

Rhizosphere 5



PROGRAM BOOK

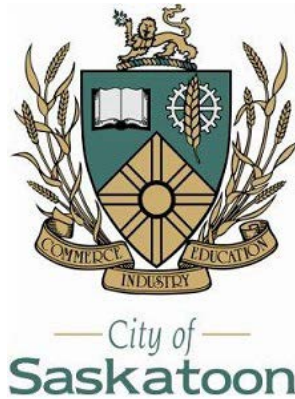
July 7 - 11, 2019
Saskatoon, Saskatchewan, Canada

Table of contents

Welcome from the Mayor	3
Welcome to Rhizosphere 5	4
Local Organizing Committee	5
Executive Oversight Committee	6
General Information	7
Floor Plans	8
Facts & Figures	9
Sponsors	11
Exhibitors	13
Conference Program	
Sunday	16
Monday	18
Tuesday	26
Wednesday	34
Thursday	44
Travel Award Recipients	49
Social Events	51
Social Tours	52
Scientific Tours	53



Welcome from the Mayor



It is my pleasure to welcome all of the delegates from across the world to Saskatoon, Saskatchewan—located in the heart of Treaty 6 Territory and the Homeland of the Métis Nation—for the Rhizosphere 5 Conference.

In Saskatoon, we have a long and proud history of tackling some of the biggest issues facing our world, and for doing this in a collaborative way that brings researchers, industry, government, and the community together to draw on each other's strengths. This conference will help to build on this tradition as you address an issue of pressing global concern: food security.

Over the time you spend here in Saskatoon, I wish you the best at this conference as you learn emerging trends in soil science and in enhancing our ability to feed a hungry and growing world. This is an issue that will only grow in importance in the decades to come, and it is an issue important to Saskatoon as we are a hub of agricultural research and activity.

I hope that everyone enjoys their stay in our community, and I hope you get the chance to eat at our fantastic local restaurants, shop at our many unique stores and malls, and maybe even visit some of our local attractions, such as the beautiful Meewasin river valley, the Remai Modern Art Gallery, or Wanuskewin Heritage Park.

I would like to thank the organizers for bringing this event to Saskatoon, and I wish the best to everyone over the days of this conference.

A handwritten signature in black ink, appearing to read 'Charlie Clark'.

Charlie Clark
Mayor

Welcome to Rhizosphere 5

Dear Colleagues,

On behalf of the Local Organizing Committee and the Executive Oversight Committee, we are pleased to welcome you to Saskatoon for **Rhizosphere 5**. We've planned an exciting scientific program under the theme of *Shining light on the world beneath our feet*. As home to Canada's only synchrotron (the *Canadian Light Source*), the University of Saskatchewan has developed an impressive array of research programs focused on food, water and soil security – with special focus on plant and root phenotyping and imaging. **Rhizosphere 5** provides delegates an exciting opportunity to exchange new insights and research on rhizosphere biological, chemical and physical processes.

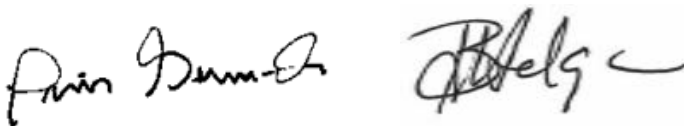
In keeping with past Rhizosphere conferences, the organizing committee has assembled an excellent scientific program consisting of Plenaries, Concurrent Contributed Sessions, Posters and Poster Pitches. These sessions will explore a range of topics and cutting-edge methodologies including, for example, *root imagining and phenotyping; the root microbiome; image-based modelling of rhizosphere processes; microbial hotspots in the rhizosphere; and root microbiome management & soil ecological engineering*. A special addition to this year's program is a joint scientific session with the *Canadian Society of Soil Science* on Wednesday afternoon, as the annual CSSS conference is being held in Saskatoon to celebrate the 100th anniversary of the Department of Soil Science at the University of Saskatchewan!

We hope you will enjoy a variety of social and cultural activities planned during the conference including an opening reception on Sunday night, a gala dinner on Tuesday evening, and a joint reception with CSSS at the Remai Modern Art Gallery on Wednesday evening. A number of pre- and post-conference tours provide delegates an opportunity to visit the University and its Synchrotron and Cyclotron, explore the city of Saskatoon, and visit several historical sites within the Province of Saskatchewan.

We want to acknowledge and thank all of our colleagues on the Local Organizing Committee who committed many hours of their time contributed to planning the scientific program and social activities. Also, a special thanks to Venue West Conference Services for providing conference logistics and to TCU Place.

Finally, and most importantly, we extend a sincere and special thanks to Tourism Saskatoon, the City of Saskatoon, Tourism Saskatchewan, the University of Saskatchewan, and all of our sponsors for their generous support of **Rhizosphere 5**.

Colleagues and delegates, please enjoy the wonderful hospitality offered by the city and residents of Saskatoon, and have an exciting and stimulating **Rhizosphere 5** conference!



Jim Germida and Bobbi Helgason
Co-Chairs, Rhizosphere 5 Local Organizing Committee

Local Organizing Committee



Co-Chair
Jim Germida
University of Saskatchewan



Melissa Arcand
University of Saskatchewan



Richard Farrell
University of Saskatchewan



J. Diane Knight
University of Saskatchewan



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Agriculture and Agri-Food Canada
(Harrow)



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Chris Yost
University of Regina



Co-Chair
Bobbi Helgason
Agriculture and Agri-Food Canada



Kari Dunfield
University of Guelph



Sue Grayston
University of British Columbia



Louise Nelson
University of British Columbia
(Okanagan)



Steve Siciliano
University of Saskatchewan



Fran Walley
University of Saskatchewan



Brad Peters
Tourism Saskatoon

Executive Oversight Committee



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Institut National de la
Recherche Agronomique (INRA)
France



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Germany



Davey Jones
Bangor University
United Kingdom



Leon Kochian
University of Saskatchewan
Canada



Hans Lambers
University of Western Australia
Australia



Hans Van Veen
Netherlands Institute of Ecology
Netherlands



General Information

WIFI

Complimentary wireless internet will be provided in all meeting spaces at the TCU Place during the event. Use the Network *Rhizosphere 5* and password *Rhizosphere*.

Social Media

Follow @Rhizosphere_5 on Twitter and share your Rhizosphere 5 moments using #Rhizo5.



Conference Registration Information

The conference registration desk is located on the main level of the TCU Place near the main entrance. It is open during the following days and times:

Sunday, July 7	15:00 – 19:00
Monday, July 8	08:00 – 17:30
Tuesday, July 9	08:00 – 19:30
Wednesday, July 10	08:00 – 17:30
Thursday, July 11	08:00 – 12:00

Any inquiries about the conference and social functions may be answered by any of the staff at the registration desk. Registered participants will receive their conference materials and name badge at the registration desk.

Please be sure to wear your name badge to all social events and conference sessions.

Sessions

Plenary and Keynote sessions will take place in Salon B+C on the upper level of TCU Place.

Parallel Sessions will take place in Gallery A, B, C & D on the main level of TCU Place.

Exhibits and Poster Information

Poster Pitches will take place in Salon B+C from Monday, July 8 to Wednesday, July 10 from 09:30 to 10:00.

Delegates are encouraged to watch these rapid-fire presentations where presenters have 2 minutes to pitch their posters to the audience.

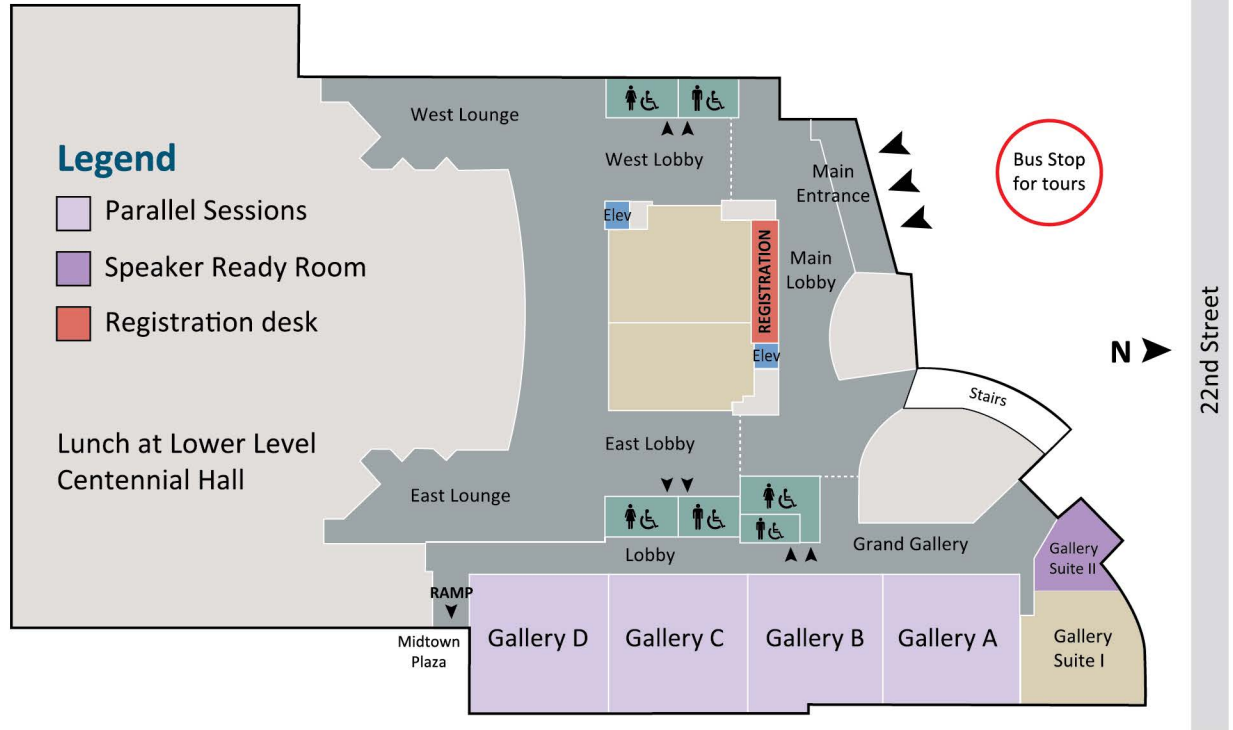
Exhibits and Posters will be located in the Grand Salon Foyer & Salon A, D, E on the upper level of TCU Place. All delegates are encouraged to take the opportunity to visit the exhibits and posters to become familiar with some of the latest advances and research in the field. Exhibits and Posters will be available during morning and afternoon breaks as well as lunches and dedicated poster sessions.

