

Program, Abstracts and List of Participants

of the

10th International Conference on Reactive Oxygen and Nitrogen Species in Plants

July 5-8, 2011, Budapest, Hungary

**Meeting of the Plant Oxygen Group
of the Society for Free Radical Research-Europe
(SFRR-E)**

Conference site

Main Building of the Hungarian Academy of Sciences
Széchenyi tér 9, 1051 Budapest, Hungary

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International Organizing Committee

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Zoltán Szigeti, Dept. Plant Physiol. Mol. Plant Biol., Eötvös Loránd University, Budapest

Scientific Program

Tuesday, July 5, 2011

16:00-19:00 Arrival, registration

19:00-21:00 Get-together and welcome reception

Wednesday, July 6, 2011

9:00-9:10 Welcome address, opening remarks

Session 1. ROS Production and Perception

Chair: Zbigniew Miszalski and Frank Van Breusegem

9:10-9:35 **Christine H. Foyer** (University of Leeds, United Kingdom)
Cellular redox homeostasis and regulation in the cell growth and stress tolerance

9:35-10:00 **Jaakko Kangasjärvi** (University of Helsinki, Finland)
ROS sensing in plant

10:00-10:15 **Jun'ichi Mano** (Yamaguchi University, Japan)
Reactive carbonyl species as mediators of oxidative stress

10:15-10:30 **Marcia Pinheiro Margis** (Universidade Federal do Rio Grande do Sul, Brazil)
APx-R: a new plant heme-containing protein

10:30-10:45 **Anna Kärkönen** (University of Helsinki, Finland)
Apoplastic H₂O₂ generation mechanisms during extra-cellular lignin formation in Norway spruce cell culture; phenolic metabolism after H₂O₂ removal

10:45-11:10 Coffee break

Session 2. Plant Metabolism and Development

Chair: José A. Hernández and Philip Mullineaux

11:10-11:35 **Sabine Lühje** (University of Hamburg, Germany)
B-type cytochromes of maize (*Zea mays* L.) root plasma membranes

11:35-11:50 **Jean-Philippe Reichheld** (Université de Perpignan, France)
Interplay between thiol redox control, plant development and auxin signaling in *Arabidopsis*

11:50-12:05 **Janine König** (University of Bielefeld, Germany)
The two faces of 2-Cys-peroxiredoxin: peroxidase and chaperone

12:05-12:20 **Manuel A. Matamoros** (Estación Experimental Aula Dei-CSIC, Zaragoza, Spain)
Characterization of thioredoxin and NADPH-thioredoxin reductase genes in *Lotus japonicus*

12:20-14:00 Lunch break

Session 2. Plant Metabolism and Development (continued)

14:00-14:15 **Irma Tari** (University of Szeged, Hungary)
Regulation of antioxidant defence systems and abscisic acid biosynthesis by salicylic acid in tomato roots

14:15-14:30 **Mario C. De Tullio** (University of Bari, Italy)
In praise of ascorbate oxidase: a 'wasteful enzyme' revisited

Session 3. Redox Signaling and Gene Expression

Chair: Laura De Gara and Jaakko Kangasjärvi

14:30–14:55 **Frank Van Breusegem** (VIB-Ghent University, Belgium)
Hydrogen peroxide signal transduction. Gathering the pieces.

14:55–15:20 **José A. Hernández** (CEBAS-CSIC, Murcia, Spain)
Role of H₂O₂ during pea seed germination: a combined proteomic and hormone profiling approach

15:20–15:45 **Christian Lindermayr** (Helmholtz Zentrum München, Germany)
Protein S-nitrosylation – function of S-nitrosoglutathione reductase in plants

15:45–16:00 **Amna Mhamdi** (Université Paris Sud, France)
Glutathione is a key player in defence phytohormone signalling triggered by intracellular H₂O₂

16:00-16:20 Coffee break

- 16:20–16:35 **Kazuyuki Kuchitsu** (Tokyo University of Science, Japan)
Regulation of ROS production in early signaling network in innate immunity in cultured plant cells
- 16:35–16:50 **Christophe Bailly** (Université Pierre et Marie Curie, Paris, France)
Regulation of cell signaling by specific mRNA oxidation is involved in seed germination
- 16:50–17:05 **Ralf Oelmüller** (Friedrich-Schiller University Jena, Germany)
Redox responsive transcription factor 1 (RRTF1) is an amplifier of radical oxygen signaling in *Arabidopsis thaliana*

