WELCOME TO

THE LANDSCAPE BELOW GROUND IV
International Conference on Tree Root Development in Urban Soils
October 15 through 17, 2018

Presented by

The Morton Arboretum®

ISA
International Society of Arboriculture®
Since 1993, The Landscape Below Ground conferences have provided a forum for the latest research and management practices on all elements of tree root development in urban soils. Their impact on arboriculture has been significant over the last 25 years. Practices now used every day, such as load-bearing soils that provide space for root growth beneath pavement, were introduced to international audiences at the conferences.

We are so pleased that you can join us to carry on this tradition at the Fourth Landscape Below Ground Conference, presented by The Morton Arboretum and the International Society of Arboriculture. During this year’s program, researchers and tree care professionals from around the world will gather to expand upon this legacy of innovation, explore the latest advances in the field, and look ahead to see what new collaborations and information are needed to further advance practice in the future.

We encourage you to make the most of your time here with the world’s leading root and soil researchers as we work to further our common goals of advancing tree care and planting and supporting healthy, long-lived trees for a greener future.

**QUESTIONS AND ASSISTANCE**

If you need assistance during the conference, the staff at the conference registration desk will be happy to answer any questions you might have.

**CONTINUING EDUCATION (CEUs)**

Sign-in sheets for ISA Continuing Education Units (CEUs) will be circulated after each conference session. Please remember to sign in for each session you attend. The full list of CEUs for each talk can be found at landscapebelowground.org and at the conference registration desk.

Certified Arborist CEUs will be indicated by the following icon with the number of credits that apply inside.

**INFORMATION ONLINE**

Visitor information, shuttle times for Monday workshops, and abstracts for the conference presentations are available online at landscapebelowground.org.

**CELL PHONES**

Please silence cell phones during sessions as a courtesy to presenters and participants.

**SPREAD THE WORD**

Please use #LBGIV on social media posts related to the conference. Follow The Morton Arboretum and International Society for Arboriculture on Twitter at @MortonArboretum and @ISArboriculture.

**WI-FI ACCESS**

Wireless Internet access is available in the hotel meeting space:

- **Network:** attwifi
- **Passcode:** Landscapes

Guests registered for the conference block at the hotel can also access Wi-Fi in their rooms.

**POSTERS**

Poster presenters will be available at their posters during the afternoon break on Tuesday, October 16 and the morning break on Wednesday, October 17. Posters will be displayed in the foyer outside the Regency Ballroom.
WORKSHOPS | THORNHILL EDUCATION CENTER, THE MORTON ARBORETUM

8:30 to 11:30 a.m.  What Root Pathogens and Roots Need  
Jim Chatfield, Joe Boggs, The Ohio State University, USA
Chrissy Balk, The Davey Tree Expert Company, USA

Planting Trees: Specifications, Installation, and Early Maintenance  
Ed Gilman, University of Florida Emeritus, USA
Gary Watson, The Morton Arboretum, USA

1:00 to 4:00 p.m.  Natural, Disturbed Urban, and Manufactured Soils: Learning from Soils at The Morton Arboretum  
Peter MacDonagh, Kestral Design Group, USA
Michelle Catania, Meghan Midgley, The Morton Arboretum, USA

Assessing the Stability of Urban Trees  
Jake Miesbauer, The Morton Arboretum, USA
Philip J.E. van Wassenaer, Urban Forest Innovations, Canada
Ken R. James, University of Melbourne, Australia

9:00 to 11:00 a.m.  Tram and Walking Tour of the Gateway to Tree Science: A Living Exhibit  
Chuck Cannon and Center for Tree Science staff, The Morton Arboretum, USA

TUESDAY, OCTOBER 16, 2018

OPENING GENERAL SESSION | REGENCY BALLROOM

8:00 a.m.  Welcome to The Landscape Below Ground  
Gerard Donnelly, President and CEO, The Morton Arboretum, USA
Skip Kincaid, Board of Directors, International Society of Arboriculture, USA

