Phytotechnologies For Sustainable Development



12th International Conference International Phytotechnology Society 2015 September 27-30 Hilton Garden Inn - Manhattan, KS

Hosted by the International Phytotechnology Society and Kansas State University

PROGRAM BOOK



ConFerence Program

12th International Phytotechnologies Conference

Organized by: International Phytotechnology Society

Hosted by: Kansas State University

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Jason White



International Phytotechnology Society

The International Phytotechnology Society (IPS) is a nonprofit, worldwide professional society comprised of individuals and institutions engaged in the science and application of using plants to address environmental problems. IPS's mission is to promote research, education, training, and application of plant-based technologies to solve environmental problems. The International Journal of Phytoremediation, which is published by Taylor and Francis, is the primary publication of IPS. The IPS Internet site is http://phytosociety.org.

The IPS was formed in 2006. Annual conferences have been held in Denver, Colorado (2007), Nanjing, China (2008), St. Louis, Missouri (2009), Parma, Italy (2010), Portland, Oregon (2011), Hasselt, Belgium (2012), Syracuse, New York (2013), and the island of Crete in Greece (2014). The IPS encourages student participation, and IPS has worked with the National Institute of Environmental Health Sciences to provide financial support for students to help with their expenses associated with attending the conferences.

All who are interested are invited to become members of the IPS. Those who present their research at this 12th conference are invited to submit a manuscript to be considered for publication in the International Journal of Phytoremediation. All manuscripts are peer reviewed. The IPS thanks all who help with peer review of manuscripts for the IJP.

The annual business meeting of the IPS is Monday evening, September 29. All who attend the conference are welcome to attend the IPS annual meeting.

Jason White President of IPS

Larry E. Erickson



Acknowledgements

This conference has been organized as a joint effort of Kansas State University (KSU) and the International Phytotechnology Society (IPS). The National Institute of Environmental Health Sciences (NIEHS) intends to provide financial support for students who present their research at the conference. We thank all those who have helped with the proposal submitted to NIEHS and the selection of Phyto-Scholars: Lawrence Davis, Stephen Ebbs, Andre Gerth, Mary Beth Leigh, Lee Newman, Liz Rylott, Jason White, and Barbara Zeeb. Global Campus at KSU has helped with the planning and organization of the conference. Leadership has been provided by Kelli Park Fuhrmann. Kim Bird and others with Communications and Marketing at KSU have helped with the program book and abstract book. Gary Pierzynski, Charles Rice, Ganga Hettiarachchi, and Steven Graham have helped with the planning for the International Year of Soils program on Sunday, September 27. Huston Gibson, Blase Leven, and Lee Skabelund have helped with the planning for the continuing education program on Monday, September 28. Lawrence Davis has helped with the selection and acceptance of abstracts for the platform and poster sessions. The main activities of the conference are associated with the technical program. We thank all who have submitted abstracts and prepared to present their research at this meeting. Jason White and Stephen Ebbs have helped with many aspects of conference planning and implementation. We thank all who have provided financial support as sponsors. We thank Konza Prairie, the Flint Hills Discovery Center, and Westar Energy for the post conference events on Wednesday afternoon, September 30.

Larry E. Erickson Conference Chair

April C. Mason



April Mason serves as the Provost and Senior Vice President of Kansas StateUniversity. She assumed that position in January, 2010. Mason serves as Kansas State University's Chief Academic Officer, with the duty of oversight of the academic dimensions of the university and to ensure the university's academic standards. In cooperation with the president and the Deans Council, Mason provides leadership in the development, review, and operationalization of policies and goals regarding instruction, research and outreach programs. She currently serves as chair elect of the Association of Public and Land Grant Universities Council on Academic Affairs and the President of the newly formed Association of Chief Academic Officers, an affiliate organization to ACE.

The deans of the nine academic colleges, the Libraries, Graduate School, the Division of Continuing Education and the CEOs of both K-State Salina and K-State Olathe report to Mason.University offices also associated with the Office of the Provost include: Undergraduate Studies, Information Technology Services, Diversity, the School of Leadership Studies, International Programs, the Center for Engagement and Community Development, and the Office of Sustainability.

Mason came to K-State from the position of dean of the College of Applied Human Sciences at Colorado State University. In this position, April gave leadership to the academic programs of the College. Before Colorado State University, Mason was on the faculty and served as an administrator at Purdue University in the College of Consumer and Family Science and the Department of Foods and Nutrition.

April holds her doctorate degree in Nutrition and her master's degree in Botany from Purdue University, West Lafayette, IN and her undergraduate degree in Biology from University of Mount Union in Alliance, Ohio. Mason's faculty home at Kansas State University is as a professor in the Department of Human Nutrition. Her primary research areas have been food security and nutrient availability from plant food products. April has traveled extensively with her research work, most notably in Costa Rica and Indonesia.

The International Phytotechnology Society Presents The Gordon Award



In 2005, the Phytoremediation community lost one of the pioneers of the field. Milton P. Gordon, Professor of Biochemistry at the University of Washington, had a life-long love of science, and his research passions allowed him to have an impact in many fields, from red-tide toxins, the development of Agrobacterium as a tool for plant genetic engineering, plant pathogenesis-related proteins, astrobiology, and his final love, phytoremediation.

Milt loved all aspects of this work, from understanding, on a molecular and genetic level, how plants are able to degrade a wide range of organic pollutants, the genetic engineering of plants to increase their ability to do this degradative task, field studies and final application of the technology to hazardous waste sites. In this capacity, Milt was the driving force behind the formation of the remediation and consulting firm Verdant Technologies.

Milt was also an outstanding teacher, and taught not only the courses required in his department, but also was involved in courses in scientific ethics and astrobiology. His love of science came through to the students, and he was always available beyond the classroom to discuss anything. This also highlights one of his other traits, that he would never turn away a student in need. He was always available to help students understand material and expand their knowledge, but he was also there for his students if they had problems outside the classroom.

In 2007, Steve McCutcheon, a friend and colleague, proposed to the International Phytotechnology Society that an award be presented at the annual meetings to honor Milt. Thus the Gordon Award was formed. The award honors people in the field of phytoremediation that exemplify the traits that made Milt the person he was; an outstanding researcher, a strong proponent of the development of phytoremediation as an applied technology, a beloved teacher and dedicated supporter of students. Every year since 2007, the IPS has presented the Gordon award, to both honor Milt and the current year's recipient, and to serve as an incentive to up and coming researchers in the field of phytoremediation to strive for excellence in these important areas.

Lee Newman August 2015

Dr. Stanislaw Gawronski



Gordon Award Recipent

Dr. Stanislaw Gawronski is a Professor of Plant Science and the Head of Laboratory of Basic Research in Horticulture, Warsaw University of Life Science (WULS). Warsaw, Poland. His primary research interest is on phytoremediation of heavy metals, organic contaminants and particulate matters in urban environments. He earned his BS, MS and PhD from Warsaw University of Life Science. Dr. Gawronski actively participates in development and dissemination of phytoremediation in Europe. He represented Poland in two COST Action Initiatives dedicated to phytoremediation. He is the founding member of the International Phytotechnology Society and served in the Board of Directors of IPS. In 2000, he was awarded the Award for Achievements in Sciences by the president of Poland.

The responsibility for a healthy environment is on everyone's shoulders. Kansas State University is proud to ease the burden.





All things green — or any hue — are in good hands at Kansas State University. In addition to housing the nation's No. 1 plant pathology department, according to the U.S. National Research Council, our top-tier researchers have been nationally recognized for their work, including several research and teaching awards from the American Phytopathological Society.

While acknowledgement is always appreciated, the real reward is seeing the difference our interdisciplinary researchers are making around the world. We take pride in ensuring that as plant technology and research grows, it's always tinged with purple.