Certificate of Attendance

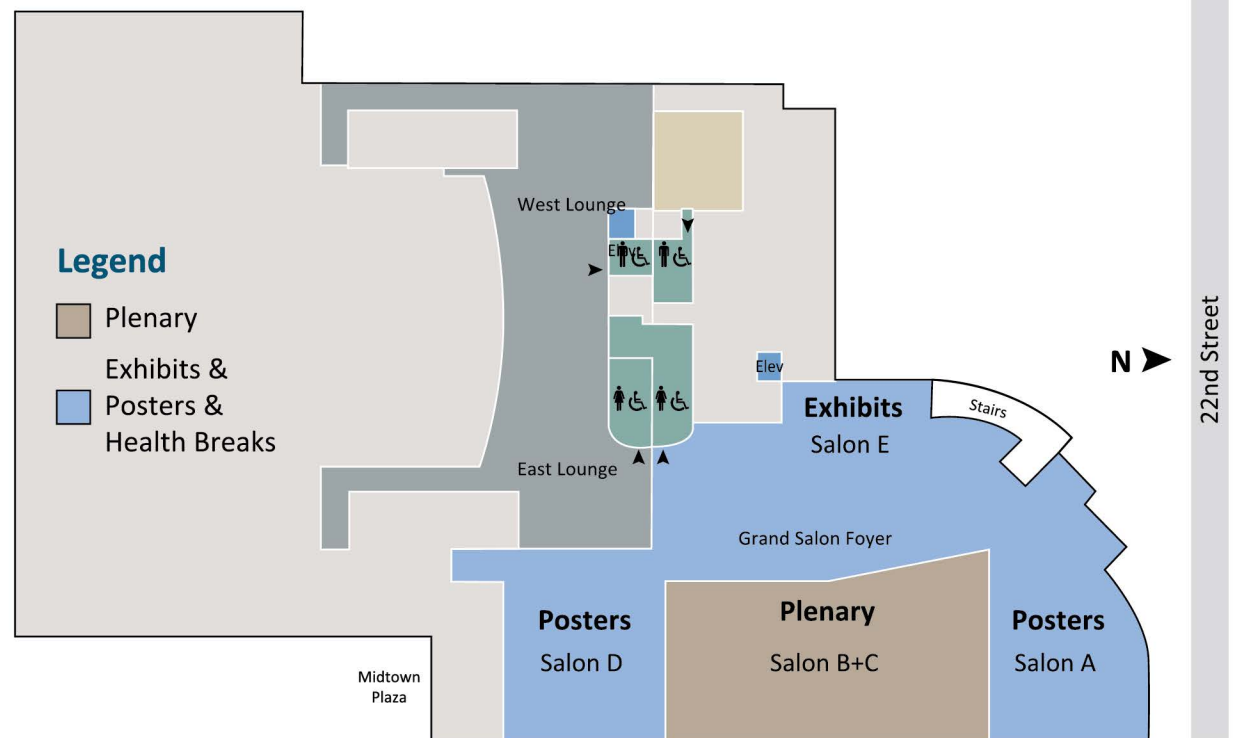
Certificates will be made available for you to download through a link provided to you after the conference.

Floor Plans

TCU, Main Level



TCU, Upper Level



Facts & Figures

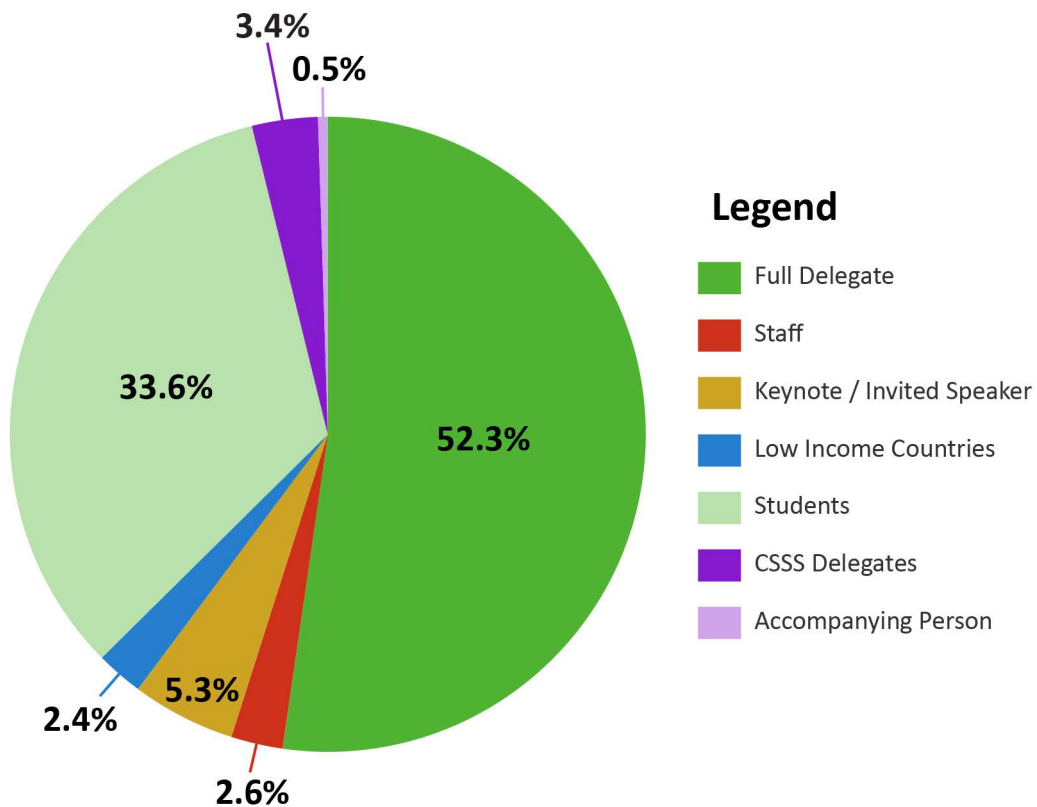
FACTS ON PRESENTATIONS

Abstracts Received: 423
Keynote Presentations: 8
Oral Presentations: 142
Poster Pitches: 26
Poster Presentations: 201

FACTS ON REGISTRATION

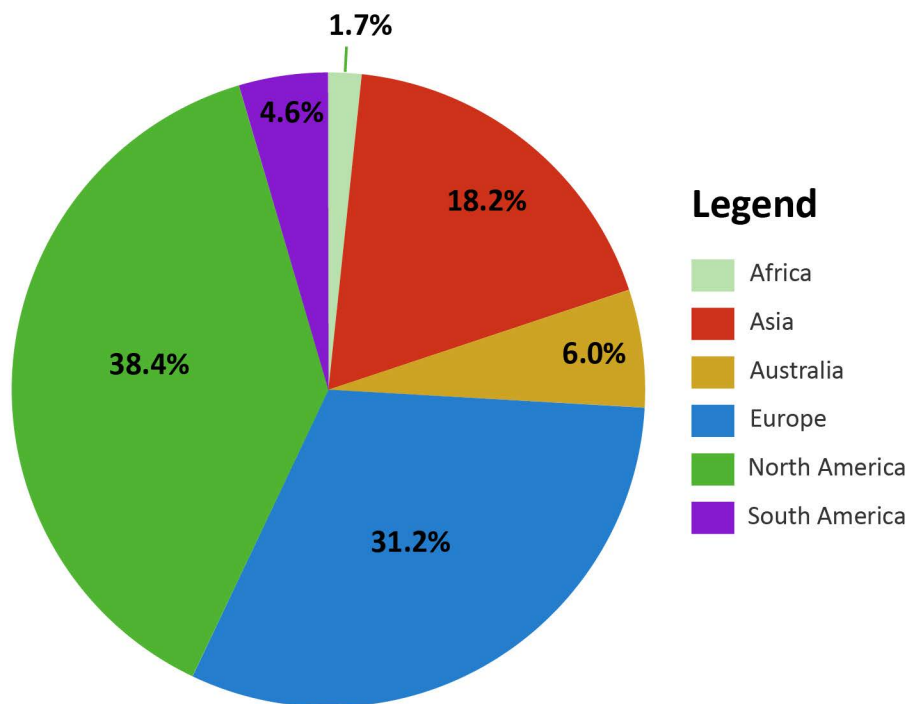
Total Number of Registrants: 417
Total Number of Countries: 41

