7th International Symposium on Root Development: Adventitious, lateral & primary roots

- at the crossroads of genome, environment & technology

15 – 19 September 2014

Weimar, Germany

www.rooting2014.org

Conference Handbook

Scientific Program and Abstracts

Program

Monday, 15 September 2014

17:30 Registration & poster set up

19:00 Welcome Buffet

Tuesday, 16 September 2014

07:30 Registration & poster set up

08:30 **Opening** *with welcome address of:*

- Prof. Dr. Eckhard George*, Scientific Director, Leibniz Institute of Vegetable- and Ornamental Crops (IGZ)*

09:00 **Opening lecture: Karin Ljung** (Umeå Plant Science Centre, Sweden)
Auxin metabolism and interactions during Arabidopsis root development - how to regulate the concentration of the regulator

Session I: Auxin homeostasis and response in root development
Moderator: Catherine Bellini (Umeå Plant Science Centre, Sweden)

09:40 **Mehdi Massoumi** (Wageningen University and Research Centre, The Netherlands)
Analysis of the role of polar auxin transport during adventitious root formation from Arabidopsis hypocotyls using mutants

10:00 **Elena Varas** (Inst. de Investigaciones Agrobiológicas de Galicia, Spain)
Effect of NPA on adventitious root induction and root development in leaves of chestnut microshoots

10:20 Coffee break

10:50 **Siamsa M. Doyle** (Umeå Plant Science Centre, Sweden)
A chemical genomics approach to identify endogenous compounds regulating auxin transport in root cells

11:10 **Victoria Mironova** (Novosibirsk State University, Russia)
How the plant root deals with missing of a PIN auxin transporter

11:30 **Peter Schopfer** (University of Freiburg, Germany)
Lateral root formation in Arabidopsis I: New insights into pattern formation

11:50 **Stefan Kircher** (University of Freiburg, Germany)
Lateral root formation in Arabidopsis II: Endogenous clock or auxin-modulated oscillator?

12:10 **Keynote: Malcolm Bennett** (The University of Nottingham, UK)
Uncovering the hidden half of plant biology

12:40 Lunch

14:00 **Plenary lecture: Sabrina Sabatini** (Sapienza University of Rome, Italy)
Molecular mechanisms involved in coherent root growth

Session II: Fine control of cell cycle and cell differentiation in root developmen
Moderator: Manuel Acosta (University of Murcia, Spain)

14:40 **Maria Maddalena Altamura** (Sapienza University of Rome, Italy)
The switch in cell-identity acquisition leading to either adventitious rooting or xylogenesis is controlled by SHR and SCR, and involves AUX1, in Arabidopsis thaliana hypocotyls and stem thin cell layers

15:00 **Einat Sadot** (Volcani Center, Israel)
Subtle perturbations to microtubules uncouple cell division from differentiation during adventitious root formation in Arabidopsis

15:20 Coffee break

15:50 **Elison B. Blancaflor** (The Samuel Roberts Noble Foundation, USA)
A Trans-Golgi Network (TGN)-localized Tetratricopeptide Repeat-Like Superfamily Protein functions in actin-mediated root developmental processes

16:10 **Victor Ivanov** (Russian Academy of Sciences, Russia)
Temporal relations between cell divisions, life-span of cells in meristem and root cell transition to elongation

16:30 – 19:00 **Poster Session I**

Wednesday, 17 September 2014

08:30 **Plenary lecture: Gloria Muday** (Wake Forest University, USA)
Auxin and ethylene cross talk controlling lateral and adventitious root formation

Session III: Other hormones, signals and related crosstalk in root development
Moderator: Malcolm Bennett (The University of Nottingham, UK)

09:10 **Angela Veloccia** (Sapienza University of Rome, Italy)
Ethylene role in adventitious root formation in Arabidopsis thaliana thin cell layers

09:30 **Junli Liu** (Durham University, UK)
Elucidating hormonal crosstalk in root development: experiments, network construction and spatiotemporal modelling for the interaction of PLS and PIN

09:50 **Keynote: Catherine Bellini** (Umeå Plant Science Centre, Sweden)
Adventitious rooting is controlled by a complex interaction between auxin and jasmonate signaling pathways