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engg.ksu.edu/chsr/ highlights/cesas

The Consortium for Environmental Stewardship and Sustainability (CESAS) is a network of partner organizations choosing to work collaboratively to

advance sustainability and sustainable development. This Consortium brings together cooperative groups focused on sustainability that integrate and connect multidisciplinary research and education efforts in the areas of science, engineering, economics, and social science. Since sustainable development requires appropriate consideration of both present and future needs, the foundation is the concept of a "Triple Bottom Line" where economic, social, and environmental values are all vital to decision making.

CESAS provides a structure for participating partner organizations to work cooperatively and individually to advance environmental stewardship and sustainability. The goal of efficient sustainable life styles can be achieved through cooperative programs that include research, education, and public service.

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APPLIED NATURAL SCIENCES



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Congratulations to the 2015 IPS PhytoScholars:

Nicole Harbordt **Linnea Honeker Jiameng Wang Katherine Bartels** Pawan Kumar **Ali Faraq Mehdawi** Luca Pagano Laura Limes **Catherine Kornacki Karanbir Singh Aulakh** Sanghamitra Majumdar Azam Noori Mariam Al-Lami Chuanxin Ma **Roberto De La Torre Roche** Scott J. Bradfield Hunter Schroer Alia D. Servin Jessica Starsman **Stephen Via Yongbo Dan** Weilan Zhang

The 2015 IPS PhytoScholar Awards are sponsored by the NIEHS Superfund Research Program. Please visit our website at www.niehs.nih.gov/srp.



National Institute of Environmental Health Sciences

Superfund Research Program

Three Poplar Trees in the Autumn, Claude Monet (1891)



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Center for Hazardous Substance Research

engg.ksu.edu/chsr

The Center for Hazardous Substance Research (CHSR) was established in 1989 and is part of the College of Engineering at Kansas State University. The purpose of the center is to conduct research, education, and service pertaining to environmental topics, where a reputable, neutral organization is needed to develop technically sound, consensus-based solutions for diverse groups of stakeholders.

Topics of research and other activities include sustainability; environmental assessments and remediation; technical assistance to communities, defense agencies and other organizations; and international programs. Environmental assessment work involves proposed nonlethal defense technologies, and software tools for environmental decision making. Remediation research has focused on contaminated soil and water from agriculture, forestry, mining, and mineral processing, and other industrial activities. Service activities include providing free technical assistance to citizens and other stakeholders who are providing input on cleanup and re-use of EPA Superfund, Brownfield, tribal and other types of sites.

Sponsors



National Institute of Environmental Health Sciences Superfund Research Program



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Agenda of Events

Sunday, Sept. 27, 2015

15:30 - 19:30 (3:30 p.m 7:30 p.m.)	Registration	Foyer
15:30 p.m. (3:30 p.m.)	Exhibits and Displays Set Up and Open for Viewing	McDowell/Tuttle/Alcove
16:00 - 17:30 (4 p.m 5:30 p.m.)	Program	
16:00 p.m. (4:00 p.m.)	Dr. Gary Pierzynski: United Nations International Year of Soils	
16:10 p.m. (4:10 p.m.)	Dr. Charles Rice: Global Soil Partnership	
16:20 p.m. (4:20 p.m.)	Dr. Ravi Naidu: Wonders of Soils: International Perspectives	
16:35 p.m. (4:35 p.m.)	Provost April Mason: World Food Issues	Big Bacin
16:50 p.m. (4:50 p.m.)	Dr. John Floros: K-State International Programs Related to Soil, Food, and Agriculture	big basin
17:00 p.m. (5:00 p.m.)	Panel Discussion - Dr. Gary Pierzynski, Dr. Charles Rice, Dr, Ravi Naidu, Provost April Mason, Dr. John Floros, Dr. Rufus Chaney and Moderator, Dr. Jason White	
17:30 - 19:30 (5:30 - 7:30 p.m.)	Exhibits, Displays, and Opening Reception	McDowell/Tuttle/Alcove

Monday, Sept. 28, 2015

7:30 - 19:30 (7:30 a.m 7:30 p.m.)	Registration	Foyer
7:30 - 8:30 (7:30 - 8:30 a.m.)	Continental Breakfast	Kaw Nation
7:30 - 8:30 (7:30 - 8:30 a.m.)	Exhibits and Displays Set Up	Foyer
7:30 - 8:30 (7:30 - 8:30 a.m.)	Poster Presentation Set Up (Author Last Name A-K)	Kings / Flint Hills
8:30 - 18:30 (8:30 a.m 6:30 p.m.)	Exhibits and Displays Open for Viewing	Foyer
8:30 (8:30 a.m.)	Posters Open for Viewing	Kings / Flint Hills

8:30 - 10:00 (8:30 - 10:00 a.m.)	Opening Plenary Sessio (Co-Chairs: Larry Erickson &	on Jason White)	
8:30 (8:30 a.m.)	Jason White: Welcome		
8:35 (8:35 a.m.)	Dr. Marcelo Sabates: Welcom	e	
8:40 (8:40 a.m.)	Karen McCulloh: Welcome		Big Basin
8:45 (8:45a.m.)	Stanislaw Gawronski: Air Phy for Green Infrastructure Servi	toremediation as a Toolbox ices in Urban Areas [50]	
9:30 (9:30 a.m.)	Kate Kennen: Intergrating Ph Landscape Design [67]	ytotechnology and	
10:00 - 10:30 (10:00 - 10:30a.m.)	Refreshment Break		Kaw Nation
		Sessions	
10:30 - 12:00 (10:30 a.m noon)	Inorganics: Chromium	Phytoremediation of Organics	Air Phytoremediation
Co-Chairs:	Rufus Chaney / Om Parkash Dhankher	R. Karthikeyan / Dawn Reinhold	Stanislaw Gawronski / Ronaldo Maghirang
Location:	McDowell	Tuttle	Alcove
10:30 (10:30 a.m.)	Citric acid enhances the phytoextraction of chromium, plant growth and photosynthesis by alleviating the oxidative damages in Brassica napus L Ali [9]	Phytotoxicity and Phytoremediation Potential of Kenaf (Hibiscus cannabinus Linn.) in Diesel-Contaminated Soil Amended with Poultry Manure and N-P-K Fertilizer Bada [15]	Role and exploitation of plant-associated bacteria during phytoremediation of air pollution Espenshade [45]
10:45 (10:45 a.m.)	Chelate assisted chromium uptake, translocation and toxicity amelioration in Indian mustard (Brassica juncea L. cv. Varuna) Seth [138]	Aerobic TCE degradation by willows and four root colonizing bacterial strains of B. cepacia Clausen [29]	Volatile Organic Compounds Prevalence and their Removal in Indoors of Mumbai City Kaur [66]
11:00 (11:00 a.m.)	Natural and Assisted Phytoex- traction Capacity of Tobacco Cultivars, Their Growth and Protein Expression Under Heavy Metals Contaminated Soil Bakht [16]	Metabolism of Triclocarban by Hydroponically Grown Pepper Plants (Capsicum annuum) Huynh [61]	Application of Botanical Biofilter for Gaseous Trimethylamine Removal by Sansevieria kirkii: Effect of Plants and Microorganisms Treesubsuntorn [157]
11:15 (11:15 a.m.)	Attenuation of chromium toxicity in mines waste water by Eichhornia crassipes Sarkar [134]	Populus alba uptake and metabolism of Pharmaceuticals and Personal Care Products Pierattini [118]	Suitable tree species and spatial structure of green land for alleviating the particulate matter pollution in the urban area of Beijing Wang [167]