BREAKDOWN OF REGISTRATION PER CATEGORY

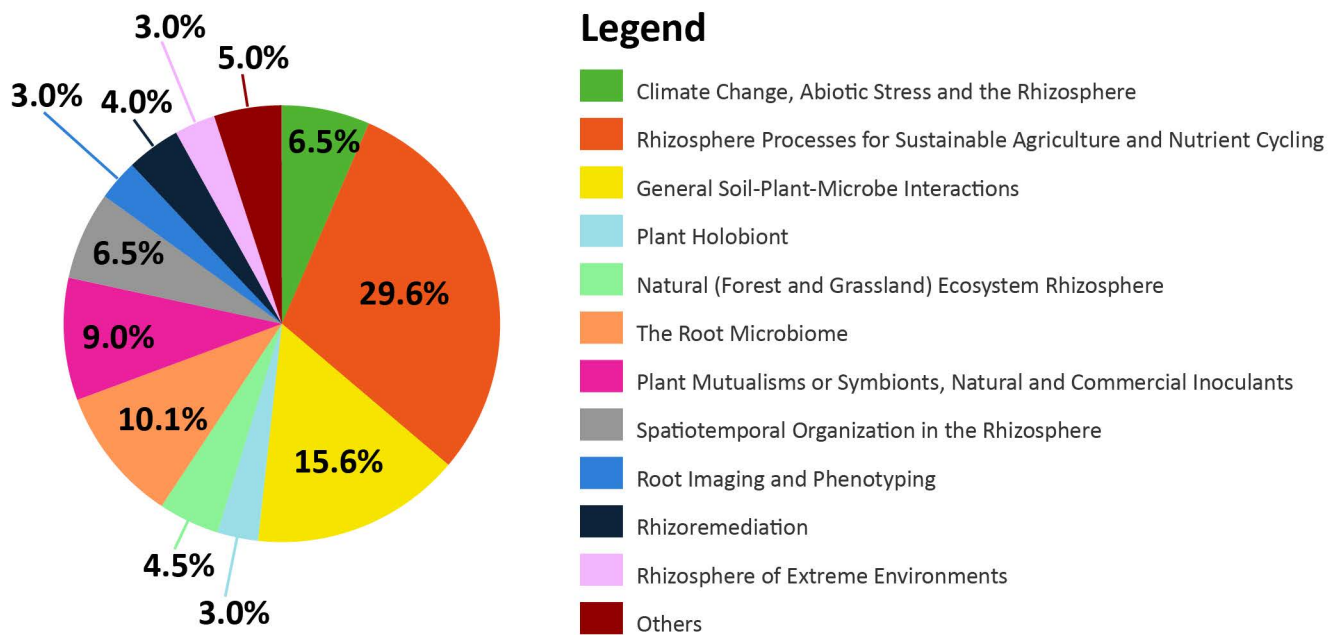


Facts & Figures

BREAKDOWN OF REGISTRATION PER REGION



POSTERS BY TOPICS



Sponsors

DIAMOND



PLATINUM



Sponsors

GOLD



SILVER



UNIVERSITY OF SASKATCHEWAN
College of Agriculture
and Bioresources
AGBIO.USASK.CA



BRONZE



STUDENT PRESENTATION AWARD



Exhibitors



Hoskin Scientific has been supplying testing and monitoring instrumentation to the Canadian market for over 70 years.

Our Environmental department provides everything from systems integration services, water quality, oceanography and aquaculture, to meteorology, hydrology, indoor air quality, soil science, and plant science. We provide solutions for monitoring and sampling biological and chemical parameters in the environment. Hoskin Scientific can equip you to collect the data you need for your project whether through a purchase or rental.

Rhizosphere Research Products B.V. is partnering with Hoskin Scientific specifically to provide products called Rhizons, instruments designed to sample water in the rhizosphere. RRP develops and produces many varieties of Rhizons for many different research applications.



PreSens
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PreSens is a world leader in the field of optical sensor technology. We develop, manufacture and distribute sensor systems for biological and environmental applications, for biotech & pharma, medical & life sciences, the food & beverage industries and for industrial and technical applications. We offer systems for:

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- Non-invasive online pH, CO₂ and oxygen measurement
- Oxygen and pH sensors for single-use bioreactors
- Microsensors for pH and oxygen
- Process control in shake flasks incl. biomass monitoring
- Low-maintenance DO measurement for fermentation and bioreactor systems
- Online oxygen and pH measurement in disposables like multiwell plates and plastic bags
- Imaging solutions for 2D-mapping of oxygen-, pH-, and CO₂-distributions

Furthermore, we are developers and manufacturers of opto-electronic OEM sensor components for companies in the field of medical equipment and process control.



The Fedoruk Centre operates the Saskatchewan Centre for Cyclotron Sciences (SCCS) a unique in Canada user facility used on nuclear imaging research. The facility, a unique cluster of research tools for environmental remediation and food security features a high-energy cyclotron, radiopharmaceutical production facility and radiochemistry laboratories. SCCS accommodates BioPETx a real-time imaging detector used to image microbial and root activity in soil ecosystems.

Exhibitors



Canadian Science Publishing (CSP) is Canada's largest publisher of scientific journals and not-for-profit leader in mobilizing scientific knowledge making it easy to discover, use, and share. With distribution in more than 125 countries, CSP publishes 24 international journals across the spectrum of science and engineering. Featuring content from a global community of researchers, CSP publications are supported by a team of internationally renowned subject-expert Editors and peer reviewers. As a first mover in open access, interdisciplinary journals, we connect researchers from diverse fields, enabling them to contribute to solving key world challenges.



Valent BioSciences is a global leader in the development and commercialization of biorational products used in agriculture, public health, and forestry markets. The Valent BioSciences soil health platform helps growers achieve short- and long-term sustainability through biorationals that promote healthy soil and root systems.



The Global Institute for Food Security (GIFS) is collaborating with over 240 research institutions, universities and agricultural industry experts in almost 30 countries to develop technologies that will help growers in Saskatchewan and around the world increase food production in a sustainable manner. GIFS was created in 2012 through a partnership involving Nutrien, the Government of Saskatchewan and the University of Saskatchewan.



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Sunday, July 7

15:30 - 16:45 | Salon B+C | **Opening Ceremony**

16:45 - 17:45 | Salon B+C | **Keynote Address**

SHINING A LIGHT ON RHIZOSPHERE RESEARCH IN SASKATCHEWAN

Leon Kochian

Global Institute for Food Security, University of Saskatchewan, Saskatoon, SK,
Canada

17:45 - 20:00 | Foyer &
Salon A, D, E | **Welcome Reception**



Photo by Angela Bedard-Haughn

Global Institute for Food Security

By 2050, there will be approximately 9.6 billion people living on the planet. Over the next 30 years, developed nations like Canada will need to produce about 70% more food, and developing nations in Africa and South Asia will need to double or even triple their food production to feed their people.

This will only be accomplished through ingenuity and innovation. The Global Institute for Food Security (GIFS) is creating technologies that will have commercial utility in advanced agricultural nations and the developing world alike.

Our vision is to create ingenious science that delivers sustainable food security for the world. This includes the deployment of digital tools such as remote sensing, image recognition and machine learning to improve our major crops.

Our mission is to help feed the world through transformative innovations in agriculture and food production that will benefit Saskatchewan's economic, social and environmental well being and which will empower developing countries to achieve local food security.



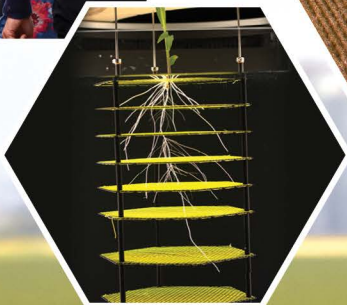
GIFS | GLOBAL INSTITUTE FOR FOOD SECURITY

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110 Gymnasium Place,
University of Saskatchewan,
Saskatoon, SK Canada S7N 4J8



Monday, July 8

08:30 - 09:30 | Salon B+C | **Keynote Address**

MULTISCALE IMAGE BASED MODELLING OF RHIZOSPHERE PROCESSES

Tiina Roose

University of Southampton, Faculty of Engineering and Environment,
Southampton, United Kingdom

09:30 - 10:00 | Salon B+C | **Poster Pitches**

10:00 - 10:30 | Foyer &
Salon A, D, E | **Health Break & Poster & Exhibits**

10:30 - 12:30 | Gallery A | **The Root Microbiome**

Chairs: Sue Grayston & Simeon Smail

10:30 - 11:00 | **PLANT MICROBIOME: UNRAVELLING THE BIOTA BLACK BOX**

V Gupta

CSIRO Ag&Food, Glen Osmond, South Australia, Australia

11:00 - 11:15 | **DOES THE SEED MICROBIOME PERSIST IN THE PLANT RHIZOSPHERE OVER TIME?**

CL Khodadad

AECOM Management Services, Inc, Kennedy Space Center, FL, United States

11:15 - 11:30 | **DEVELOPMENT OF THE RHIZOSPHERE MICROBIOME IS DEPENDENT ON ROOT AGE AND THE PRECEDING DETRITUSPHERE**

MD Denton

University of Adelaide, Glen Osmond, Australia

11:30 - 11:45 | **PLANT FUNCTIONAL GROUP AND THEIR ASSOCIATED ROOT TRAITS AS PREDICTORS OF THE SAPROPHYTIC FUNGAL COMMUNITIES IN EXPERIMENTAL GRASSLANDS.**