10:20 Coffee Break

10:50 **Yuko Maki** (Snow Brand Seed Co, Japan)
Phenyllactic acid isolated from "bokashi" fertilizer promotes rooting through auxin response

11:10 **Francisco Pérez-Alfocea** (CEBAS-CSIC, Spain)
Hormonal changes in the roots of ABA overproducing tomato plants

11:30 **Aditi Gupta** (National Institute of Plant Genome Research, India)
Interaction between glucose and brassinosteroid signalling pathways during early seedling root growth and development in Arabidopsis

11:50 **Manjul Singh** (National Institute of Plant Genome Research, India)
Glucose-phytohormone interaction in modulation of root directional growth of Arabidopsis seedling

12:10 **Keynote: Michael A. Djordjevic** (Australian National University, Australia)
Regulatory CEP Peptides negatively control lateral root formation in Medicago truncatula and enhance competency for root nodulation

12:40 Lunch

13:45 Guided Weimar tour:
UNESCO World Heritage in Weimar & Duchess Anna Amalia Library:
group I - 13:45 – 17:00 group II – 14:15 – 17:30
group III – 14:45 – 18:00 group IV – 15:15 – 18:30,
The relevant group is indicated in the conference bag.

20:00 Conference dinner:

Location: Villa Haar, Dichterweg 2 a, 99425 Weimar

with welcome addresses of:

- Stefan Wolf*, Lord Major of the city of Weimar*
- Dr. Patricia Schmitz-Möller*, Program Director "Life Science I" German Research Foundation (DFG)*

Thursday, 18 September 2014

09:00 **Plenary lecture: Lorenzo Lamattina** (Universidad Nacional de Mar del Plata, Argentina)
NO secrets: Unravelling the hidden story of root growth and developmental processes

Session IV: Environmental control and practical aspects of root development
Moderator: Carmen Díaz-Sala (University of Alcala, Spain)

09:40 **Margareta Welander** (Swedish University of Agricultural Sciences, Sweden)
Environmental factors influencing rooting of Aristolochia manschuriensis in semi-solid agar medium and the new Plantform bioreactor

10:00 **Uwe Druege** (Leibniz Institute of Vegetable and Ornamental Crops, Germany)
Enhanced adventitious rooting of Petunia cuttings after dark storage involves rooting zone-specific expression of invertases during the dark phase

10:20 **Laszlo Kocsis** (University of Pannonia, Hungary)
Seasonal changes of root development of Cabernet sauvignon grafted on different rootstocks

10:40 Coffee break

11:10 **Yi Zhou** (University of Adelaide, Australia)
Root distortion and development of wheat under different cropping systems

11:30 **Frédéric Danjon** (INRA, France)
In-depth phenotyping of root architecture and root deformations in planted Pinus pinaster saplings

11:50 **Audrey Lemay** (Université du Québec à Chicoutimi, Canada)
How does the root system inhibit windthrow in thinned black spruce sites in the boreal forest?

12:10 **Annie DesRochers** (University of Quebec in Abitibi-Temiscamingue, Canada)
Root clonal networks preserve genetic diversity in trembling aspen stands of eastern Canada

12:30 Lunch

14:00 **Plenary lecture: Nicolaus von Wirén** (Leibniz Institute of Plant Genetics and Crop Plant Research, Germany)
Impact of nutrient availability on root system architecture

Session Va: Competence for root development: genetics and donor plant effects
Moderator: Arthur Fett-Neto (Federal University of Rio Grande do Sul, Brazil)

14:40 **Anja Paschold** (University of Bonn, Germany)
Dynamic single parent expression patterns in primary root tissues of maize hybrids and their parents are driven by non-syntenic genes

15:00 Coffee break

15:30 **José Manuel Pérez-Pérez** (Universidad Miguel Hernández, Spain)
Genetical genomics of adventitious root formation in carnation cuttings

15:50 **Keynote: Carmen Díaz-Sala** (University of Alcalá, Spain)
Maturation-related decline of adventitious root formation in pine: Searching for cell reprogramming genes by transcriptome analysis

16:20 **Gregor Osterc** (University of Ljubljana, Slovenia)
Physiological maturation and rooting: what is really happening on the biochemical level?