8:20 a.m.  Twenty-Five Years of The Landscape Below Ground  
Gary Watson, The Morton Arboretum, USA
Ed Gilman, University of Florida Emeritus, USA
L.R. Costello, University of California Emeritus and Oracle Oak Nursery, USA

8:40 a.m.  The Ideal Nursery Root System: How We Got There and Can We Specify It  
Ed Gilman, University of Florida Emeritus, USA

9:20 a.m.  Planting and Managing Trees in Engineered Soils and Constructed Spaces  
Nelda Matheny, James R. Clark, HortScience | Bartlett Consulting, USA

10:00 a.m.  Break

10:30 a.m.  Root Growth in Structural Soil Under Porous and Non-porous Asphalt After 12 Years  
Nina Bassuk, Cornell University, USA

11:10 a.m.  Poster Introductions

12:10 p.m.  Lunch in the Majestic Ballroom
### TUESDAY, OCTOBER 16, 2018 (cont.)

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<thead>
<tr>
<th>CONCURRENT SESSION</th>
<th>PINE ROOM</th>
<th>MAPLE ROOM</th>
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<tbody>
<tr>
<td><strong>MANAGING URBAN SOILS</strong></td>
<td><strong>TREE ANCHORAGE AND STABILITY</strong></td>
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<tr>
<td><strong>1:10 p.m.</strong></td>
<td>Soil Management Practices, Tree Resource Allocation Patterns, and Pest Resistance</td>
<td>Root Plate Stability and Failure in Winds</td>
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<td>Daniel Herms, The Davey Tree Expert Co., USA</td>
<td>Ken R. James, University of Melbourne, Australia</td>
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<tr>
<td><strong>1:40 p.m.</strong></td>
<td>Experiments and Applications for Biochar as a Soil Amendment for the Green Industry</td>
<td>Tree Stability Recovery After Root Failure</td>
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<td>Andreas Detter, Brudi and Partner TreeConsult, Germany</td>
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<td></td>
<td>Stephen Rust, Faculty of Resource Management, Hochschule für angewandte Wissenschaft und Kunst, Germany</td>
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<tr>
<td><strong>2:10 p.m.</strong></td>
<td>Mexico City Urban Soils Quality Evaluation as a Support for Trees</td>
<td>Boulevard Tree Failures During Wind-loading Events</td>
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<tr>
<td>Vivian Alvarez Islas, Silke Cram Heydrich, Blanca Prado Pano, Universidad Nacional Autónoma de México, Mexico</td>
<td>Gary Johnson, University of Minnesota, USA</td>
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<td>Alicia Chacaol Hilú, Universidad Nacional Autónoma de México, Mexico</td>
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<td>Isabelle Barois Bouillard, Instituto de Ecología A.C., Mexico</td>
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<tr>
<td><strong>2:40 p.m.</strong></td>
<td>Break</td>
<td>Poster session</td>
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<td><strong>TREE ANCHORAGE AND STABILITY (cont.)</strong></td>
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<tr>
<td><strong>3:10 p.m.</strong></td>
<td>Using Forest Soils to Help Understand Restoration Thresholds for Tree Establishment Along Highway Roadsides</td>
<td>Determination of Strain Patterns Across the Root-Stem Transition Zone in Trees</td>
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<td>Darby McGrath, Jason Henry, Ryan Munroe, Vineland Research and Innovation Centre, Canada</td>
<td>Gregory Dahle, West Virginia University, USA</td>
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<td>Jake Miesbauer, The Morton Arboretum, USA</td>
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<tr>
<td><strong>3:40 p.m.</strong></td>
<td>Does Matching Organic Amendment Chemistry with Tree Litter Chemistry Enhance Tree Survival, Growth, and Health in a Roadside Soil?</td>
<td>The Development of 3D Imaging Techniques to Measure Root Volume and Stability</td>
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<td>Meghan Midgley, The Morton Arboretum, USA</td>
<td>Jake Miesbauer, The Morton Arboretum, USA</td>
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<td>Andrew Koeser, University of Florida Gulf Coast Research &amp; Education Center, USA</td>
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<tr>
<td><strong>4:10 p.m.</strong></td>
<td>Organic Matter Improves Tree Establishment in Degraded and Compacted Urban Soils</td>
<td>Patterns of Dissymmetric Radial Root Growth in Response to Wind Exposure in Two Maple Species</td>
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<td>Peter Somerville, Stephen J. Livesley, Claire Farrell, Peter B. May, University of Melbourne, Australia</td>
<td>Jason Grabosky, Rutgers University, USA</td>
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<td><strong>4:40 p.m.</strong></td>
<td>Sessions End</td>
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7:00 to 9:00 p.m. Social in the Majestic Ballroom
Networking and discussion of new knowledge needed for improving practice
### CONCURRENT SESSION | PINE ROOM