Session 4. Photosynthesis and Respiration

Chair: H el ene Vanacker and Zolt an Szigeti

- 17:05–17:30 **Zbigniew Miszalski** (Institute of Plant Physiology, Krak ow, Poland)
Involvement of ROS in C₃-CAM shift in *Mesembryanthemum crystallinum* L. plants
- 17:30–17:45 **Anja Krieger-Liszkay** (CEA Saclay, Gif-sur-Yvette, France)
Superoxide anion radicals and singlet oxygen damage photosystem II
- 17:45-18:00 ** Eva Hideg** (Biological Research Centre Szeged, Hungary)
Photosensitized singlet oxygen elicitors in leaves – what are they doing?

18:00-20:00 **POSTER VIEWING**

Thursday, July 7, 2011

Session 4. Photosynthesis and Respiration (continued)

- 9:00–9:25 **Philip M. Mullineaux** (University of Essex, Colchester, United Kingdom)
Cheating death: the role of reactive oxygen species in signalling for high light acclimation in *Arabidopsis*
- 9:25–9:40 **Yoshitaka Nishiyama** (Saitama University, Japan)
Role of reactive oxygen species in the regulation of photosynthesis and protein synthesis under photoinhibition
- 9:40-9:55 **Zolt an Szigeti** (E tv os Lor and University, Budapest, Hungary)
Resistance mechanism of horseweed to superoxide generating paraquat

9:55-10:10 **Boris N. Ivanov** (Institute of Basic Biological Problems, Pushchino, Russia)
The mechanisms of oxygen reduction in photosynthetic electron transport chain and hydrogen peroxide formation in chloroplast thylakoid membrane

10:10-10:25 **Anne-Sophie Bohrer** (Université Paris-Sud, France)
An atypical reduction mechanism for the chloroplastic thioredoxin z in *Arabidopsis thaliana*

10:25-10:40 **Veronica G. Maurino** (Heinrich-Heine-University, Düsseldorf, Germany)
Dynamic of the expression of ROS-responsive genes after the induction of H₂O₂ formation in chloroplasts

10:40–11:00 Coffee break

Session 5. Abiotic Stress

Chair: C. Jacyn Baker and Balázs Barna

11:00–11:25 **Alex Levine** (The Hebrew University of Jerusalem, Israel)
Coordination of plant responses to salt stress by phosphatidylinositol 5-phosphatases: from stress perception in plasma membrane to gene expression

11:25–11:50 **Maria C. De Pinto** (University of Bari, Italy)
Defense mechanisms activated by TBY-2 cells in response to short and long term heat stress

11:50-12:05 **Claudia Jonak** (Gregor Mendel Institute, Vienna, Austria)
Phosphorylation - mediated stress signalling and redox regulation

12:05-12:20 **László Szabados** (Biological Research Centre, Szeged, Hungary)
Proline metabolism and oxidative stress

12:20-14:00 Lunch break

14:00-14:15 **Michael Frei** (University of Bonn, Germany)
The significance of oxidative stress tolerance in the breeding of stress resistant rice

14:15-14:30 **Tsanko S. Gechev** (University of Plovdiv, Bulgaria)
Transcriptome and metabolome analysis of the desiccation tolerant glacial relic *Haberlea rhodopensis* reveal potential new players in drought tolerance

14:30-14:45 **Ann Cuypers** (Hasselt University, Diepenbeek, Belgium)
The cellular redox state as a modulator in cadmium and copper responses in *Arabidopsis thaliana* seedlings