16:40 – 19:00 **Poster Session II**

Friday, 19 September 2014

Session VI: New tools to analyze and control root development
Moderator: Annie DesRochers (Université d. Québec en Abitibi-Témiscamingue, Canada)

08:30 **Jerzy Nakielski** (University of Silesia, Poland)
Computer simulation of the root cap regeneration

08:50 **Joanna Szymanowska-Pułka** (University of Silesia, Poland)
A lateral root development – catching up the form

09:10 **Adriano Sofo** (Università degli Studi della Basilicata, Italy)
Root architecture and morphometric analysis of Arabidopsis thaliana grown in metal-gradient agar dishes

09:30 **Dieter Lohr** (Weihenstephan-Triesdorf University of Applied Sciences, Germany)
Near infrared spectroscopy as a rapid tool to predict rooting capacity depending on nitrogen and carbohydrate status of cuttings

09:50 Coffee break

10:20 **Plenary lecture: Guido Grossmann** (Ruprecht-Karls-University Heidelberg, Germany)
Tracking molecular flux in roots

Session Vb: Competence for root development: genetics and donor plant effects
Moderator: Uwe Druege (Leibniz Institute of Vegetable and Ornamental Crops, Germany)

11:00 **Keynote: Amanda Rasmussen** (The University of Nottingham, UK),
Plant puberty: do hormonal changes during floral switch cause decline in pea cutting adventitious root formation?

11:30 **Millicent A. Otiende** (Maseno University, Kenya)
Effect of cutting position on adventitious rooting of rose and relations to endogenous auxin and cytokinins

11:50 **Arthur G. Fett-Neto** (Universidade Federal do Rio Grande do Sul, Brazil)
Gene expression during adventitious rooting in Eucalyptus globulus micro-cuttings derived from donor plants exposed to far-red light

12:10 Closing Session

12:40 Lunch

Root architecture and morphometric analysis of *Arabidopsis thaliana* grown in metal-gradient agar dishes

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This study aims at elucidating root reactions to the toxic heavy metals cadmium, copper and zinc at sub-toxic concentrations (10 µM $CdSO_4$, 5 µM $CuSO_4$, and 150 µM $ZnSO_4$). For this purpose, we devised a new screening strategy using Petri dishes (12 x 12 cm) with a gradient of distances between germinating seeds and a metal-contaminated medium concentrations in order to study alterations in root architecture and morphology of *Arabidopsis thaliana* (L.) Heinh. (Columbia ecotype; Col-0) when treated with each metal alone (Cd, Cu, Zn) or in triple combination (Cd/Cu/Zn). Each dish was filled with 100 mL melted agarized medium (bacteriological agar supplemented with 0.5% sucrose and 1/4 strength Murashige and Skoog liquid medium without micronutrient and vitamins) + metal . After the medium solidified, the gel was cut diagonally under sterile conditions and the upper half discharged. Then, a metal-free melted medium was poured into the dish in order to fill the empty space. After the second solidification step, top agar (1.5 cm from the upper border) was removed to allow shoot development. Control dishes without metals were kept as controls. Agar final thickness was 0.4 cm. Seeds were sterilized in sodium hypochlorite and let to germinate (eight seeds per plate) at the top of the dishes. To simulate the dark conditions of the soil, the top agar surface (0.3 mm) was covered with activated carbon and the rest of the dish surface covered with a dark foil. Dishes were kept in a growth chamber under controlled conditions. After two weeks, all agar dishes were scanned at high resolution by an image analysis system and the whole root systems analysed. For each plant, the following morphological measurements were carried out: total length of the root system, length of primary root and lateral roots, number of root tips, average root diameter, root density, root growth angle and slope. Metal concentration in the dishes was determined by inductively coupled plasma-atomic emission spectrometry (ICP-AES) on digested agar samples collected along the gradient, and a diffusion coefficient for each metal was calculated. In the presence of all metals, and of Cd in particular, primary root length significantly decreased compared to controls whereas root system total length increased due to the higher root branching. This was confirmed by the significantly higher number of root tips in metal-treated seedlings. The seedlings nearer to the areas with agar + metals showed a marked curvature and a higher root branching. This behavior, together with an observed increase in root diameter in metal-treated seedlings may be interpreted as compensatory growth, and a thicker roots could act as a barrier to protect root from the metals. We therefore propose that the remodelling of the root