#### TREE ROOTS AND THE BUILT ENVIRONMENT

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<td>A Test of Tree Protection Zones: Responses of Live Oak (<em>Quercus virginiana</em> Mill) Trees to Root Severance Treatments</td>
<td>Andrew R. Benson, Justin A. Morganroth, The University of Canterbury, New Zealand Andrew K. Koester, The University of Florida, USA</td>
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<td>8:30 a.m.</td>
<td>Street Trees, Construction, &amp; Longevity: Tree Growth and Response Over Forty Years (1979–2018)</td>
<td>Richard Hauer, University of Wisconsin-Stevens Point, USA Andrew Koester, Gulf Coast Research and Education Center, University of Florida, USA David Sivyer, Randy Krouse, City of Milwaukee, USA</td>
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<td>9:00 a.m.</td>
<td>A Computer Vision Approach to Automated Detection of Tree Root Locations Using Ground Penetrating Rader (GPR)</td>
<td>Justin Miron, Andrew A. Millward, Ryerson University, Canada</td>
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<td>Below-Ground Urban Tree Management Research and Practices in Shanghai</td>
<td>Hu Yonghong, Chenshan Botanical Garden, China</td>
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### CONCURRENT SESSION | MAPLE ROOM

#### TREE ROOT DEVELOPMENT AND MANAGEMENT

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#### TREE PRODUCTION, PLANTING, AND ESTABLISHMENT

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<td>Evaluating the Missouri Gravel Bed and a Wood Chip Production Method for Transplant Success</td>
<td>Kelby Fite, Liza Holmes, Eelden LeBrun Bartlett Tree Research Laboratories, USA</td>
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<td>11:00 a.m.</td>
<td>Across Three Species, Smaller Transplanted Container-Grown Stock Offers Rapid Growth and Economic Advantages Compared to Larger Container-Grown Trees</td>
<td>Lauren M. Garcia Chance, Clemson University, USA Michael A. Arnold, Todd Watson, Leonardo Lombardini, Charles R. Hall, Sean T. Carver, Andrew R. King, Texas A&amp;M University, USA</td>
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<td>11:30 a.m.</td>
<td>Container Type Affects Nursery Production and Landscape Establishment of Pyrus calleryana ‘Glen’s Form’ (Chanticleer®)</td>
<td>Alison S. O’Connor, James E. Klett, Anthony J. Koski, Colorado State University, USA</td>
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<td>12:00 p.m.</td>
<td>Lunch in the Majestic Ballroom</td>
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CONCURRENT SESSIONS |

TREE PRODUCTION, PLANTING, AND ESTABLISHMENT (CONT.)

