nutrients and contaminants, WG2 concentrates on exploiting 'omics'-approaches in phytotechnologies, WG3 provides concepts for improving nutritional quality and safety of food crops and WG 4 deals with the integration and application of phytotechnologies (<http://w3.gre.ac.uk/cost859/working-groups.html>).

In the frame of COST-Action 859, an interdisciplinary workshop of WG1 and WG3 was held in Israel, October 2007. The workshop was hosted by Ben Gurion University of the Negev, Jacob Blaustein Institutes for Desert Research (BIDR) at the Sede-Boqer Campus.

The working group coordinators had invited the WG members to contribute to the important topic of 'Nutrient Biofortification and Exclusion of Pollutants in Food Plants' and had set up four scientific sessions – according to the four COST WGs – as well as a professional field trip for the COST delegates.

Highly interesting plenary lectures have given an excellent insight into hot topics of this COST action.

- Charlotte Poschenrieder from Barcelona, Spain, reported on 'heavy metals and plant secondary metabolism and its relevance for plant defense and medical herb quality'.
- Yona Chen from Jerusalem, Israel, presented 'the role of iron and its stimulatory effects of humic substances on plant growth'.
- Martin Broadley from Nottingham, UK, focussed his talk on 'improving the micronutrient content of crops using agronomic and genetic approaches with special reference to Selenium', and
- Jonathan Gressel from Rehovot, Israel, opened us 'potential biotechnological solutions to tropical mycotoxin and natural contaminations'.

Around 20 additional lectures and 40 posters of high quality supported human health by nutrient biofortification and the exclusion of pollutants in food plants. Plants yield more than 99% of the total biomass on earth. Thus, every organism on earth is constituted predominately from plants. The protection and conservation of the species and the diversity of species, particularly in tropical and subtropical areas, has been evaluated as one of the most important political and ecological demands in national and international politics. In addition, plants are responsible for

the most important reaction on earth, photosynthesis, in the course of which sugar molecules are produced from water and carbon dioxide in a complicated, light-driven reaction, and oxygen is produced simultaneously. Life on earth in its present form would not be possible without the production of carbohydrases in the respiratory chain. A system which diffuses into a state of imbalance, one that is fed by constantly increasing CO₂ emissions and the simultaneous indiscriminate destruction of tropical rain forests in particular, represents a great ecological and economic challenge for mankind due to the resulting greenhouse effect. With respect to their effect on the flow of matter and of energy in the food chain, plants represent an important link between the atmosphere and the soil, on the one hand, and between consumers from the first to the highest order (humans) on the other. Pollutants are introduced into the food chain via plants, and these pollutants often cause irreversible damage to individual organisms or to entire biological communities as a result of accumulation and exclusion processes.

As one outcome of the conference it can be stated that further research should develop control mechanisms for pollution release into the environment [including (bio-)technologies for avoiding it], its impact on living organisms and communities, and finally to balance the input/output charges of pollutants for human beings. For the future, a deeper insight in traditional and new biomolecular methods, the exchange of latest information on trace elements and organic compounds research, and the education of interested students in the field of biotechnologies were identified as important tasks.

After two days of intensive scientific discussions, a special field trip around the Negev desert invited the participants to realize the problems of the South of Israel between water consumption and plant water use efficiency. The excursion turned us to Advat – an ancient Nabatean Roman city with a view on a reconstructed Nabatean run-off farm, that had used an interesting technology of rain water storage in the field more than 2000 years before, furthermore to the Kibbutz Neot Smadar as an example for a constructed wetland in the desert and to date palm production using irrigation with saline water. The local scientists were able to mitigate the detrimental effects of Boron on plant health by adjusting optimum saline concentrations for the irrigation. Additionally, the effect of radon on alfalfa and the effect of different use of nitrogen compounds on the growth of tomato plants were demonstrated by the agronomists of this Kibbutz. All participants left the conference with the feeling that Israel is, for sure, a place to come back to.