D Francioli

Wageningen University, Wageningen, Netherlands

Monday, July 8

11:45 - 12:00	CONTRASTING LONG-TERM FERTILIZATION REGIMES DIFFERENTIALLY IMPACT ROOT-ASSOCIATED MICROBIAL COMMUNITIES DURING THE DEVELOPMENT OF FIELD-GROWN MAIZE
	A Bourceret Max Planck Institute for Plant Breeding Research, Plant Microbe Interactions department, Cologne, Germany
12:00 - 12:15	SOIL-BORNE LEGACIES OF PLANT DISEASE
	G Vismans Utrecht University, Utrecht, Netherlands
12:15 - 12:30	STRUCTURAL EQUATION MODELLING OF A WINNOWED SOIL MICROBIOME IDENTIFIES HOW INVASIVE PLANTS RE-STRUCTURE MICROBIAL NETWORKS
	SD Siciliano Soil Science, Saskatoon, SK, Canada
10:30 - 12:30	Gallery B Spatio-temporal Organization in the Rhizosphere
	Chair: Doris Vetterlein
10:30 - 11:00	X-RAY CT BASED PLATFORM FOR INTEGRATION OF PHYSICAL, CHEMICAL AND BIOLOGICAL INFORMATION ON SPATIOTEMPORAL PATTERNS AT SINGLE ROOT AND ROOT SYSTEM SCALE
	D Vetterlein Helmholtz Centre for Environmental Research - UFZ, Halle, Germany
11:00 - 11:15	ROOTS CHANGE THE PORE STRUCTURE ONLY IF THEY HAVE TO – DEVELOPMENT OF BIOPORES AND COMPACTION AROUND ROOTS.
	M Lucas Helmholtz Centre for Environmental Research - UFZ, Halle, Germany
11:15 - 11:30	RHIZOSPHERE MODELLING REVEALS THE SPATIOTEMPORAL DISTRIBUTION OF DAIDZEIN, WHICH ALTERS BACTERIAL COMMUNITIES IN THE RHIZOSPHERE
	A Sugiyama Kyoto University, Uji, Japan
11:30 - 11:45	HYDRAULIC BRIDGES AT THE ROOT-SOIL INTERFACE: INSIGHTS FROM HIGH-RESOLUTION SYNCHROTRON X-RAY CT
	P Duddek University of Bayreuth, Bayreuth, Germany

Monday, July 8

11:45 - 12:00	CONTRASTING IMPACTS OF RHIZODEPOSITS ON THE PHYSICAL FORMATION AND FUNCTIONING OF THE RHIZOSPHERE
	PD Hallett University of Aberdeen, Aberdeen, United Kingdom
12:00 - 12:15	SIMULATING AND CHARACTERIZING SPATIO-TEMPORAL PATTERNS OF RHIZODEPOSITS-THE DEVELOPMENT OF THE RHIZOSPHERE IN 3D
	A Schnepf Agrosphere (IBG-3), Forschungszentrum Juelich GmbH, Jülich, Germany
12:15 - 12:30	RESPONSE OF SOIL MICROBIAL COMMUNITY TO PHOTOSYNTHETIC PRODUCT SECRETION ACTIVITY OF PLANT ROOTS INDICATED BY RHIZOSPHERE LIVE IMAGING METHOD
	Y Unno Institute for Environmental Sciences, Rokkasho, Aomori, Japan
10:30 - 12:30	Gallery C
	Root Exudates Chairs: Melissa Arcand & Eduardo Mitter
10:30 - 11:00	SAMPLING ROOT EXUDATES – MISSION IMPOSSIBLE?
	E Oburger University of Natural Resources and Life Sciences, Tulln, Austria
11:00 - 11:15	DIGGING INTO SOIL CHEMISTRY – METABOLOMICS ANALYSIS OF ROOT EXUDATES AND RHIZOSPHERE METABOLITES
	A Weinhold German Center for Integrative Biodiversity Research (iDiv) Halle-Jena-Leipzig, Leipzig, Germany Friedrich Schiller University Jena, Institute of Biodiversity, Jena, Germany
11:15 - 11:30	QUANTIFYING CITRATE-ENHANCED PHOSPHATE UPTAKE BY ROOTS
	D McKay Fletcher Bioengineering Sciences Research Group, University of Southampton, Southampton, UK, Southampton, Hants, United Kingdom

Monday, July 8

11:30 - 11:45

ORGANIC ACIDS AND PHOSPHATASE ENZYMES DETERMINE PHOSPHORUS AVAILABILITY IN THE RHIZOSPHERE OF DIFFERENT PLANT SPECIES.

D Touhami

Soil Science, Faculty of Agriculture and Life Sciences, Lincoln University, Christchurch, Canterbury, New Zealand

11:45 - 12:00

HOW RICE ROOT EXUDATES SHAPE THE NITRIFICATION PROCESS?

WM Shi

State Key Laboratory of Soil and Sustainable Agriculture, Institute of Soil Science, Chinese Academy of Sciences, Nanjing, Jiangsu, China

12:00 - 12:15

WHO'S YOUR NEIGHBOR? PLANTS NEIGHBORS INDUCE SPECIES-SPECIFIC CHANGES IN A FOCAL PLANTS' ROOT EXUDATION AND RHIZOSPHERE COMMUNITY COMPOSITION

TC Ulbrich

W.K. Kellogg Biological Station, Michigan State University (MSU), Hickory Corners, MI, United States

Department of Integrative Biology, MSU, East Lansing, MI, United States

12:15 - 12:30

COMPARATIVE ANALYSIS OF ROOT EXUDATES AND BACTERIAL DIVERSITY IN AEROPONICS AND SOIL

A Zancarini

Plant Hormone Biology group, Swammerdam Institute for Life Sciences, University of Amsterdam, Amsterdam, Netherlands

12:30 - 14:00

Centennial Hall

Lunch

14:00 - 15:00

Salon B+C

Keynote Address

THE SOIL-BORNE SUPREMACY: ROOT MICROBIOME AND PLANT IMMUNITY

Corné Pieterse

Utrecht University, Utrecht, Netherlands

Monday, July 8

15:15 - 16:45	Gallery A	The Root Microbiome Chairs: Davide Francioli & Sue Grayston
15:15 - 15:45		HOW BIOTIC INTERACTIONS SHAPE THE MOVEMENT OF FRESH AND DECAYING ROOT CARBON INTO SOIL J Pett-Ridge Lawrence Livermore National Lab, Livermore, CA, United States
15:45 - 16:00		CLOSE-UP ON INFORMATIONAL WAR BETWEEN GRAM OPPOSITE RHIZOBACTERIA A Chane Laboratoire de Microbiologie Signaux et Microenvironnement & Fed4277 Norvege - Normandie Université, Evreux, France
16:00 - 16:15		SHOTGUN METAGENOMICS SEQUENCING OF THE RHIZOSPHERE MICROBIOTA ASSOCIATED TO SEVEN ECOTYPES OF MEDICAGO TRUNCATULA. B Pivato Agroécologie, AgroSup Dijon, INRA, Univ. Bourgogne, Univ. Bourgogne Franche-Comté, F-21000 Dijon, France
16:15 - 16:30		INTENDED AND UNINTENDED CONSEQUENCES OF PLANTED FOREST MANAGEMENT FOR MICROBIAL RHIZOBIOME PROPERTIES SJ Smail Scion, Christchurch, New Zealand
16:30 - 16:45		A SYNTHETIC COMMUNITY APPROACH TO UNDERSTANDING THE POPLAR MICROBIOME D Carper Oak Ridge National Laboratory, Oak Ridge, TN, United States
15:15 - 16:45	Gallery B	Spatio-temporal Organization in the Rhizosphere Chair: Doris Vetterlein
15:15 - 15:45		INSIGHTS INTO THE SPATIAL ORGANIZATION OF RICE-ASSOCIATED DIAZOTROPHS AND THEIR NITROGEN FIXATION ACTIVITY H Schmidt University of Vienna, Department of Microbiology and Ecosystem Science, Vienna, Austria

Monday, July 8

15:45 - 16:00	SPATIAL EVALUATION OF CARBON FLOW AND MICROBIAL FUNCTION THROUGH THE ROOT-RHIZOSPHERE-SOIL CONTINUUM
	J Moran Pacific Northwest National Laboratory, Richland, WA, United States
16:00 - 16:15	BENCHMARKING MODELS OF ROOT ARCHITECTURE AND FUNCTION
	A Schnepf Forschungszentrum Jülich GmbH, Agrosphere Institute, IBG-3, Jülich, Germany
16:15 - 16:30	INFLUENCE OF ROOT MUCILAGE GEL PROPERTIES ON PORE-SCALE PROCESSES IN THE RHIZOSPHERE
	M Brax University Koblenz-Landau, Institute for Environmental Sciences, Group of Environmental and Soil Chemistry, Landau in der Pfalz, Germany
16:30 - 16:45	ROOT POSITION AND TRAIT SHIFTS DEPENDING ON A NEIGHBOR'S NUTRIENT-ACQUISITION STRATEGY IN KWONGAN NUTRIENT-IMPOVERISHED SOILS
	P de Britto Costa University of Campinas, Campinas, Brazil University of Western Australia, Perth, Australia
15:15 - 16:45	Gallery C Rhizosphere of Extreme Environments
	Chairs: Steve Siciliano & Marcus Griffiths & Milko Jorquera
15:15 - 15:45	RHIZOBACTERIAL COMMUNITIES ASSOCIATED WITH FLOWERING DESERT PHENOMENON (ATACAMA DESERT, CHILE) AND THEIR POTENTIAL AS PLANT GROWTH-PROMOTING BACTERIA
	M Jorquera Universidad de La Frontera, Temuco, Chile
15:45 - 16:00	FLAVONOIDS ARE INVOLVED IN PHOSPHORUS DEFICIENCY-INDUCED CLUSTER-ROOT FORMATION IN WHITE LUPIN
	CY Xiong China Agricultural University, Beijing, China
16:00 - 16:15	ROOT SYSTEM ARCHITECTURE AND SALT DYNAMICS AT THE ROOT ZONE
	U Nachshon ARO Volcani Center, Rishon-LeTzion, Israel

Monday, July 8

16:15 - 16:30 RHIZOSPHERE MICROBIOME OF HALOPHYTES AS A SOURCE OF OSMOREGULATORY GENES

S Mukhtar

School of Biological Sciences, University of Punjab, Lahore, Pakistan

Department of Biological Sciences, Forman Christian College (A Chartered University), Lahore, Pakistan

16:30 - 16:45 BACTERIAL COMMUNITIES ASSOCIATED WITH THE NATIVE ANTARCTIC GRASS DESCHAMPZIA ANTARCTICA.

