The Root Zone: Soil Physics & Beyond

BARD-Hosted
2016 Kirkham Conference
And the Research workshop of
the Israel Science Foundation

Ben-Gurion University of the Negev, Sede Boqer Campus, Israel,
10-14 April
### Schedule

#### 10.4.16 Sunday

**18:00**  Reception dinner at Sfinat Hamidbar

**19:00**  **Opening lecture** - Hendrik Bruins, Ben-Gurion University of the Negev  
*Planning for food security: Global perspectives, roots and reserves*

**20:00**  Ensemble Joya

#### 11.4.16 Monday

**9:00-9:20**  **Welcome and opening remarks**  
Naftali Lazarovitch, Ben-Gurion University of the Negev  
Dan Blumberg, Vice President, Ben-Gurion University of the Negev

**Session 1 - Don Kirkham (Presider: Brent Clothier, Plant & Food Research)**

**9:20-9:50**  Jan Hopmans, University of California, Davis  
*Progress in Root zone Research – A tribute to Don Kirkham*

**9:50-10:20**  **Kirkham Medal Ceremony**  
*Lecture of prize winner*

**10:20-11:00**  **Coffee**

**Session 2 - Water flow and uptake (Presider: Keith Bristow, CSIRO)**

**11:00-11:30**  Mathieu Javaux, Université catholique de Louvain  
*Modeling root water uptake and growth in heterogeneous soils*

**11:30-12:00**  Maciej Zwieniecki, University of California, Davis  
*Active control of water fluxes in plants*

**12:00-12:30**  Jirka Simunek, University of California, Riverside  
*Modeling root water and nutrient uptake using a macroscopic approach*

**12:30-12:45**  Valentin Couvreur, Université catholique de Louvain  
*An upscaling model describing root radial hydraulic conductivity from cross section anatomy and aquaporin expression patterns*

**12:45-13:05**  Discussions

**13:05-14:30**  **Lunch**

**Session 3 - Root respiration and soil aeration (Presider: Shmulik**
Friedman, ARO)

14:30-15:00 Scott Jones, Utah State University
Considerations for growing plants in the reduced gravity of space: gas percolation and root intrusion effects in porous media

15:00-15:30 Shimon Rachmilevitch, Ben-Gurion University of the Negev
Root respiration in response to abiotic stress and neighbors

15:30-15:45 Indira Paudel, ARO, Volcani Center
Quantifying the CO₂ transported in xylem and soil in grapefruit orchards

15:45-16:00 Ilan Ben-Noach, ARO, Volcani Center
Barrel experiments for evaluating the effects of oxygation of clayey soils on pepper yield and continuum modeling of air injection into the root zone

16:00-16:20 Discussions

16:20-17:00 Coffee

Session 4 - Solute uptake by roots (Presider: Moshe Silberbush, Ben-Gurion University of the Negev)

17:00-17:30 Hans Lambers, The University of Western Australia
Plant phosphorus acquisition strategies on the world’s most phosphorus-impoverished soils

17:30-18:00 Jonathan Lynch, Pennsylvania State University
Anatomics: exploiting root anatomical phenes to develop crops with improved soil resource capture

18:00-18:15 Uri Nachshon, ARO, Volcani Center
Soil structure and texture manipulation to control root zone salt distribution

18:15-19:00 Discussions

19:00 Dinner + Jezart (Jaz Music)

21:00 Moonlight walk
**12.4.16 Tuesday**

6:30-8:00 Early morning walk

**Session 5 - Root-soil interface and noninvasive measurements**

*(Presider: Alex Furman, Technion - Israel Institute of Technology)*

8:30-9:00 Jan Vanderborght, Forschungszentrum Jülich IBG-3

*Combination of root zone process observations with process models*

9:00-9:30 Andrea Carminati, Georg-August University Goettingen

*Biophysical rhizosphere processes affecting root water uptake*

9:30-10:00 Tiina Roose, University of Southampton

*Multiscale image based modelling of plant soil interaction*

10:00-10:15 Nele Friederike Richter-Harder, Georg-August-University of Goettingen

*Hydraulic conductivity of roots, soil and their interface*

10:15-10:35 Discussions

10:35-11:15 **Coffee**

**Session 6 - Root morphology, architecture and growth** *(Presider: Jhonathan E. Ephrath, Ben-Gurion University of the Negev)*

11:15-11:45 Boris Rewald, University of Natural Resources and Life Sciences

*A root is a root is a root? – The importance to differentiate between root types*

11:45-12:15 Alain Pierret, Institut de Recherche pour le Développement

*The role of deep roots in deep critical zone processes*

12:15-12:45 Hinanit Koltai, ARO, *Volcani Center*

*Strigolactones are regulators of root development and response to phosphate deficiency*