- 14:45-15:00 **Marina Leterrier** (Estación Experimental del Zaidín, Granada, Spain)
Arabidopsis cys-c1 knockout mutant which accumulates cyanide but has lower NO content in root tissues is more sensitive to arsenic stress
- 15:00-15:15 **Evelyn Farfan** (University of Antwerp, Belgium)
Future climate conditions (elevated CO₂ and temperature) improve plant stress responses, through better redox homeostasis
- 15:15-15:30 **Russell L. Jones** (University of California, Berkeley, CA, USA)
Hydrogen sulfide protects against chilling-induced oxidative stress
- 15:30-15:45 **Gábor Kocsy** (Agricultural Research Inst., Martonvásár, Hungary)
Study of the redox control of cold acclimation and vegetative to generative transition in wheat
- 15:45-16:05 Coffee break

Session 6. Plant Antioxidants and Health

Chair: Alain Puppo and András Szarka

- 16:05-16:30 **Alan J. Slusarenko** (Aachen University, Germany)
Allicin from garlic is a redox toxin that pushes cells into apoptosis
- 16:30-16:45 **Maria Müller** (University of Graz, Austria)
Subcellular quantification of glutathione under different environmental stress situations
- 16:45-17:00 **Valentina Picchi** (Agricultural Research Council, Milan, Italy)
On the different scavenging capacity of pure compounds and fruit extracts against superoxide and hydroxyl radicals
- 17:00-17:15 **Dmytro I. Lytvyn** (Institute of Food Biotechnology and Genomics, Kiev, Ukraine)
1-L-Myo-inositol-3-phosphate synthase deficient *Arabidopsis thaliana* plants display raised tissue-specific sensitivity to oxidative stress
- 17:15-18:30 **POSTER VIEWING**
- 17:15-18:30 **PLANT OXYGEN GROUP MEETING**
- 19:00-22:00 **CONFERENCE DINNER (DANUBE BOAT TOUR)**

Friday, July 8, 2011

Session 7. Reactive Nitrogen Species (RNS)

Chair: Christine H. Foyer and Jörg Durner

- 9:00–9:25 **Massimo Delledonne** (University of Verona, Italy)
Nitric oxide is a central starting point for multiple signaling cascades during the disease resistance response
- 9:25–9:40 **David Wendehenne** (UMR INRA/CNRS/Univ. of Burgundy, Dijon, France)
GAPDH, NtOSAK and CDC48, a conserved chaperone-like AAA-ATPase, as nitric oxide targets in response to (a)biotic stresses
- 9:40-9:55 **Olga Blokhina** (University of Helsinki, Finland)
Metabolic and physiological responses of *Arabidopsis* plants expressing *Vitreoscilla* hemoglobin (VHb) to nitrosative stress
- 9:55-10:10 **José León** (Instituto de Biología Molecular y Celular de Plantas, CSIC-UPV, Valencia, Spain)
Nitric oxide regulates DELLA content and *PIF* expression to promote photomorphogenesis in *Arabidopsis*
- 10:10-10:25 **Helena G. Carvalho** (Inst. for Molecular and Cell Biology, Porto, Portugal)
Regulation of glutamine synthetase by reactive nitrogen species in root nodules of *Medicago truncatula*
- 10:25-10:40 **Tibor Janda** (Agricultural Research Inst., Martonvásár, Hungary)
Atnoa1 mutation may induce temperature acclimation mechanisms in *Arabidopsis thaliana*
- 10:40-11:00 Coffee break

Session 8. Plant-Microbe Interactions

Chair: Jean-Pierre Métraux and Gábor Gullner

- 11:00-11:25 **Alain Puppo** (UMR IBSV INRA - CNRS - Univ. de Nice, France)
Oxygen and nitrogen species are very active in the legume – rhizobium symbiosis
- 11:25-11:50 **C. Jacyn Baker** (US. Dept. of Agriculture, Beltsville, MD, USA)
How does redox metabolism in the apoplast affect bacterial pathogenesis?
- 11:50-12:15 **Gary J. Loake** (University of Edinburgh, UK)
Plant immuNOlogy: cracking the redox code