Sessions (cont.)			
10:30 - 12:00 (10:30 a.m noon)	Inorganics: Chromium	Phytoremediation of Organics	Air Phytoremediation
Co-Chairs:	Rufus Chaney / Om Parkash Dhankher	R. Karthikeyan / Dawn Reinhold	Stanislaw Gawronski / Ronaldo Maghirang
Location:	McDowell	Tuttle	Alcove
11:30 (11:30 a.m.)	Chromium (IV) uptake of crambe and the resultant changes induced by Cr stress in photochemical responses, antioxidant activity and lipid peroxidation Zulfiqar [188]	Fate and Metabolism of 2,4-Dini- troanisole in Willow Trees Schroer [136]	An Assessment of the Trace Element Exposure Risk to Urban Brownfields Gardeners via Inha- lation Weeks [169]
11:45 (11:45 a.m.)	Mannitol alleviates chromium toxicity in wheat plants in relation to growth, oxidative stress and Cr uptake in sand and soil media Ali [8]	Phytoremediation of 1,4-Dioxane with Sweet Basil and Common Radish Struckhoff [147]	Phytoscreening for Vapor Intrusion Potential: Comparing Effects of Tree Diameter Wilson [171]
10:30 - 12:00 (10:30 a.m noon)	Continuing Education: Reduction on Brownfie (Co-Chairs: Huston Gibson, B (Presenters: Ganga Hettiarad	Risk Exposure and Risk Ids Blasé Leven, Lee Skabelund) chchi, Mark Walker, Blasé Leven)	Konza Prairie
12:00 - 13:15 (noon - 1:15 p.m.)	Lunch Presentation (Tsao, Da on Gaining Regulatory and Si Suite of Phytotechnologies	vid: An Industrialist's Perspective takeholder Acceptance of the	Kaw Nation
		Sessions	
13:30 - 15:00 (1:30 - 3:00 p.m.)	Inorganics: Cadmium	Field Studies	Constructed Wetlands
Co-Chairs:	Danielle Carlin / Heather Henry / Marta Marmiroli	Nicholas Dickinson / Ron Zalesny	Dennis Haag / Brad Loveless / Amanda Ludlow
Location:	McDowell	Tuttle	Alcove
13:30 (1:30 p.m.)	The Role of Iron in Cadmium Phytoextraction and Pro- duction of Endogenous free Proline and total Phenolics in Ricinus communis under hy- droponic condition Hadi [55]	Lessons Learned from the Long-Term Monitoring and Management of a Large Scale Phyto Plot Conklin [30]	Sustainable Wastewater Treatement: Using Natural Systems in the Middle East Coulon [32]
13:45 (1:45 p.m.)	The Effect of Compost and Charcoal Waste on Phytoremediation Cadmium-Contaminated Soils by soybean (Glycine max (L) Merrill) Muliadi [99]	DDT Remediation at Point Pelee National Park: Hydroxypropyl-β-Cyclodextrin and Phytoextraction Approaches Dahmer [34]	Stacking it Up: Combining Gravel Infiltration Basin and Constructed Treatment Wetland for Process and Storm Water Treatment in San Jose, California Cutting [33]

		Sessions (cont.)	
13:30 - 15:00 (1:30 - 3:00 p.m.)	Inorganics: Cadmium	Field Studies	Constructed Wetlands
Co-Chairs:	Danielle Carlin / Heather Henry / Marta Marmiroli	Nicholas Dickinson / Ron Zalesny	Dennis Haag / Brad Loveless / Amanda Ludlow
Location:	McDowell	Tuttle	Alcove
14:00 (2:00 p.m.)	Removal of Cd(II) from contaminated soils and treatment of effluent using Nephrolepis exaltata Samarakkody [132]	Restoration Rhizosphere Phytotechnologies: Case Studies in New Zealand's HMEs Dickinson [39]	Phytoremediation of real denim-dying textile wastewater in a vertical flow constructed wetland model using of zeolite and pumice stone media Dogdu [40]
14:15 (2:15 p.m.)	Phenanthrene-induced alterations to Noccaea caerulescens roots and consequences for Cd phytoextraction Sirguey [144]	Suppression of Prairie Grasses Due to Excess Magnesium in a Portion of a Restored Prairie at the DOE Weldon Spring Site Krabbe [68]	Early Development of Sandhill Fen: Plant Establish- ment, Community Stabilization, and Ecosystem Development on Oil Sands Soft Tailings Ebbs [42]
14:30 (2:30 p.m.)	Phytoextraction of cadmium contaminated agricultural soils using hyperaccumulator Sedum plumbizincicola: pot and field study Wu [173]		Enhanced Treatment Wetlands Using Native Species for Ethanol Removal Szymaszek [148]
14:45 (2:45 p.m.)		Use of Vegetation Sampling and Analysis to Detect a Problem Within a Portion of a Restored Prairie at the DOE Weldon Spring Site Scholes [135]	Phytoremediation of veterinary and human pharmaceuticals. From laboratory to real scale Vanek [162]
13:30 - 15:00 (1:30 - 3:00 p.m.)	Continuing Education: Urban Applications of Phytotechnologies (Co-Chairs: Huston Gibson, Blasé Leven, Lee Skabelund) (Presenters: Stacy Hutchinson & Lee Skabelund)		Konza Prairie
15:00 - 15:30 (3:00 - 3:30 p.m.)	Refreshment Break		Kaw Nation

		Sessions	
15:30 - 17:15 (3:30 - 5:15 p.m.)	Inorganics: Cadmium	Field Studies	Studies with Vegetation and Contaminated Water
Co-Chairs:	Danielle Carlin / Heather Henry / Marta Marmiroli	Nicholas Dickinson / Ron Zalesny	Elizabeth Nichols / Valentina Pidlisnyuk
Location:	McDowell	Tuttle	Alcove
15:30 (3:30 p.m.)	Interplay between Brassinosteroids and Abscisic Acid Confers Cadmium Tolerance in Tomato Ahammed [2]	Species assemblage promotes functional complementarity for remediation of multi-contaminated brownfield Desjardins [37]	Phytoremediation: Utilizing aquatic plants for the management of contaminants in aquatic environment Ansari [14]
15:45 (3:45 p.m.)	Enhanced Cd-extraction of oil- seed rape (Brassica napus) by plant growth promoting bac- teria isolated from rhizosphere soil and roots of Sedum alfredii Hance Pan [114]	White Island: From Trash to Treasure Conklin [31]	Domestic wastewater treatment by constructed wetlands in mountian areas of Morocco Fanssi [46]
16:00 (4:00 p.m.)	Bioaccumulation and changes in the photosynthetic apparatus of Prosopis juliflora exposed to cadmium Michel-López [89]	Sodic soil remediation in a semi-arid region involving organic amendments and vegetative remediation by Casu- arina equisetfolia and Erianthus arundinaceus Mohanraj [93]	Phyto Processes for PCB Removal in Lagoon and Riverine Sediments Licht [73]
16:15 (4:15 p.m.)	Effects of Organic Fertilizers on the Heavy Metal Absorp- tion of Beta vulgaris L.Var. Cicla In Soil Contaminated with Cadmium Nguyen [106]	Effect of buffer strips on runoff and leachate production for restoration of an old dump garbage in Medellin Morató [97]	Modeling Leachate Irrigation on Landfill ETCap® to Manage Water by Poplar and Willow Licht [74]
16:30 (4:30 p.m.)	Mechanisms in Low Accumulation and High Tolerance towards Cadmium of Cultivars of Brassica parachinensis Wu [174]	A Decade of Phytoremediation Projections by Eucalyptus Trees Preventing Contaminated Plume Migration Thomas [150]	The use of forest phytotechnologies to remediation of heavy metals polluted soil amended with sewage sludge Placek [121]
16:45 (4:45 p.m.)	Comparative response of maize hybrids to cadmium stress with respect to growth and different micronutrients uptake Zia-ur-Rehman [187]	Biochar soil amendments enhance early hybrid poplar establishment Zalesny [183]	Prolonged effects of irrigation with low quality water on soil biological characteristics Saber [130]
17:00 (5:00 p.m.)	Early Stage of Technosols Evolution in Response to Organic Amendments Kanso [65]	Long-Term monitoring of poplars used for phtoremediation Zalesny [182]	Use of Textile Waste Water as Organic Amendment for Production of Wheat on Saline Sodic Soils Yaseen [17]