A Znoj

Institute of Biochemistry and Biophysics Polish Academy of Science, Warsaw, Poland

16:45 - 18:00

Foyer &
Salon A, D, E

Poster Session & Exhibits & Drinks



Photo by Angela Bedard-Haughn



- Root Mass Expansion
- Improved Water Acquisition
- Increased Nutrient Efficiency

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Tuesday, July 9

08:30 - 09:30 | Salon B+C | **Keynote Address**

MICROBIAL HOTSPOTS & HOT MOMENTS IN THE RHIZOSPHERE

Yakov Kuzyakov

Georg-August University of Göttingen, Göttingen, Germany

09:30 - 10:00 | Salon B+C | **Poster Pitches**

10:00 - 10:30 | Foyer & Salon A, D, E | **Health Break & Posters & Exhibits**

10:30 - 12:30 | Gallery A | **Climate Change, Abiotic Stress in the Rhizosphere**

Chair: Louise Nelson

10:30 - 11:00

MICROBE-TO-PLANT SIGNALS: A WAY TO DEVELOP CLIMATE CHANGE RESISTANT AGRICULTURE

D Smith

McGill University, Ste. Anne de Bellevue, Quebec, Canada

11:00 - 11:15

DEVELOPING A TRAIT-BASED FRAMEWORK FOR PREDICTING MICROBIAL RESPONSE TO EXTREME CLIMATE EVENTS

O Nicolitch

Faculty of Science and Engineering, University of Manchester,, Manchester, United Kingdom

11:15 - 11:30

PSEUDOMONAS SP. STRAINS MRBP4 AND MRBP13 ISOLATED FROM MAIZE RHIZOSPHERE SOIL, EXTENUATES DROUGHT STRESS IN INOCULATED MAIZE (ZEA MAYS L.) PLANTS

OB Ojuederie

North-West University, Mafikeng, North-West Province, South Africa

11:30 - 11:45

RESPONSE OF THE WHEAT MICROBIOME TO THREE YEARS OF RAINFALL MANIPULATIONS

H Azarbad

INRS-Institut Armand-Frappier, Laval (Québec), Canada

11:45 - 12:00 THE EFFECT OF STRIGOLACTONES ON THE MICROBIOME OF RICE

B Kim

University of Amsterdam, Amsterdam, Netherlands

12:00 - 12:15 THE ROLE OF ARBUSCULAR MYCORRHIZA IN ADAPTATION TO ABIOTIC STRESS IN WHEAT

S Ravnskov

Department of Agroecology, Aarhus University, Research Centre Flakkebjerg DK-4200, Slagelse, Danmark

12:15 - 12:30 MICROBIAL COMMUNITY IMPACTS PLANT PERFORMANCE BASED ON DROUGHT HISTORY

J Munoz-Ucros

School of Integrative Plant Science, Cornell University, Ithaca, NY, United States

10:30 - 12:30 Gallery B **Carbon Dynamics in the Rhizosphere**

Chairs: Bobbi Helgason & Jemaneh Habtewold

10:30 - 10:45 HOT OR NOT? EFFECT OF RHIZOSPHERE HOTSPOTS ON TOTAL SOIL RESPIRATION

M Holz

Centre for Agricultural Landscape Research, Muencheberg, Germany

10:45 - 11:00 IMPACT OF ROOT HAIRS AND TEMPERATURE ON MICROBIAL CARBON UTILIZATION AND ENERGY PRODUCTION IN THE RHIZOSPHERE

X Zhang

Department of Biogeochemistry of Agroecosystems, University of Göttingen, Germany

11:00 - 11:15 CARBON AND NITROGEN CYCLING IN THE RHIZOSPHERES OF DIFFERENT GRASSLAND SPECIES

A Leptin

Department of Soil and Physical Sciences, Lincoln University, Lincoln, New Zealand

Manaaki Whenua - Landcare Research, Lincoln, New Zealand

11:15 - 11:30	COORDINATION OF SOIL MICROBES WITH ROOT FUNCTIONAL TRAITS AND IMPLICATIONS FOR SOIL RESPIRATION IN RIPARIAN AGROECOSYSTEMS
	KA Borden University of Toronto Scarborough, Toronto, ON, Canada University of British Columbia, Vancouver, BC, Canada
11:30 - 11:45	MONITORING SPATIAL AND TEMPORAL CARBON DYNAMICS IN NODULATED ROOTS BY CO-REGISTRATION OF MAGNETIC RESONANCE IMAGING AND POSITRON EMISSION TOMOGRAPHY
	R Koller Institute of Bio- and Geosciences, IBG 2: Plant Sciences, Forschungszentrum Jülich, Jülich, NRW, Germany
11:45 - 12:00	NANOSIMS: OPPORTUNITIES TO STUDY CARBON AND NITROGEN TRANSFORMATION AND CYCLING IN PLANT-MICROBIAL-SOIL SYSTEMS
	XH He Centre of Excellence for Soil Biology, College of Resources and Environment, Southwest University, Chongqing, China
10:30 - 12:30	Gallery C Rhizosphere Processes for Sustainable Agriculture
	Chair: Melissa Arcand
10:30 - 11:00	FUNCTIONAL RHIZOMICROBIOME: ROLE OF BENIGN BELOW-GROUND MICROBES IN MODULATING ABOVE-GROUND PLANT FITNESS AND SURVIVAL.
	H Bais University Of Delaware, Newark, United States
11:00 - 11:15	DOES THE GENOTYPE OF WHEAT PLAY A ROLE IN SOIL STRUCTURAL DYNAMICS?
	S Schmidt University of Nottingham, Loughborough, United Kingdom
11:15 - 11:30	BACTERIAL MICROBIOMES AND PLANT GENOTYPES: WHAT DRIVES PHENOTYPIC VARIATION AMONG CANOLA LINES?
	SD Mamet University of Saskatchewan, Saskatoon, Saskatchewan, Canada

Tuesday, July 9

11:30 - 11:45 ROOT-ASSOCIATED MICROBIOME OF MAIZE GENOTYPES WITH CONTRASTING PHOSPHORUS USE EFFICIENCY

EA Gomes

Embrapa Maize and Sorghum, Sete Lagoas, MG, Brazil

11:45 - 12:00 THE RHIZOMICROBIOME OF SORGHUM: IMPACT ON PLANT GROWTH AND STRESS TOLERANCE

EE Kuramae

Netherlands Institute of Ecology (NIOO-KNAW), Microbial Ecology, Wageningen, Netherlands

12:00 - 12:15 TWO DISTINCT GENE-COEXPRESSION NETWORKS, MYCORRHIZAL MODULE AND PHOSPHATE-STARVATION MODULE, ARE INDEPENDENTLY REGULATED IN THE FIELD

T Ezawa

Hokkaido University, Sapporo, Japan

10:30 - 11:20 Gallery D **Technical Session**

ILLUMINATE THE ROOT-SOIL INTERFACE. NON-INVASIVE IMAGING OF O₂, PH AND CO₂ IN SOIL SCIENCE.

PreSens Precision Sensing, Germany

12:0 - 14:00 Centennial Hall **Lunch**

14:00 - 15:00 Salon B+C **Keynote Address**

UNDERSTANDING AND ENGINEERING THE RHIZOSPHERE MICROBIOME

Etienne Yergeau

Université du Québec, Institut National de la Recherche Scientifique, Institut Armand-Frappier, Laval, QC, Canada

Tuesday, July 9

15:15 - 16:45	Gallery A	Climate Change, Abiotic Stress in the Rhizosphere Chairs: Louise Nelson & Don Smith
15:15 - 15:30		DISENTANGLING THE ROLE OF ROOT TRAITS IN THE RHIZOSPHERE COMMUNICATION NETWORK AND THEIR RESPONSE TO CLIMATE CHANGE. A Williams University of Manchester, Manchester, United Kingdom
15:30 - 15:45		RESPONSES OF TREE INTERACTIONS TO CLIMATE CHANGE AND INVASIVE SPECIES J Simon University of Konstanz, Konstanz, Germany
15:45 - 16:00		FINE ROOT CARBON EXUDATION AND MORPHOLOGY EFFECTS IN DIFFERENT NITROGEN SOURCES AND AIR HUMIDITY TREATMENTS M Sell University of Tartu, Tartu, Estonia
16:00 - 16:15		RHIZOSPHERE LEGACY: AMELIORATION OF MICRO-BIOPHYSICAL PROPERTIES OF COMPACTED SOIL (will not be presented) BS Razavi Dept. Soil Science, Christ-Albrecht-University Kiel, Germany
16:15 - 16:30		PLASTICITY AS THE KEY ABILITY OF ROOTS FOR ADAPTATION TO VARIOUS TYPES OF WATER STRESSES IN RICE PLANTS A Yamauchi Graduate School of Bioagricultural Sciences, Nagoya University, Nagoya, Aichi, Japan
16:30 - 16:45		ROLE OF ROOT PLASTICITY ON RESPONSE TO SOIL COMPACTION J Correa Forschungszentrum Jülich, Jülich, Germany
15:15 - 16:45	Gallery B	Negative Soil-Plant-Microbe Interactions (Pests and Pathogens) Chair: Lori Phillips
15:15 - 15:30		UNRAVELING THE MECHANISM BEHIND PLANT AND BENEFICIAL MICROBES INTERACTION LEADING TO DISEASE SUPPRESSION (will not be presented) KH Hooshmand Aarhus University, Slagelse, Denmark