1:00 p.m. The Lessons Learned From Twenty Years of Containerised Tree Production
Keith Sacre, Barcham Trees LLC, United Kingdom

1:30 p.m Toward Developing Well-Structured Root Systems in Containers via Root Pruning
L.R. Costello, University of California Emeritus and Oracle Oak Nursery, USA
Peter MacDonagh, Kestrel Design Group, USA

2:00 p.m. Nursery Root Production on Trees
Connor Shaw, Possibility Place Nursery, USA

2:30 p.m. Break

CLOSING GENERAL SESSION | REGENCY BALLROOM

3:00 p.m. The Effects of Soil Compaction on the Growth and Establishment of Street Trees in Urban Melbourne, Australia
Gregory M. Moore, Alicia Fitzgerald, May B. May, University of Melbourne, Australia

3:30 p.m. Root Development and Tree Growth Associated with Various Soil Treatments Under Pavement
Tom Smiley, Bartlett Tree Experts, USA

4:00 p.m. Soil Profile Rebuilding: Rehabilitating Compacted Urban Soils on Site
Susan Day, Department of Forest Resources and Environmental Conservation, Virginia Tech, USA
Yujuan Chen, Tree People, USA

4:30 p.m. The Landscape Below Ground—Past, Present, and Future

5:00 p.m. Sessions End

POSTERS

Impact of Biochar Urban Soil Application on Growth and Physiology of Newly Planted Live Oak Saplings
Camran Abdollahi, Southern University, USA

Low Impact In Situ Field Studies of Fine Root Growth of Urban Street Trees—A Pilot Study Using Scanners and Root Sampling Zones
Frida Andreasson, Ann-Mari Fransson

Assessment of Root System Quality in Container-Grown Trees
Marie V. Ambusk and Gordon Mann, Trees ROI

A Case Study of Rooting Patterns on Soil-Type Interfaces
Els Couenberg, Natura Ingenium, The Netherlands

Root Architecture Altered by Taproot Pruning
Marvin Lo, Gary Watson, The Morton Arboretum, USA

Species Variation in Root Tolerance of Poor Soil Conditions
Marvin Lo, Gary Watson, The Morton Arboretum, USA

Community Gravel Beds as Options for Restoration Programs
Gary Johnson, University of Minnesota, USA

Comparing Static and Dynamic Assessment of Root System Stability After Root Severance
Marvin Lo, Jake Miesbauer, Gary Watson, The Morton Arboretum, USA
Frank Balestri, formerly The Morton Arboretum, United States

Designing a Dynamic Urban Ground: Interpreting Root System Research for Landscape Architects
Gwendolyn McGinn, Studio Outside, USA

Enhancing Tree Transplant Success Through the Manipulation of Root Hydraulic Conductance
Brandon M. Miller, Nina L. Bassuk, Cornell University, USA

Root Penetration of PVC Pipes
Gregory M. Moore, Susan Bendel, Peter B. May, University of Melbourne, Australia

Balancing Carbon Expenses and Sequestration in Street Tree Plantings
Anu Riikonen, Jukka Pumpanen, Mari Mäki

Osmotic Adjustment and Gas Exchange Response During Drought for Two Tree Species (Quercus bicolor & Betula pendula) Grown in Containers with Limited Soil Volume
Miles Schwartz Sax, Nina Bassuk, Henrik Sjoman, Cornell University, USA

Sustainable Growth Medium for Urban Roadside Tree Planting
Erik Solfjeld, Norwegian Public Roads Administration, Norway

NYC Department of Parks and Recreation Trees & Sidewalks Program
Tyler Wilcox, Ben Osborne, NYC Department of Parks and Recreation Trees & Sidewalks Program, New York, New York, USA
Thank you to our exhibitors! Please visit them in the Atrium from 7:30 a.m. to 5:00 p.m. on October 16-17.

DeepRoot Green Infrastructure, LLC
Environmental Design, Inc.
GRO Horticultural Enterprises Inc
GreenBlue Urban
High Caliper Growing

Historic Tree Care
Illinois Arborists Association (IAA)
Supersonic Air Knife
Tree Care Industry Association (TCIA)

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