15:30 - 17:00 (3:30 - 5:00 p.m.)	Continuing Education: Urban Applications of Phytotechnologies Round Table (Co-Chairs: Huston Gibson, Blasé Leven, Lee Skabelund) (Presenters: Stanislaw Gawronski, Huston Gibson, Ganga Hettiarachchi, Stacy Hutchinson, Kate Kennen, Blasé Leven, Lee Skabelund, Mark Walker)	Konza Prairie
17:00 - 18:30 (5:00 - 6:30 p.m.)	Poster Presentations with Authors (Author Last Name A - K)	Kings / Flint Hills
18:30 (6:30 p.m.)	Exhibits and Displays Close	McDowell / Tuttle / Alcove
18:30 - 19:00 (6:30 - 7:00 p.m.)	Poster Take Down	Kings / Flint Hills
19:00 - 21:00 (7:00 - 9:00 p.m.)	Banquet and IPS Annual Meeting	Kaw Nation

Tuesday, Sept. 29, 2015

7:30 - 19:30 (7:30 a.m 7:30 p.m.)	Registration		Foyer
7:30 - 8:30 (7:30 - 8:30 a.m.)	Continental Breakfast		Kaw Nation
7:30 - 8:30 (7:30 - 8:30 a.m.)	Poster Presentation Set Up (Author Last Name L - Z)		Kings / Flint Hills
8:30 (8:30 a.m.)	Exhibits and Displays Open for	or Viewing	Foyer
8:30 - 18:30 (8:30 a.m 6:30 p.m.)	Posters Open for Viewing		Kings / Flint Hills
		Sessions	
8:30 - 10:00 (8:30 - 10:00 a.m.)	Inorganics: Arsenic	Plant / Microbe Studies	Phytotechnology Projects
Co-Chairs:	Lawrence Davis / Nelson Marmiroli	M.N.V Prasad / Liz Rylott	James Linton / Cristina Negri
Location:	McDowell	Tuttle	Alcove
8:30 (8:30 a.m.)	Designing arsenic phytoremediation system: significance of arsenate reductase evolution in arsenic tolerant biological systems Sarangi [133]	Biodegradation of engine oil by fungi from mangrove habitat Ameen [12]	Phytoremediation Case Studies in Manhattan, Kansas Barden [19]

Sessions (cont.)			
8:30 - 10:00 (8:30 - 10:00 a.m.)	Inorganics: Arsenic	Plant / Microbe Studies	Phytotechnology Projects
Co-Chairs:	Lawrence Davis / Nelson Marmiroli	M.N.V Prasad / Liz Rylott	James Linton / Cristina Negri
Location:	McDowell	Tuttle	Alcove
8:45 (8:45 a.m.)	Understanding of trace elements retention by sulfate reduction in a pilot-scale con- structed wetland treatment system designed for FGD wastewater Galkaduwa [48]	Bioremediation of hydrocarbon contaminated soil Jamil [63]	Vegetative Buffer for Treating Surface Runoff from Livestock Confinement Facilities in Kansas Boyer [22]
9:00 (9:00 a.m.)	Two cv. Of Solanum lyco- persicum treated with As and As+Si: Differences in As uptake, localization.oxidative stress response and proteom- ic profile Marmiroli [84]	A molecular-ecological approach for trinitrotoluene contaminant-detoxification in the rhizosphere of Acer pseudoplatanus Thijs [149]	From Phytoremediation to Hybridized Plant-Based Remediation Systems - A Summary Review, 1988-2015 Gatliff [49]
9:15 (9:15 a.m.)	Rice Plasma Membrane Intrin- sic Proteins Play Critical Role in Arsenite and Boron Trans- port and Providing Tolerance in Plants Dhankher [38]	Biodegradation Dynamics of Polychlorinated Biphenyls in the Rhizosphere of Alfalfa-Rhizobium Symbiosis Tu [159]	Assessment of Phytoremediation Application in China: Cost and Benefits Lei [71]
9:30 (9:30 a.m.)	Study on the arsenic mobilization and absorption mechanisms in an intercrop- ping system of Pteris vittata and mulberry tree Wan [166]	The investigation of the organic and mineral fertilizers efficiency in the process of PAHs bioremediation in soil Wlóka [172]	Incorporating Vegetative Solutions into Landfill Closure along the Buffalo River Ludlow [78]
9:45 (9:45 a.m.)		Phytoremediation of Salt and Hydrocarbon Impacted Soils Using Biochar Augmentation Zeeb [184]	Phytotechnology Cost Benefits: Twenty Eight Years of Project Experience Thomas [153]
8:30 - 10:00 (8:30 - 10:00 a.m.)	Phyto-Scholar Program: Soil Restoration and Soil Improvement (Co-Chairs: Heather Henry & Elizabeth Nichols)		Big Basin
8:30 (8:30 a.m.)	Gary Pierzynski : Physical and Chemical Aspects of Soils		-
9:15 (9:15 a.m.)	Charles Rice: Biological Aspec	cts of Soils	
10:00 - 10:30 (10:00 - 10:30 a.m.)	Refreshment Break		Kaw Nation

Sessions (cont.)			
10:30 - 12:00 (10:30 a.m noon)	Inorganics: Lead	Plant / Microbe Studies	Green Infrastructure and Water Quality
Co-Chairs:	Rufus Chaney / Gary Pierzynski	M.N.V Prasad / Liz Rylott	Tricia Moore / Lee Skabelund
Location:	McDowell	Tuttle	Alcove
10:30 (10:30 a.m.)	Assessing the Potential of Goat Weed (Ageratum conyzoidies) for the Phytoremediation of Lead-Polluted Soils Aiyesanmi [6]	Plant root-microbe community dynamics during the phytostabilization of metalliferous mine tailings in semiarid regions Honeker [58]	Green Roofs: Benefits of Water and Energy Balance Gibler [51]
10:45 (10:45 a.m.)	Effect of Chelating Agents, Fungi and Native Plants in Remediation of Metals Contaminated Soils Akhtar [7]	Arbuscular mycorrhizal fungi-assisted phytoremedi- ation: a green technology for cleaning-up aged polluted soils Lounès-Hadj Sahraoui [78]	Integrating the Landscape: A Unified Watershed Management Program Hutchinson [60]
11:00 (11:00 a.m.)	Preliminary Study for Reveg- etation of Lead/Zinc Mine Tailings: Effect of Different Amendments on Plant Growth and Survival Al-Lami [11]	Arbuscular mycorrhizae efficiency in dissipation of dioxins/furans from aged-polluted soil: a microcosm experiment Meglouli [87]	Use of Indigenous plants as key components of the ecological infrastructure to secure water and food in South Africa Liphadzi [77]
11:15 (11:15 a.m.)	Chemically induced phytoextraction of lead (Pb) contaminated soil by high biomass producing grasses Greipsson [52]	Halo-tolerant Rhizobacteria (Klebsiella pneumonia and Pantoea dispersa) reduce sodium uptake and enhance growth and seed yield of Chickpea plants grown under salt conditions Nayyar [105]	Screening CO ₂ sequestration ef- ficient Pulp wood species in OTC under elevated CO ₂ conditions Mohanraj [94]
11:30 (11:30 a.m.)	Phytoextraction potential of a weed (Solanum nigrum) grown in lead contaminated soil Thomas [152]	Identification of arsenic resistant endophytic bacteria from roots of Pteris vittata Indian ecotype and assessment of their potential for remediation Tiwari [154]	Stormwater management with biofilters: Altos de la Estancia, a case study Morató [96]
11:45 (11:45 a.m.)	Gardening on contaminated urban soils: Mechanisms to reduce risk potential Hettiarachchi [57]	Selenium Toxicity in Cereal crops and its detoxication by Se resis- tant microbes Yasin [179]	Assessing Downstream Benefits of Green Infrastructure Design and Planning on Urban Storm- water Runoff Pavlowsky [115]