Tuesday, July 9

15:30 - 15:45 POSSIBLE ROLE OF BACTERIAL COMMUNITIES IN MODULATING ABUNDANCE OF COMMON SCAB PATHOGEN IN RHIZOSPHERE AND GEOCAULOSPHERE OF POTATO

C Goyer

Agriculture and Agri-Food Canada, Fredericton, New Brunswick, Canada

15:45 - 16:00 ROOT ROT ALTERS THE STRUCTURE OF THE PEA ROOT AND RHIZOSPHERE MICROBIOME

Z Hossain

Agriculture and Agri-Food Canada, Swift Current, SK, Canada

16:00 - 16:15 DEVELOPING BENEFICIAL RHIZOSPHERE INTERACTIONS TO SUPPRESS ABOVE GROUND INSECT PESTS

A Gaudin

University of California Davis, Davis, USA

16:15 - 16:30 SOIL COMMUNITY SHAPED BY LONG-TERM ORGANIC AMENDMENTS COULD ALLEVIATE ABOVEGROUND HERBIVORY DAMAGE VIA ENHANCING RICE PLANT TOLERANCE AND RESISTANCE

M Liu

Soil Ecology Lab, College of Resources and Environmental Sciences, Nanjing Agricultural University, Nanjing, Jiangsu Province, China

16:30 - 16:45 THE POTATO COMMON SCAB-INDUCING PATHOGEN STREPTOMYCES SCABIES DEGRADES SUBERIN, A RELCACITRANT PLANT BIOPOLYMER

C Beaulieu

Université de Sherbrooke, Sherbrooke/QC, Canada

15:15 - 16:45 Gallery C **Amendments and Commercial Inoculants**

Chair: Anton Hartmann

15:15 - 15:30 SALINITY STRESS TOLERANCE OF 'MEYER' LEMON TREES IMPROVED BY A CONSORTIUM OF FOUR ARBUSCULAR MYCORRHIZAL FUNGI (RHIZOPHAGUS INTRARADICES, FUNNELIFORMIS MOSSEAE, CLAROIDEOGLOMUS ETUNICATUM, GLOMUS AGGREGATUM)

J Racsko

Mycorrhizal Applications, LLC., Grants Pass, OR, United States

Tuesday, July 9

15:30 - 15:45

URBAN AGRICULTURE WITH AN EMPHASIS ON SOIL HEALTH, MYCORRHIZAL FUNGI AND COMMERCIAL MYCORRHIZAL INOCULANTS

M Salomon

The Waite Research Institute and The School of Agriculture, Food and Wine, The University of Adelaide, Adelaide, South Australia, Australia

15:45 - 16:00

SOIL AMENDMENTS AFFECT MYCORRHIZAL COLONIZATION, ROOT NODULATION AND DRY MATTER ACCUMULATION IN COWPEA

IM Uzoh

Food Security and Safety Niche Area, North-West University, Mafikeng campus, Mafikeng/ North West Province, South Africa

Department of Soil Science, University of Nigeria, Nsukka campus, Nsukka/ Enugu State, Nigeria

16:00 - 16:15

THE INDUCTION OF NITRATE UPTAKE IN MAIZE PLANTS IS COUNTERACTED BY AZOSPIRILLUM BRASILENSE INOCULATION

Y Pii

Free University of Bozen-Bolzano, Bolzano, Italia

16:15 - 16:30

PROTIST INTRODUCTION ENHANCES PLANT GROWTH BY RESHAPING THE RHIZOSPHERE MICROBIOME

N Amacker

University Utrecht, Utrecht, Netherlands

16:30 - 16:45

ACCUMULATION OF MINERAL ELEMENTS IN THE RHIZOSPHERE AND CHICKPEA LEAVES: RESPONSE TO PHOSPHORUS AND RHIZOBIUM INOCULATION

JB Ogola

Department of Plant Production, University of Venda, Limpopo, South Africa

16:45 - 18:00

Foyer &
Salon A, D, E

Poster Session & Exhibits & Drinks

19:00 - 23:00

Centennial
Hall

Gala Dinner



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Wednesday, July 10

08:30 - 09:30	Salon B+C	Keynote Address ROOT MICROBIOME MANAGEMENT AND SOIL ECOLOGICAL ENGINEERING FOR A SUSTAINABLE AGRICULTURE Marcel van der Heijden University of Zurich, Zurich, Switzerland
09:30 - 10:00	Salon B+C	Poster Pitches
10:00 - 10:00	Foyer & Salon A, D, E	Health Break & Posters & Exhibits
10:30 - 12:30	Gallery A	Plant Holobiont Chair: Angela Sessitsch
10:30 - 11:00		SEEDS - RESERVOIR AND VECTOR OF DIVERSE AND FUNCTIONALLY IMPORTANT MICROBIOTA A Sessitsch AIT Austrian Institute of Technology, Tulln, Austria
11:00 - 11:15		HAS AGRICULTURAL INTENSIFICATION CAUSED HOLOBIONT-LEVEL ADAPTATION IN MAIZE? J Schmidt University of California, Davis, Davis, CA, United States
11:15 - 11:30		NITROGEN AVAILABILITY MODULATES THE HOST CONTROL OF THE BARLEY RHIZOSPHERE MICROBIOTA R Alegria Terrazas Division of Plant Sciences, University of Dundee at the James Hutton Institute, Dundee, United Kingdom
11:30 - 11:45		ROLE OF N-ACYL-HOMOSERINE LACTONE QUORUM SENSING COMPOUNDS OF GRAM-NEGATIVE BACTERIA FOR BENEFICIAL HOLOBIONTIC MICROBE-PLANT INTERACTIONS A Hartmann Ludwig-Maximilians-Universität München, Lehrstuhl Mikrobe-Host Interactions, Planegg/Martinsried, Germany

Wednesday, July 10

11:45 - 12:00

ARE THE CHANGES IN THE METABOLIC ACTIVITY OF THE ARBUSCULAR MYCORRHIZAL HYPHOSPHERE WARNING NEIGHBOURING PLANTS?

C Cabral

Department of Agroecology, Aarhus University, Research Centre Flakkebjerg, Slagelse, Denmark

12:00 - 12:15

THE PLANT MICROBIOME OF BRASSICA CARINATA AND ITS POTENTIAL TO INCREASE PLANT GROWTH AND YIELD

V Peta

South Dakota State University, Brookings, United States

12:15 - 12:30

PLANT LIFE CYCLE AND ENVIRONMENTAL CONDITIONS SHAPE THE COMPOSITION OF FUNGAL MICROBIOME IN CANOLA GENOTYPES

N Bazghaleh

University of Saskatchewan, Saskatoon, Saskatchewan, Canada

10:30 - 12:30

Gallery B

P Acquisition in the Rhizosphere

Chair: Melissa Arcand

10:30 - 10:45

INFLUENCE OF ROOT HAIRS AND RHIZOSPHERE ACIDIFICATION ON PHOSPHORUS MOBILIZATION FROM ALKALINE SOILS

S Halicki

Georg-August University of Goettingen, Goettingen, Germany

10:45 - 11:00

PHOSPHORUS-ACQUISITION STRATEGIES OF NATIVE PLANT SPECIES OF CAMPO NATURAL GRASSLANDS OF SOUTHERN SOUTH AMERICA

DF Michelini

Faculty of Agronomy, Universidad de la República, Salto, Salto, Uruguay

11:00 - 11:15

ARBUSCULAR MYCORRHIZAL FUNGI SECRETE ACID PHOSPHATASE TO HYPHOSPHERE IN RESPONSE TO PHOSPHORUS DEFICIENCY

K Tawaraya

Yamagata University, Tsuruoka, Japan

11:15 - 11:30

MODELING THE COMPARATIVE IMPACT OF ROOT HAIRS ON PHOSPHORUS UPTAKE UNDER DIFFERENT FIELD CONDITIONS

S Ruiz

University of Southampton, Southampton, United Kingdom

Wednesday, July 10

11:30 - 11:45

MONITORING PHOSPHORUS MOBILITY IN SOIL RELEVANT FOR ROOT UPTAKE USING MICRODIALYSIS AND X-RAY COMPUTED TOMOGRAPHY

C Petroselli

University of Southampton, Southampton, United Kingdom

11:45 - 12:00

WHAT IS THE ACTUAL MERIT OF CLUSTER ROOT FORMATION IN PHOSPHORUS UPTAKE FROM REAL SOIL?