- 12:15-14:00 Lunch break
- 14:00-14:25 **Andrey A. Aver'yanov** (Res. Inst. of Phytopathology, B. Vyazemy, Russia)
Pro-/antioxidant state of infection droplets as related to systemic acquired resistance of rice to blast disease
- 14:25-14:50 **Floriane L'Haridon** (University of Fribourg, Switzerland)
A permeable cuticle is associated with the release of reactive oxygen species and induction of innate immunity
- 14:50-15:05 **Ming-Tsair Chan** (Academia Sinica Biotechnology Center, Taiwan)
Ectopic expression of an EAR motif deletion mutant of *SIERF3* enhances tolerance to salt stress and *Ralstonia solanacearum* in tomato
- 15:05-15:20 **Balázs Barna** (Plant Protection Institute, Budapest, Hungary)
The Janus-face of reactive oxygen species in resistance of plants to necrotrophic and biotrophic pathogens
- 15:20-15:35 **Gildas Bourdais** (The Sainsbury Laboratory, Norwich, UK)
Signalling in stomatal responses to biotic and abiotic stresses
- 15:35-15:55 Coffee break
- 15:55-16:10 **Françoise Simon-Plas** (INRA, UMR PME, Dijon, France)
Role of reactive oxygen species in the modulation of gene expression by cryptogein, an elicitor of defense reactions
- 16:10-16:25 **Bernd Zechmann** (University of Graz, Austria)
Sulfur-induced resistance is correlated with enhanced glutathione metabolism in *Tobacco mosaic virus*-infected tobacco plants
- 16:25-16:40 **Lóránt Király** (Plant Protection Institute, Budapest, Hungary)
Resistance to disease symptoms in tobacco induced by pretreatment with low concentrations of H₂O₂
- 16:40 Closing of the conference

P-158. CHANGES IN ANTIOXIDANT CAPACITY OF SOYBEAN AND MAIZE SEEDLINGS AS A RESPONSE TO *RHIZOCTONIA SOLANI* KÜHN INFECTION

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Changes in enzymatic and non-enzymatic antioxidant systems in leaves and roots of soybean and maize seedlings were studied after inoculation with *Rhizoctonia solani* Kühn, AG 2-2 IIIB. After the infection with *R. solani*, increase in superoxide anion ($O_2^{\cdot -}$) scavenging activity was recorded only in leaves and roots of soybean plants. Hydroxyl radical ($\cdot OH$), the production of which was remarkably increased in infected soybean seedlings, were invariably produced in infected maize seedlings in comparison to control. Furthermore, superoxide-dismutase activity increased only in infected maize roots, which could point to enhanced $O_2^{\cdot -}$ dismutation. Nevertheless, lipid peroxidation intensity was notably recorded only in soybean plants, which could lead to presumption that $\cdot OH$ was successfully neutralized in maize seedlings and that membrane lipids were prevented from peroxidation with $\cdot OH$, potentially the most responsible for these processes. Peroxidase were significantly active in infected leaves compared to control in both species, especially in soybean.

Naturally, ROS accumulation induced significantly enhanced phenylalanin ammonia-lyase (PAL) activity, which escalated phenolic compounds synthesis in maize seedlings. Ability to accumulate phenolics, under the condition of pathogen attack, correlated with the results for the DPPH-assay that determines these maize plants in active group¹. However, infected soybean seedlings showed significant deficiency in these compounds in comparison to control, thus it indicated lack of complementariness between non-enzymatic and enzymatic antioxidant systems.

Both species responded to *R. solani* infection inducing non-enzymatic antioxidant system which was in correlation with necrotic processes developed on inoculated plants. Therefore, enhanced antioxidant activity of investigated plants could be presumed as defensive response to the pathogen infection. According to our results, inoculated soybean plants showed that their antioxidant systems cannot prevent ROS increase, thus they were ineffective to counteract with oxidative stress induced by *R. solani*. Contrary to soybean, enzymatic system in maize roots presented an excellent complement to enhanced non-enzymatic system in maize leaves, which ultimately led to more effective ROS neutralization. Results obtained may contribute to better understanding and knowledge of different plants responses to pathogen attack which could help plant producers and breeders in selection of plant genotypes with more efficient antioxidant systems.

1. Lee S, Mbwambo Z, Chung H, Luyengi L, Gamez E, Mehta R, Kinghorn A, Pezzuto J. 1998. Evaluation of the antioxidant potential of natural products. *Combinatorial Chemistry and High Throughput Screening* 1: 35-46.