10:30 - 12:00 (10:30 a.m noon)	Phyto-Scholar Program: Phytotechnology Educational Programs and Career Paths (Co-Chairs: Heather Henry & Elizabeth Nichols)	
10:30 (10:30 a.m.)	Joel Burken, Missouri University of Science and Technology	
10:40 (10:40 a.m.)	Ravi Naidu, CRC CARE and University of Newcastle, Australia	
10:50 (10:50 a.m.)	Stanislaw Gawronski, Warsaw University of Life Sciences, Poland	
11:00 (11:00 a.m.)	Lee Newman, SUNY ESF	Konza Prairie
11:10 (11:10 a.m.)	Jaco Vangronsveld, Hasselt University, Belgium	
11:20 (11:20 a.m.)	Barbara Zeeb, Royal Military College, Canada	
11:30 (11:30 a.m.)	Stephanie Rolley, Kansas State University	
11:40 (11:40 a.m.)	Heather Henry, National Institute of Environmental Health Sciences	
11:50 (11:50 a.m.)	David Tsao, British Petroleum	
12:00 - 13:15 (noon - 1:15 p.m.)	Lunch Presentation Naidu, Ravi: Soil: The Critical Zone for Sustainability [101]	Kaw Nation

Sessions (cont.)

13:30 - 15:00 (1:30 - 3:00 p.m.)	Mixtures of Metals	Genetic Modification Studies	Site Monitoring and Management
Co-Chairs:	Lee Newman / Jaco Vangronsveld	Timothy Durrett / Nelson Marmiroli	Charles Barden / Cristina Negri
Location:	McDowell	Tuttle	Alcove
13:30 (1:30 p.m.)	Phytoremediation of heavy metals by Lemna gibba in a Kashmir Himalayan Ramsar site Ahmad [4]	Basis for cadmium sulphide quantum dot tolerance and sensitivity: a genome-wide nanotoxicology screening of Saccharomyces cerevisiae mutants Marmiroli [85]	Green Infrastructure Demonstration and Traning: Monitoring and Interpreting Two Sites on the Kansas State University Campus Canfield [26]
13:45 (1:45 p.m.)	Growth performance, metal accumulation and biochemical responses of three fern species grown on fly ash contaminated soil Alka [10]	Field trials of genetically modified switchgrass to remediate explosives pollution Rylott [126]	Novel Plant Sensing of Landfill Flaws for Ecological and Human Health Benefits Burken [24]
14:00 (2:00 p.m.)	Dissolution of metals from automotive brake pad wear debris: Impacts on plant growth and stability of aquatic communities Ebbs [43]	Cu-miRNAs target mimics as tools in bio-engineering of metabo- lism: A case study of comprehen- sive analysis of Cu homeostasis in plants Shahbaz [140]	Estimation of Benzene, Toluene and Chlorobenzene Removal Rates by a Phytoremediation Plot Limmer [76]

		Sessions (cont.)	
13:30 - 15:00 (1:30 - 3:00 p.m.)	Mixtures of Metals	Genetic Modification Studies	Site Monitoring and Management
Co-Chairs:	Lee Newman / Jaco Vangronsveld	Timothy Durrett / Nelson Marmiroli	Charles Barden / Cristina Negri
Location:	McDowell	Tuttle	Alcove
14:15 (2:15 p.m.)	Phytoextraction of Trace Elements by Water Hyacinth in Contaminated Area of the Gold Mine Tailing Shuvaeva [142]	Promiscuous dispersal of biodeg- radation genes: a key to improve endophyte-enhanced phytore- mediation? Weyens [170]	Phytoforensic Detection of Sub- surface Geochemistry Reactions: Field, Laboratory and Classroom Applications Burken [25]
14:30 (2:30 p.m.)	Phytoaccumulation of heavy metal (Pb, Zn, Cd) in ten wetland plants under different hydrological regimes Yang [175]		The Influence of Tree Properties on Contaminant Concentrations at Field Sites Limmer [75]
14:45 (2:45 p.m.)	Comparison of the influence of Cd, Ni, and Cu on sunflower growth and accumulation capacity Zhao [186]		Contaminated Sites Manage- ment: A Risk-Based Approach Naidu [102]
13:30 - 15:00 (1:30 - 3:00 p.m.)	Phyto-Scholar Program: Phyto-Scholar Alumni Presentations (Co-Chairs: Heather Henry & Elizabeth Nichols)		
13:30 (1:30 p.m.)	Ganga Hettiarachchi		
13:45 (1:45 p.m.)	Louis Licht		Konza Prairie
14:00 (2:00 p.m.)	Stacy Hutchinson		
14:15 (2:15 p.m.)	Dawn Reinhold		
14:30 (2:30 p.m.)	Elizabeth Nichols		
15:00 - 15:30 (3:00 - 3:30 p.m.)	Refreshment Break		Kaw Nation

Sessions (cont.)

15:30 - 17:15 (3:30 - 5:15 p.m.)	Mixtures of Metals	Results from Surveys	Studies with Biomass and Contaminated Water
Co-Chairs:	Lee Newman / Jaco Vangronsveld	Louis Licht / Ron Zalesny	Phil Barnes / Matt Limmer
Location:	McDowell	Tuttle	Alcove
15:30 (3:30 p.m.)	Phytoremediation poten- tial of Cannabis sativa and Parthenium hysterophorus: Identification and characteri- zation of GR and PLD α genes Ahmad [3]	Arsenic concentration in wild plants from natural attenuation islands on two mine tailings González-Chávez [52]	Marine in Industrial Biotech- nology: Biosorption by Sargas- sum glaucescens brown algae nanoparticle at new membrane reactor Esmaeili [44]
15:45 (3:45 p.m.)	Heavy metal toxicity: impact on plant development and metal uptake by wheat varieties (Ghaznavi-98 and Siren) Bakht [17]	Heavy metal content of Gunnera perpensa, a medicinal plant used in the Eastern Cape South Africa Learnmore [70]	Phytoextraction of Cadmium with increasing concentration of total phenolics and free proline in Veronica anagallis aquatica and Epilobium iazum plants Hadi [54]
16:00 (4:00 p.m.)	Effects of Fly Ash and Steel Slag on Trace Metal Accumu- lation in Rice Seedlings Plant- ed on Trace Metal Contami- nated Acidic soil Gu [53]	The potential of native plants for phytoremediation of contaminat- ed soils with Lead and Zinc (Case Study: The rangelands of around National Iranian Lead & Zinc Fac- tory-Zanjan) Moameri [92]	Modeling the removal of hexava- lent chromium, adsorbed by least cost organic wastes and optimi- zation of flame atomic absorption spectrophotometer (FAAS), for economic and accurate chromium determination Mirza [90]
16:15 (4:15 p.m.)	Development of an effective phytoremedial technology for metal contaminated calcare- ous soils Iram [62]	Phytoremediation of DDT-con- taminated soils in Kazakhstan Nurzhanova [110]	Adsorption of Cd(II) from aque- ous solution using Azadirachta indica (Neem) leaves Mishra [91]
16:30 (4:30 p.m.)	Evaluation of biochar bene- ficial effects on the phytosta- bilization of contaminated soils using poplar: influence on metal(loid)s bioavailability Morabito [95]	Assessing Diversity and Phytore- mediation Potential of Mangroves for copper contaminated sedi- ments in Subic Bay, Philippines Paz-Alberto [116]	Removal of perfluoroalkyl com- pounds using Agave sisalana microporous activated carbon fibre Mudumbi [98]
16:45 (4:45 p.m.)	Alternanthera bettzickiana a halophytic plant for phytore- mediation of Cadmium (Cd), Chromium (Cr), and Lead (Pb) contaminated soils Saeed [131]	Heavy metals accumulation in plants in industrial areas (Ewekoro and Sango Otta) of Ogun State, Nigeria Soyoye [146]	Banana Stalk Derived lignin as adsorbent for nickel (II) ion removal from water Okoronkwo [112]
17:00 (5:00 p.m.)	Valuation of certain reme- diative amendments in enhancing phytoremediation in various contaminated soil ecosystems Zaghloul [180]	Physiological and morphological responses to explosives contam- ination across plant functional groups Via [165]	