J Wasaki

Graduate School of Biosphere Science, Hiroshima University, Hiroshima, Japan
School of Integrated Arts and Sciences, Hiroshima University, Hiroshima, Japan

12:00 - 12:15

THE WHEAT ROOT SECRETED PROTEOME IN THE CONTEXT OF PLANT PHOSPHORUS NUTRITION

C Staudinger

ARC Centre of Excellence in Plant Energy Biology, School of Molecular Sciences, University of Western Australia, Crawley, Western Australia, Australia
School of Biological Sciences, University of Western Australia, Crawley, Western Australia, Australia

12:15 - 12:30

BIOGEOCHEMICAL PHENOTYPING OF WINTER WHEAT FOR PHOSPHORUS ACQUISITION

RK McGrail

University of Kentucky, Lexington, KY, United States

10:30 - 12:30

Gallery C

Cutting-edge Approaches and Rhizosphere Modelling

Chair: Lori Phillips

10:30 - 10:45

WHAT DID WE LEARN IN 58 YEARS OF RHIZOSPHERE MODELING AND WHERE TO GO NEXT

C Kuppe

Forschungszentrum Jülich GmbH, Institute of Bio- and Geosciences - Plant Sciences (IBG-2), 52425 Jülich, Germany

10:45 - 11:00

MODELING THE IMPACT OF BIOPORES ON ROOT GROWTH AND ROOT WATER UPTAKE UNDER DIFFERENT SOIL PHYSICAL AND ENVIRONMENTAL CONDITIONS

M Landl

Forschungszentrum Juelich GmbH, Agrosphere (IBG-3), Jülich, Germany

Wednesday, July 10

11:00 - 11:15	IMAGING OF ROOTS AND PORE NETWORKS IN SOIL SYSTEMS BY USING HIGH RESOLUTION X-RAY MICRO-CT	H Schmidt University of Vienna, Vienna, Austria
11:15 - 11:30	CAPTURING SOLUTE PENETRATION THROUGH RIDGE AND FURROW OR FLAT PLANTING SYSTEMS USING X-RAY COMPUTED TOMOGRAPHY	C Scotson Bio-Engineering, Faculty of Engineering and Physical Sciences, University of Southampton, Southampton, United Kingdom
11:30 - 11:45	TRACE GASES : EXTENDING THE LIMITS OF RHIZOSPHERE	A de la Porte INRS - Armand Frappier Institute, Laval, Canada
11:45 - 12:00	NEW STRATEGIES FOR ASSESSING MICROBIAL INTERACTIONS IN THE RHIZOSPHERE	P Andeer Lawrence Berkeley National Laboratory, Berkeley, CA, United States
12:00 - 12:15	TRACKING 3D WATER FLOW AND ROOT UPTAKE IN SOIL BY ULTRA-FAST NEUTRON TOMOGRAPHY	C Toetzke Institute of Environmental Science and Geography, University of Potsdam, Potsdam, Brandenburg, Germany
12:15 - 12:30	A MODEL-DATA INTEGRATION STUDY FOR SOIL RICE COLUMN USING MULTISCALE MODELLING APPROACH CONSIDERING RHIZOSPHERE GRADIENTS	T Mai Institute of Bio- and Geosciences: Agrosphere (IBG 3) Forschungszentrum Jülich GmbH, Jülich, Germany
12:30 - 14:00	Centennial Hall	Lunch
14:00 - 14:15	Salon B+C	Rhizosphere 5 & CSSS Joint Session - Opening Remarks

Wednesday, July 10

14:15 - 15:15 | Salon B+C | **Keynote Address**

AN INDIGENOUS RESPONSE TO A BIOSECURITY THREAT: THE CASE OF KAURI DIEBACK (AGATHIS AUSTRALIS)

Amanda Black

Lincoln University, Canterbury, New Zealand

15:15 - 15:45 | Foyer & Salon A, D, E | **Health Break & Posters & Exhibits**

15:45 - 17:45 | Gallery A | **Forest Ecosystem Rhizosphere**

Chairs: Lenka Harantova & Sue Grayston

15:45 - 16:15 | FOREST TREE RHIZOSPHERE: AN ACTIVITY HOTSPOT WITH SPECIFIC MICROBIOME AND SPECIFIC FUNCTIONS

P Baldrian

Institute of Microbiology of the CAS, Prague, Czech Republic

aad69c | COUPLING OF SOIL ZYMOGRAPHY AND AUTORADIOGRAPHY TO QUANTIFY NUTRIENT ACQUISITION IN THE BEECH RHIZOSPHERE

S Spielvogel

Christian-Albrechts University, Kiel, Germany

16:30 - 16:45 | GREATER ROOT PHOSPHATASE ACTIVITY OF TROPICAL TREES AT LOW PHOSPHORUS SUPPLY DESPITE STRONG VARIATION AMONG CO-OCCURRING SPECIES

X Guilbeault-Mayers

Université de Montréal, Montréal, Québec, Canada

16:45 - 17:00 | EFFECTIVE USE OF ORGANIC PHOSPHORUS ALLOWS XYLOMELUM OCCIDENTALE TO INHABIT SEVERELY PHOSPHORUS IMPOVERISHED SOILS

H Zhong

School of Biological Sciences, The University of Western Australia, Perth, Western Australia, Australia

Wednesday, July 10

17:00 - 17:15	LIVING AND DEAD ROOTS FACILITATE EMERGENCE AND SURVIVAL OF OAK ACORNS IN CENTRAL TEXAS
	MA Gorzelak Agiculture and Agri-Food Canada, Lethbridge, AB, Canada
17:15 - 17:30	IDENTIFYING DISEASE SUPPRESSIVE PROPERTIES IN THE RHIZOSPHERE TO PROTECT NEW ZEALAND'S KAURI AGAINST DIEBACK DISEASE
	AK Byers BioProtection Research Centre, Lincoln, Canterbury, New Zealand
17:30 - 17:45	LINKING 31 YEARS OF SPECIES ABUNDANCE DATA FROM A BIODIVERSE MOUNTAIN MEADOW TO PLANT-SOIL FEEDBACK
	D in 't Zandt Department of Experimental Plant Ecology, Institute for Water and Wetland Research, Radboud University, Nijmegen, Netherlands
15:45 - 17:45	Gallery B Root Imaging and Phenotyping Chairs: Chris Topp & Randy Clark
15:45 - 16:15	3D IMAGING, COMPUTER VISION, STATISTICAL AND MATHEMATICAL APPROACHES REVEAL THE GENETIC BASIS OF PLANT ROOT AND INFLORESCENCE ARCHITECTURES
	CN Topp Donald Danforth Plant Science Center, St. Louis, United States
16:15 - 16:45	APPLICATION OF ROOT IMAGING AND PHENOTYPING TO MODELING AND BREEDING
	R Clark Corteva Agriscience, Johnston, Iowa, United States
16:45 - 17:00	FUNCTIONAL SIGNIFICANCE OF HETERORHIZY IN A ROOT SYSTEM FOR WATER UPTAKE IN RICE PLANT
	Y Watanabe Graduate School of Bioagricultural Sciences, Nagoya University, Nagoya, Aichi, Japan

Wednesday, July 10

17:00 - 17:15

THE PLASTICITY OF CANOLA ROOT SYSTEM ARCHITECTURE: HYDROPONICS VERSUS SOIL GROWN CANOLA

HP Ahmed

Global Institute for Food Security (GIFS), UofS, Saskatoon, SK, Canada

17:15 - 17:30

HIGH-THROUGHPUT PHENOTYPING OF MULTIPLE ION UPTAKE KINETICS IN MAIZE

M Griffiths

Noble Research Institute LLC, Ardmore, United States

15:45 - 17:45

Gallery C

Rhizoremediation

Chairs: Steve Siciliano & Chris Yost

15:45 - 16:00

A ROOT TO SUCCESS: HARNESSING THE NATURAL COMPLEXITY OF RHIZOSPHERE EXUDATION TO DECONTAMINATE SOIL

A Fremont

Institut de Recherche en Biologie Végétale, Montreal, Québec, Canada

16:00 - 16:15

RHIZOREMEDIATION OF TOLUENE USING HYBRID POPLARS AT A PILOT INDUSTRIAL FIELD SITE

M Ben-Israel

School of Environmental Sciences, University of Guelph, Guelph, ON, Canada

16:15 - 16:30

COMPLEXITY MATTERS: SOIL FOOD WEBS SHAPE THE ROOT MICROBIOME AND MODIFY PLANT TRAITS IN WILLOW UNDER CONTAMINATED CONDITIONS.

S Correa Garcia

INRS Institute Armand Frappier, Laval, Canada

16:30 - 16:45

RHIZOREMEDIATION OF ORGANIC CHEMICALS IN THE EXISTENCE OF FE USING EXUDED H₂O₂ BY FENTON REACTION

T Wagatsuma

Yamagata University, Tsuruoka, Wakaba 1-23, 997-8555, Japan

16:45 - 17:00

EXTRACELLULAR SILICA NANO-COAT INDUCED BY POLYETHYLENEIMINE CONFERS ALUMINUM TOLERANCE TO ROOT BORDER CELLS

XY Chen

Foshan University, Foshan, Guangdong, China

Wednesday, July 10

17:00 - 17:15 SOIL FUNGI, A RESOURCE AGAINST CADMIUM THREAT IN CACAO PLANTS

H Cordoba

Universidad Nacional de Colombia, Bogotá, Colombia

15:45 - 17:45 Gallery D **Root-Soil Interactions**

Chairs: Bobbi Helgason & Steve Mamet

15:45 - 16:00 DOES P CYCLING CHANGE OVER THE GROWING SEASON IN WHEAT RHIZOSPHERE AND BULK SOILS IN LONG-TERM PLOTS WITH DIFFERENT N AND P FERTILIZATION?

BJ Cade-Menun

Agriculture & Agri-Food Canada, Swift Current Research and Development Centre, Swift Current, Saskatchewan, Canada

16:00 - 16:15 LONG-TERM CROP ROTATION DIVERSITY AFFECTS FUNCTION AND STRUCTURE OF THE SOIL AND RHIZOSPHERE MICROBIAL COMMUNITIES

B Helgason

Dept. of Soil Science, University of Saskatchewan, Saskatoon, SK, Canada

16:15 - 16:30 DOES CROP FREQUENCY AND DIVERSIFICATION IN CANOLA-PULSE-CEREAL ROTATIONS CHANGE THE ARBUSCULAR MYCORRHIZAL FUNGAL MICROBIOME IN CROP ROOTS AND RHIZOSPHERE AND CROP YIELD?