12:45-13:00 Sigal Savaldi-Goldstein, Technion - Israel Institute of Technology

*Regulation of root growth by brassinosteroids*

13:00-13:20 Discussions

13:20-14:20 **Lunch**

**Session 7 - Biophysical processes in the soil** *(Presider: Markus Tuller, The University of Arizona)*

14:20-14:50 Paul Hallett, University of Aberdeen

*Rhizosphere by design: root traits that physically manipulate soil*
14:50-15:20  Teamrat Ghezzehei, University of California, Merced

*Rhizosphere Hydrodynamics: how do roots modulate flow and transport properties in their immediate environment*

16:20-16:35  Nimrod Schwartz, Université catholique de Louvain

*The impact of mucilage exudate on root water uptake – numerical study*

16:35-16:50  Ravid Rosenzweig, Geological Survey of Israel

*Direct measurement of hydraulic properties of unsaturated biofilm-affected soils*

16:50-17:10  Discussions

17:10-21:00  **Session 8 - Poster session with lightning oral presentations and Dinner (Presiders: Adi Perelman and Naftali Lazarovitch, Ben-Gurion University of the Negev)**

**13.4.16 Wednesday** - Educational trip

**14.4.16 Thursday**

**Session 9 - Session 6 - Rhizosphere heat regime (Presider: Noam Weisbrod, Ben-Gurion University of the Negev)**

8:30-9:00  Robert (Bob) Horton, Iowa State University of Science and Technology

*Heat transfer in the root zone: measurements, models, and unresolved questions*

9:00-9:20  Or Sperling, ARO, Volcani Center

*Temperature gradients within trees assist carbohydrate allocation*

9:20-9:40  Moses Kwame Aidoo, Ben-Gurion University of the Negev

*Mechanisms associated with the tolerance of bell pepper (capsicum annuum l.) root zone response to low temperature*

9:40-10:00  Elad Levintal, Ben-Gurion University of the Negev

*Free and forced convection in high-permeability porous media*

10:00-10:20  Discussions

10:20-11:00  **Coffee**

**Session 10 - Rhizosphere microbiome (Presider: Harry Vereecken, (Forschungszentrum Jülich IBG-3)**
11:00-11:30  Mary Firestone, University of California, Berkeley  
*The interconnected rhizosphere*

11:30-12:00  Dror Minz, ARO, Volcani Center  
*The root zone from the microbial point of view*

12:00-12:30  Yan Jin, University of Delaware  
*Plant-Growth Promoting Rhizobacteria Enhances Plant Drought Stress Tolerance by Mediating Physicochemical and Hydrological Changes in Rhizospheric Soil*

12:30-12:45  Rachel Neurath, University of California, Berkeley  
*Rhizosphere Control of Soil Carbon Association with Fresh Mineral Surfaces*

12:45-13:05  **Discussions**

13:05-14:00  **Lunch**

14:00-17:00  **Discussion, summary and conclusions (Presider: David Robinson, Centre for Ecology & Hydrology)**

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**Session 8 - Poster session with lightning oral presentations and Dinner**
*(Presiders: Adi Perelman and Naftali Lazarovitch, Ben-Gurion University of the Negev)*

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<td>University of Southampton</td>
<td>Root hair impact on soil structure formation in the rhizosphere</td>
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<td>Harini Rangarajan</td>
<td>Pennsylvania State University</td>
<td>Multi-objective optimization of root systems using evolutionary algorithms: matching root systems and environments</td>
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<td>Hannah Schneider</td>
<td>Forschungszentrum Jülich</td>
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<td>Gaochao Cai</td>
<td>Forschungszentrum Jülich IBG-3</td>
<td>Parameterization of root water uptake models that consider dynamic root distributions and compensation</td>
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<td>Nathaniel A. Bogie</td>
<td>University of California, Berkeley</td>
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<td>Jessie Godfrey</td>
<td>University of California, Davis</td>
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<td>Yong Zhou</td>
<td>Texas A&amp;M University</td>
<td>Landscape-scale spatial patterns of root distribution along the soil profile: linking aboveground plant communities to belowground biogeochemical cycling</td>
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<td>Sarah Garre</td>
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<td>Impact of tillage practices on soil moisture dynamics in</td>
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<td>Fabio J. Mallmann</td>
<td>Effects of plant roots on modelling the vertical transport of copper and zinc in a clayey oxisol contaminated by long-term pig slurry amendments</td>
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<td>University of California, Riverside</td>
<td>Image based modelling of two fluid flow in soil</td>
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<td>Laura J. Cooper</td>
<td>Plant water-uptake effects on salt distribution at the root-soil interface</td>
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<td>University of Southampton</td>
<td>Root uptake of heavy metals from an abandoned mine site</td>
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<td>Adi Perelman</td>
<td>Factors affecting the aeration status of the root zones in drip-irrigated orchards</td>
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<td>Ben-Gurion University of the Negev</td>
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