15:30 - 17:00 (3:30 - 5:00 p.m.)	Global Soil Partnership Program (Co-Chairs: Larry Erickson & Jason White)	
15:30 (3:30 p.m.)	Charles Rice: Global Soil Partnership Program	Konza Prairie
16:00 (4:00 p.m.)	Jon Hempel: State of Soil	
16:30 (4:30 p.m.)	Panel Discussion and Audience Participation: Jon Hemple, Valentina Pidlisnyuk, M.N.V. Prasad, Charles Rice, and Mark Walker	
17:00 - 18:30 (5:00 - 6:30 p.m.)	Poster Presentations with Authors (Author Last Name L - Z)	Kings / Flint Hills
18:30 (6:30 p.m.)	Exhibits and Displays Close	Foyer
18:30 - 19:00 (6:30 - 7:00 p.m.)	Poster Take Down	Kings / Flint Hills
18:30 - 19:00 (6:30 - 7:00 p.m.)	Exhibit and Display Take Down	Foyer
19:00 (7:00 p.m.)	Dinner On Your Own	Downtown Manhattan

Wednesday, Sept. 30, 2015

7:30 - 9:30 (7:30 - 9:30 a.m.)	Registration		1	Foyer	
7:30 - 8:30 (7:30 - 8:30 a.m.)	Continental Breakf	ast	l	Kaw Nation	
		Sessions			
8:30 -10:00 (8:30 -10:00 a.m.)	Inorganics: Metal Uptake and Toxicity	Plant Nano Particle Interactions	Risk Reduction of Wastewater	Inorganics: General	
Co-Chairs:	Ganga Hettiarachchi / Elizabeth Pilon-Smits	Yongming Luo / Jason White / Thomas Vanek	Danielle Carlin / Craig Just	Lawrence Davis / Jay Weeks	
Location:	McDowell	Tuttle	Alcove	Konza Prairie	
8:30 (8:30 a.m.)	Effect of Soil Volume on Yield of and Ni Hyperaccumulation by Alyssum corsicum Chaney [27]	Accumulation of metal oxide engineered nanoparticle in sweet potato Bradfield [23]	Microbial ecology of an ecological wastewater treatment plant: insigh into pharmaceutical removal processes Bale [18]	 Effect of arsenic levels and phosphate management on phyto- extraction efficiency of Chinese brake fern (Pteris vittata L.) Mandal [82] 	
8:45 (8:45 a.m.)	Phytoremediation research on contaminant fate: Mercury in Mexican polluted soils Daniel Garcia-Mercado [36]	Characterization of Gold Nanoparticles Uptake by Tomato Plants Using Single Particle Inductively Coupled Plasma-Mass Spectrometry Dan [35]	Phytoremediation Potential of Lemna mir L. for Heavy Metals Bokhari [21]	hor Phytoremediation of Potential Toxic Elements in Contaminated Sewaged Soils by Sunflower (Helianthus annuus) and Corn (Zea mays L.) Plants Saber [128]	

Wednesday, Sept. 30, 2015 (cont.)

Sessions (cont.)				
8:30 -10:00 (8:30 - 10 :00a.n	Inorganics: Metal ^{1.)} Uptake and Toxicity	Plant Nano Particle Interactions	Risk Reduction of Wastewater	Inorganics: General
Co-Chairs:	Ganga Hettiarachchi / Elizabeth Pilon-Smits	Yongming Luo / Jason White / Thomas Vanek	Danielle Carlin / Craig Just	Lawrence Davis / Jay Weeks
Location:	McDowell	Tuttle	Alcove	Konza Prairie
9:00 (9:00 a.m.)	Silicon (Si) alleviates cotton (Gossypium hirsutum L.) from zinc (Zn) toxicity stress by limiting Zn uptake and oxidative damage Farid [47]	The influence of Cu or Zn nutritional status on the uptake of CuO or ZnO nanoparticles by plants Kumar [69]	Modeling Sustainable Reuse of Nitrogen-laden Process Water by Poplar Just [64]	Impact of ionic and nanoparticle speciation states of silver on photosynthesis in Spirodela polyrhiza Shabnam [139]
9:15 (9:15 a.m.)	Evaluation of Pteris vittata (brake fern),a native plant for remediation of residual Uranium from mine tailings Rao [123]	Bioavailability of Cerium Oxide Nanoparticles to Plants: Impact of Soil Properties and Contaminant Aging Ma [79]	Mitigation of PPCPs at a Forested Municipal Waste- water Land-Application Site Nichols [107]	Mannitol alleviates chromium toxicity in wheat plants in relation to growth, oxidative stress and Cr uptake in sand and soil media Ali [8]
9:30 (9:30 a.m.)	Phytomining of Light Rare Earth Elements Rezaee [125]	Nanoceria modulates the kidney bean proteome and compromises its nutritional quality Majumdar [81]	Heavy Metal accumula- tion and translocation in soil-plant interface in wetland-cum-agricultural ecosystems around Keo- ladeo National Park, India: Implicaitons on ecological processes and human health Prusty [122]	Metal hyper-accumulators: Mechanisms of hyper-ac- cumulation and metal tolerance Razaque [124]
9:45 (9:45 a.m.)	Towards developing methods to increase uptake of palladium by plants for revegetation and remediation of mine wastes Shamsul [141]	Trophic transfer of en- gineered nanoparticles in terrestrial food chains Torre-Roche [156]	Chemical characterization of Sewage Effluent repet- itively used in arid soils irrigation Zaghloul [181]	Phytoremediation of Heavy Metals Assisted by Plant Growth Promoting (PGP) Bacteria: A Review Yang [176]
10:00 - 10:30	Refreshment Breal	<	Kaw I	Vation

10:00 - 10:30 (10:00 - 10:30 a.m.) Kaw Nation

Wednesday, Sept. 30, 2015 (cont.)

Sessions (cont.)				
10:30 -12:00 (10:30 a.m noon)	Inorganics: Selenium and Copper	Plant Nano Particle Interactions	Biomass and Bio Products	General Organics
Co-Chairs:	Ganga Hettiarachchi / Stacy Hutchinson	Yongming Luo / Jason White / Thomas Vanek	Joel Burken / Kraig Roozeboom	David Tsao / Mark Walker
Location:	McDowell	Tuttle	Alcove	Konza Prairie
10:30 (10:30 a.m.)	Interaction of plant growth promoting rhizo- bacteria and gibberellic acid to facilitate the hyper- accumulation of selenium in Indian mustard (Brassica juncea L.) Ahmad [5]	Nanoscale-Copper Responses of Salt Marsh Halophyte Halimione por- tulacoides L. Anjum [13]	Development of Bio- products from Camelina McLaren [86]	Phytoremediation of soil contaminated with petro- leum hydrocarbon using different amendments Hajabbasi [56]
10:45 (10:45 a.m.)	Influence of endophytic Bacillus pumilus and EDTA on the phyto-extraction of Cu from soil using Cicer arietinum Chaudhary [28]	Titanium Dioxide Nanoparticles Exposure Lower the Toxicity of Tetracycline to Arabidopsis thaliana and Oryza sativa Ma [78]	Appraisal of the poten- tial of the energy crop Miscanthus x giganteus for management of trace element contaminated soils: Focus on Cd, Pb and Zn Nsanganwimana [109]	Interdependence of soil and agricultural practice in a two - year phytoremediation in situ experiment Nwaichi [111]
11:00 (11:00 a.m.)	Enhanced efficiency of Cu removal by castor (Ricinus communis L.) in the presence of exogenous low weight organic acids Huang [59]	CdS quantum dots and CdSO₄: different oxidative stress responses and uptake in A. thaliana w.t. Marmiroli [83]	Perennial phytotechnol- ogy for sustainable and land management at the former military sites in Slovakia and Ukraine Pidlisnyuk [117]	Antioxidant behavior in Hydrocotyle vulgaris under hydrocarbon stress in constructed wetlands Saba [127]
11:15 (11:15 a.m.)	Analysis of selenium accumulation, speciation and tolerance of potential selenium hyperaccumu- lator Symphyotrichum ericoides Mehdawi [88]	Mycorrhizal Lycopersicon esculentum aquaporins gene expression and physiological responses to silver nanoparticle Noori [108]	Biomass characterization of locally available weeds as bioenergy feedstock: A case study Singh [143]	The Biodegradation of Polystyrene by Soil Bacteria Thomas [151]
11:30 (11:30 a.m.)	Evolution of Selenium Hyperaccumulation in Stanleya Pilon-Smits [119]	Nanoscale Interactions between Engineered Nanomaterials and Black Carbon (Biochar) in Soil Servin [137]	Biomass from Bioremediation as Feed Stock for Boosting Bioeconomy Varaprasad [163]	
11:45 (11:45 a.m.)	Investigation of Seleni- um hyperaccumulation mechanism in Stanleya pinnata: RNA Sequencing Pinpoints Potenital Genes for Phytoremediation and Biofortification Wang [168]	The nanoparticle effect on plant metabolisms of arabidopsis thaliana Vanek [161]	Utility of duckweed system in wastewater treatment and bio-energy feedstock production Verma [164]	

Wednesday, Sept. 30, 2015 (cont.)

11:30 - 12:00 (11:30 a.m noon)	Oral Presentations by Poste (Co-Chairs: David Tsao & Mark W	Poster Authors ark Walker)		
11:30 (11:30 a.m.)	Extraction procedure and chemica for green synthesis of Ag nanopart	l composition of two plants ticles Carrillo González [P22]	Konza Prairie	
11:40 (11:40 a.m.)	Antimony (Sb) - Pollution and Rem Assessment of Technologies Mirza			
11:50 (11:50 a.m.)	In vitro antioxidant potential and fre various extracts of pollen of Nelumb	e radical scavenging activity of o nucifera Gaertn Sardar [P71]		
12:15 - 13:00 (12:15 - 1 p.m.)	Closing Plenary Session (Co-Chairs: Larry Erickson & Jaso	Big Basin		
12:15 (12:15 p.m.)	Phytoremediation and Environme (PhytERA): A New Approach Maest			
12:30 (12:30 p.m.)	Presentation of Awards Jason Wh			
12:45 (12:45 p.m.)	Invitation to Attend the 13th Inter Conference in 2016			
12:55 (12:55 p.m.)	Closing Comments Jason White			
	Afternoon Events	Westar Wetlands	St. Marys, KS	
14:00 (2:00 p.m.)		Konza Prairie	100 Konza Prairie Lane Manhattan, KS 66502	
		Flint Hills Discovery Center (Show name tag for entrance fee)	315 South 3rd Street Manahttan, KS 66502	

Continuing Education Program

The 12th IPC includes a day of activities that will provide continuing education for professionals who want to learn what is offered. The conference organizers have received approval from the American Planning Association for their members to received 6 hours of credit for attending this program. We are also working to get approval from the professional society that serves the needs of landscape architects. The opening plenary will be part of the continuing education program. Global Campus provides continuing education credits, also. This program is open to all who register for the conference.

Monday, Sept. 28

8:30 to 10:00 a.m. - Opening plenary session for all Air Phytoremediation as a Toolbox for Green Infrastructure Services in Urban Areas Stanislaw Gawronski, Warsaw University of Life Sciences

Integrating Phytotechnology and Landscape Design Kate Kennen, Offshoots, Inc., Boston

Continuing Education Program

10:30 to Noon - Risk Exposure and Risk Reduction on Brownfields

Blase Leven, Mark Walker, and Ganga Hettiarachchi, K-State Kansas State University provides technical assistance to communities with Brownfields in 21 states. This session will include:

- 1. Overview of the U.S. program to manage risk and restore Brownfields to productive activities
- 2. Definitions and regulations for Brownfields
- 3. Site assessment processes
- 4. Software tools for Brownfields
- 5. Training and workshop educational activities and available materials
- 6. Technical assistance to communities
- 7. Phyto applications
- 8. Establishing gardens on Brownfield properties
- 9. Risk management associated with gardens on Brownfield sites

1:30 to 3:00 p.m. - Urban Applications of Phytotechnologies Stacy Hutchinson and Lee Skabelund, K-State This session will include

 Water management to reduce flooding: Vegetation can be used to help address storm water management in urban watersheds. This presentation will include urban land use planning and integration of stakeholders goals within watersheds to manage water quantity and quality to meet environmental regulations.

2. Green roof monitoring: This presentation will be on monitoring hydrology and related factors to improve green roof planning, design, implementation, and management.

Please see the abstract prepared by Lee Skabelund

3:30 to 5:00 p.m. - Urban Applications of Phytotechnologies Stanislaw Gawronski, Warsaw University of Life Science, Poland; Huston Gibson, KSU; Stacy Hutchinson, KSU; Kate Kennen, Offshoots, Inc.; Blase Leven, KSU; and Lee Sakbelund, KSU

Round table discussion with a panel of professionals. This includes time for questions for the two plenary speakers.

Learning Objectives

The 12th International Phytotechnology Conference provides an unusual opportunity to learn about new developments related to a variety of topics. Continuing education is important for many professionals and there will be a variety of important learning outcomes associated with this conference. The Monday program has the following learning objectives:

- 1. An introduction to air phytoremediation by an expert from Warsaw Poland who has many years of experience and many published papers.
- 2. An understanding of how vegetation can be used to improve air quality in urban areas.
- 3. A better understanding of how to integrate phytotechnology and landscape design.
- 4. A better understanding of Brownfields regulations, risk reduction objectives, and technical assistance programs.
- 5. An improved understanding of how to establish a garden on a Brownfields property and how to minimize risk associated with gardening.
- 6. A better understanding of how to use vegetated systems in stormwater management, and how to design vegetated watersheds.
- 7. A better understanding of efficient and effective monitoring of green roof systems and the instrumentation and its application.
- 8. The round table discussion is an opportunity to ask questions and discuss further the topics of the day and related topics.

Continuing Education Program (cont.)

Biographical Information

Larry E. Erickson is professor of chemical engineering and Director of the Center for Hazardous Substance Research at KSU. He has been active in phytotechnology research and education for more than 20 years.

Stanislaw Gawronski is a professor in the Faculty of Horticulture, Biotechnology and Landscape Architecture at Warsaw University of Life Sciences and the 2015 winner of the International Phytotechnology Society Gordon Award. His expertise is in air phytoremediation; that is, the use of vegetation to improve air quality in urban environments.

Huston Gibson is an assistant professor of planning in the Department of Landscape Architecture/Regional and Community Planning at KSU. He has a PhD in Planning from Florida State University.

Ganga Hettiarachchi is associate professor of soil and environmental chemistry in the Department of Agronomy at KSU. She has been conducting research and lecturing on risk reduction and safety at urban garden sites on Brownfield properties.

Stacy Hutchinson is a professor at KSU with teaching and research interests in environmental/natural resources conservation engineering with application of vegetated systems to sustainable urban stormwater runoff systems. She has a PhD in Civil Engineering from KSU.

Kate Kennen, RLA, leads and owns Offshoots, Inc. and is coauthor of the new book Phyto: Principles for Site Remediation and Landscape Design. She has degrees from Cornell and Harvard's Graduate School of Design. She also teaches at the Harvard Graduate School of Design.

Blase Leven leads the Technical Assistance to Brownfields program at KSU, which serves 21 states. He has organized workshops and provided technical assistance to help communities address contamination problems for more than 20 years. His education is in geology.

Lee Skabelund, ASLA, MLA University of Michigan (1990) is an associate professor of landscape architecture at KSU. He has overseen the design, installation, and monitoring of two living roofs and a bio-retention treatment train on the KSU campus so as to understand the opportunities and constraints associated with green infrastructure practices. He is the lead author of a chapter in the new book Green Roof Ecosystems.

Mark Walker leads the Technical Assistance to Brownfields program in Region 8 for KSU. He has degrees in microbiology and environmental health and more than 20 years of experience working with Brownfields programs. He has served as Brownfields coordinator for the State of Colorado.

Amount of Instructional Time

The instructional time will be 6 hours.

In addition to the time above, there will be a lunch speaker David Tsao who will speak on "An Industrialist's Perspective on Gaining Regulatory and Stakeholder Acceptance of the Suite of Phytotechnologies".

There will also be posters to view and exhibits.

Continuing Education Credits

Global Campus at Kansas State University provides Continuing Education Credits. There will be an opportunity to register for these as part of the conference registration process.

Tours and Post Conference Events



Westar Energy Constructed Wetland Treatment System Tour

In 2014, Westar Energy was awarded the Edison Award by the Edison Electric Institute for their recently constructed wetland treatment system (CWTS) at Jeffrey Energy Center, the largest coal-fired steam electric generation plant in Kansas. Located near St. Marys, KS, this wetland was designed to biologically treat the wastewater generated from the flue gas desulfurization (FGD) process, originating from the wet scrubber which removes sulfur dioxides from the air emissions. The CWTS is an innovative process, engineered to work with nature by removing heavy metals (arsenic, selenium, mercury, etc...) from the water that is eventually recycled back into their cooling water processes. Westar was also honored by POWER Magazine with their first Water Award for this new wetland. Please view the following web link for a short video titled "Cleaner by Nature" which promotes this innovative approach to treating this industrial wastewater

https://vimeo.com/133575223

Those who wish to tour the wetland site may do so on Wednesday, September 30, starting at 2:00 p.m.(14:00) from the 12th IPC registration area. The tour will include a 50 minute drive to the site and a tour of the wetland by Westar employees. For those who provide their own transportation, they can start for home after the tour. For those returning to the conference center, the estimated arrival time is 6:00 p.m. (18:00). If you wish to go on this tour, please sign up at the 12th IPC registration desk and pick up a copy of the Jeffrey Energy Center Tour Guidelines, which address safety issues.



Konza Prairie Biological Station

Konza Prairie Biological Station (KPBS) is located on a 3,487 hectare native tallgrass prairie preserve jointly owned by The Nature Conservancy and Kansas State University. More than 1500 papers have been published on KPBS research by more than 250 students and faculty since 1971. It is located south of Manhattan, and the entrance is on McDowell Creek Road. Please see the Internet site http://kpbs.konza.k-state.edu/ for more information on the research programs, maps, and hiking trails.

Those who are interested may visit the site and walk on one of the trails with Dr. Jim Koelliker, KSU professor emeritus of Biological and Agricultural Engineering. Sign up for this event at the Registration Desk and meet at 2:00 p.m. in the registration area on September 30.

Biographies

Larry E. Erickson is professor of chemical engineering and Director of the Center for Hazardous Substance Research at KSU. He has been active in phytotechnology research and education for more than 20 years.

Stanislaw Gawronski is a professor in the Faculty of Horticulture, Biotechnology and Landscape Architecture at Warsaw University of Life Sciences and the 2015 winner of the International Phytotechnology Society Gordon Award. His expertise is in air phytoremediation; that is, the use of vegetation to improve air quality in urban environments.

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Blase Leven leads the Technical Assistance to Brownfields program at KSU, which serves 21 states. He has organized workshops and provided technical assistance to help communities address contamination problems for more than 20 years. His education is in geology.

Lee Skabelund, ASLA, MLA University of Michigan (1990) is an associate professor of landscape architecture at KSU. He has overseen the design, installation, and monitoring of two living roofs and a bio-retention treatment train on the KSU campus so as to understand the opportunities and constraints associated with green infrastructure practices. He is the lead author of a chapter in the new book Green Roof Ecosystems.

Mark Walker leads the Technical Assistance to Brownfields program in Region 8 for KSU. He has degrees in microbiology and environmental health and more than 20 years of experience working with Brownfields programs. He has served as Brownfields coordinator for the State of Colorado.

Dr. Lawrence Davis is a professor of biochemistry at Kansas State University with expertise in plant science. He has been conducting phytoremediation research for more than 20 years. He has helped to organize this conference and arrange the technical program.

Dr. Larry E. Erickson is professor of chemical engineering and director of the center for hazardous substance research at Kansas State University. He has been conducting research on the beneficial effects of vegetation in contaminated soil since 1991. He has provided technical leadership for this conference.

Dr. John Floros is dean of the College of Agriculture and director of K-State Research and Extension at Kansas State University. He is a food scientist and has served as president of the Institute of Food Technologists.

Professor **Elena Maestri** teaches environmental biology and conducts phytoremediation research at the University of Parma in Italy. She serves on the Board of Directors of the International Phytotechnology Society.

April Mason is provost and senior vice president of Kansas State University. Her professional expertise is in foods and nutrition and she has been working on food security with Presidents United to Solve Hunger (PUSH). She leads K-State's effort to partner with other universities and organizations to end global hunger and malnutrition.

Karen McCulloh is mayor on Manhattan, Kansas and a member of the Manhattan City Commission. She has previously served on the Riley County Commission. She has served on the National Association of Counties Energy, Environment and Land Use Board.

Dr. Ravi Naidu is CEO and Managing Director of the Cooperative Research Centre for Contamination Assessment and Remediation of the Environment (CRC CARE). He is at the University of Newcastle in Australia. His work focuses on the remediation of contaminated soil, water, and air, and the potential impacts of contaminants upon health. He has authored or coauthored more than 400 research articles and provided leadership for several international conferences. **Kelli Park Fuhrmann** works for Global Campus at Kansas State University. She has provided organizational and logistical leadership for this conference.

Dr. Gary Pierzynski is university distinguished professor of agronomy and head of the department of agronomy at Kansas State University. He is a past president of the Soil Science Society of America. He is a co-author of the book Soils and Environmental Quality. He has been involved with research at field sites with contaminated soil since 1990.

Dr. Charles Rice is university distinguished professor of soil microbiology at Kansas State University. He was a member of the United Nations International Panel on Climate Change that received the Nobel Prize in 2007. He chairs the Division on the Role of Soils in Sustaining Society and the Environment of the International Union of Soil Sciences. He is a past president of the Soil Science Society of America.

Dr. Marcelo Sabates is the associate provost who provides leadership for the Office of International Programs. His B.A. is from the University of Buenos Aires, Argentina.

Dr. David Tsao provides leadership for remediation engineering and its application for BP. He is a founding member of the International Phytotechnology Society, and serves on the Board of Advisors of the Interstate Technology and Regulatory Council (ITRC).

Dr. Jason C. White is the Chief Scientist in the Department of Analytical Chemistry at the Connecticut Agricultural Experiment Station. He is president of the International Phytotechnology Society and editor of the International Journal of Phytoremediation. His Ph.D. from Cornell University is in environmental toxicology.

Internet Addresses

Conference website http://conferences.k-state.edu/phytotech2015/

Kansas State University http://www.k-state.edu/

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