J Masse

Institut de recherche en biologie végétale, Montreal, QC, Canada

Département de sciences biologiques - Université de Montreal, Montreal, QC, Canada

16:30 - 16:45 DISCOVERY OF THE UNTAPPED POTENTIAL OF H₂-OXIDIZING BACTERIA IN SOIL THROUGH THE USE OF MULTI-OMICS, MICROBIOLOGICAL AND MODELLING APPROACHES

P Constant

INRS, Centre Armand-Frappier Santé Biotechnologie, Laval, Québec, Canada

16:45 - 17:00 EVALUATION OF SOIL BACTERIA AS BIOCONTROL AGENTS FOR FIELD PEA ROOT ROT CAUSED BY APHANOMYCES EUTEICHES

AT Godebo

Department of Soil Science, University of Saskatchewan, Saskatoon, SK, Canada

Wednesday, July 10

17:00 - 17:15 POTENTIAL OF CHERRY RHIZOSPHERE ACTINOMYCETES AS BIOCONTROL AGENTS AGAINST PLANT-PARASITIC NEMATODES

M Marin-Bruzos

Department of Forest and Conservation Sciences, UBC Vancouver, Vancouver, BC, Canada

17:15 - 17:30 DIVERSITY OF PARASITIC FUNGI FROM SOYBEAN CYST NEMATODE ASSOCIATED WITH LONG-TERM CONTINUOUS CROPPING OF SOYBEAN IN BLACK SOIL

Y Xu

Northeast Institute of Geography and Agroecology, Chinese Academy of Sciences, Harbin, China

18:00 - 21:00 Remail Modern Art Gallery Joint Reception with CSSS



Photo by Angela Bedard-Haughn



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Thursday, July 11

08:30 - 09:30 | Salon B+C | **Keynote Address**

RHIZOSPHERE DYNAMICS AND INTERVENTIONS TO INCREASE CROP PRODUCTIVITY

Michelle Watt

Plant Sciences, Institute of Bio and GeoSciences-2, Forschungszentrum Juelich, Juelich, Germany

Faculty of Agriculture, University of Bonn, Bonn, Germany

09:30 - 10:00 | Foyer & Salon A, D, E | **Health Break & Posters**

10:00 - 12:00 | Gallery A | **Mutualisms and Symbionts**

Chairs: Louise Nelson & Miranda Hart

10:00 - 10:30 | THE FATE OF FUNGAL BIOFERTILIZERS – WHERE DO THEY GO, AND HOW DO THEY GET THERE?

M Hart

UBC Okanagan, Kelowna, BC, Canada

10:30 - 10:45 | ESTABLISHMENT AND FUNCTIONALITY OF ARBUSCULAR MYCORRHIZAL COMMUNITIES IN THE ROOT RHIZOSPHERE

H Bücking

South Dakota State University, Brookings, United States

10:45 - 11:00 | MICROBIAL COMMUNITY COMPOSITION AND SUCCESSION IN THE HYPHOSPHERE OF AN ARBUSCULAR MYCORRHIZAL FUNGUS

BD Emmett

Boyce Thompson Institute, Ithaca, United States

11:00 - 11:15 | EFFECT OF DARKSIDEA SPECIES ON BOUTELOUA GRACILIS: AN OVERVIEW OF THE MUTUALISM-PARASITISM CONTINUUM.

MJ Romero-Jimenez

Western Illinois University, Macomb, United States

Thursday, July 11

11:15 - 11:30	BIDIRECTIONAL NUTRIENT FLUXES IN TRIPARTITE INTERACTIONS OF MEDICAGO TRUNCATULA ARE CONTROLLED BY PLANT NUTRIENT DEMAND
	KR Cope Biology and Microbiology Department, South Dakota State University, Brookings, South Dakota, United States
11:30 - 11:45	TOWARDS THE EFFECTIVE BREEDING AND DEVELOPMENT OF IMPROVED MICROBIAL INOCULA FOR BETTER CASSAVA YIELDS IN AFRICA
	M Thuita International Institute of Tropical Agriculture, Nairobi, Kenya
11:45 - 12:00	THE BATTLE BETWEEN ELITE RHIZOBIAL INOCULANTS AND RABBLE OF RESIDENTS AFFECTING FIELD PEA NITROGEN NUTRITION
	C Daulagala Hawkesbury Institute for the Environment, Western Sydney University, Penrith, Australia
10:00 - 12:00	Gallery B Rhizosphere Processes and Interactions Chairs: Bobbi Helgason & Navid Bazghaleh
10:00 - 10:15	WHEAT RHIZOSPHERE MICROBIAL BIOMASS, COMPOSITION AND ENZYME ACTIVITIES IN RESPONSE TO GLYPHOSATE IN THE CANADIAN PRAIRIES
	NZ Lupwayi Agriculture & Agri-Food Canada, Lethbridge, Canada
10:15 - 10:30	MICRO-HYDROLOGICAL NICHES IN SOILS: HOW MUCILAGE AND EPS ALTER THE BIOPHYSICAL PROPERTIES OF THE RHIZOSPHERE AND OTHER BIOLOGICAL HOT SPOTS
	P Benard University of Bayreuth, Bayreuth, Germany University of Göttingen, Göttingen, Germany
10:30 - 10:45	ROOT SYMBIONTS AND SOIL SUCCESSIONAL STAGE INFLUENCE PLANT-SOIL FEEDBACK EFFECTS ON VEGETATION SUCCESSION
	K McMahan University of British Columbia, Vancouver, BC, Canada

Thursday, July 11

10:45 - 11:00 THE DESIGN AND FUNCTION OF THE RHIZOSHEATH

S Rabbi

University of Sydney, Sydney, Australia

11:00 - 11:15 HUNTING FOR ELITE RHIZOBIUM STRAINS TO MAXIMIZE BIOLOGICAL N FIXATION BY WHITE CLOVER

S Shi

AgResearch Ltd., Christchurch, New Zealand

11:15 - 11:30 KNOW YOUR NEIGHBOUR: HOW NEIGHBOUR ROOTS DILUTE SOIL-BORNE FUNGAL DISEASE AMONGST SUSCEPTIBLE HOSTS

EA Ampt

Plant Ecology and Nature Conservation group, Wageningen University, Wageningen, Netherlands

11:30 - 11:45 BIOTIC VERSUS ABIOTIC DRIVERS: DISENTANGLING KEY FACTORS SHAPING RHIZOSPHERE PHOSPHORUS SPECIATION ALONG A CLIMATE GRADIENT

S Spielvogel

Christian-Albrechts University Kiel, Institute for Plant Nutrition and Soil Science, Kiel, Germany

11:45 - 12:00 ACTIVE FOOD WEB COMPONENTS IN GRASSLAND RHIZOSPHERE NETWORKS DURING NATURE RESTORATION

E Morriën

University of Amsterdam (UvA), Amsterdam, Netherlands

10:00 - 12:00 Gallery C **Rhizosphere of Cropping Systems**

Chairs: Kari Dunfield & Micaela Tosi

10:00 - 10:15 ORGANIC MANAGEMENT STRENGTHENS INTERKINGDOM RELATIONSHIPS IN THE SOIL AND RHIZOSPHERE OF BARLEY

E Kuramae

Netherlands Institute of Ecology, Wageningen, Netherlands

10:15 - 10:30 THE RHIZOSPHERE MICROBIOME: HOW BIODIVERSITY AND PLANT BREEDING CAN SHAPE FUNCTIONAL TRAITS IN RESPONSE TO BIOTIC/ABIOTIC STRESSES

SM Tsai

Cell and Molecular Biology Laboratory, Center for Nuclear Energy in Agriculture CENA, University of Sao Paulo USP, Piracicaba, Sao Paulo, Brazil

Thursday, July 11

10:30 - 10:45	NITROGEN COMPLEMENTARITY UTILIZATION, BIOLOGICAL N ₂ FIXATION OF SOYBEAN AND PEANUTS AND N TRANSFER TO ASSOCIATED MAIZE IN INTERCROPPING UNDER FIELD CONDITIONS	
	L Li China Agricultural University, Beijing, China	
10:45 - 11:00	CROP DIVERSIFICATION POSITIVELY ALTERS THE INTENSITY OF SOIL-PLANT INTERACTIONS IN INTENSIVE AGROSYSTEMS	
	S Mira UMR SAS, Rennes, France	
11:00 - 11:15	LONG-TERM FARMING PRACTICES SHAPE THE RHIZOSPHERE MICROBIOTA AND PLANT HEALTH	
	D Babin Julius Kühn-Institut, Federal Research Centre for Cultivated Plants (JKI), Institute for Epidemiology and Pathogen Diagnostics, Braunschweig, Germany	
11:15 - 11:30	FUNTIONAL ROOT TRAIT BASED CLASSIFICATION OF COVER CROPS TO SUPPORT SUSTAINABLE AGRICULTURE	
	C Hudek Cranfield University, Cranfield, United Kingdom	
11:30 - 11:45	ENGINEERING ROOT/RHIZOSPHERE PROCESSES FOR IMPROVING NUTRIENT-USE EFFICIENCY AND YIELD IN CHINESE INTENSIVE MAIZE-CROPPING SYSTEMS	
	JB Shen Department of Plant Nutrition, China Agricultural University, Beijing, China	
11:45 - 12:00	HIGH MAIZE DENSITY ALLEVIATES THE INHIBITORY EFFECT OF MINERAL N ON NODULATION OF INTERCROPPED PEA	
	C Zhao Gansu Provincial Key Laboratory of Aridland Crop Science, Lanzhou, Gansu, China College of Agronomy, Gansu Agricultural University, Lanzhou, Gansu, China	
12:10 - 13:30	Salon B+C	Closing Ceremony & Poster Award & Rhizosphere 6 Announcement

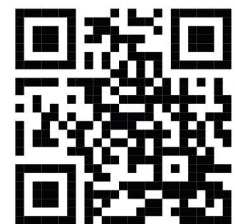
Rethink Tomorrow

Novozymes is the world leader in biological solutions. Together with customers, partners and the global community, we improve industrial performance while preserving the planet's resources and helping to build better lives.

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Student Travel Award Recipients

Rhizosphere 5 made funds available for travel awards. The grants were:

- Canadian Students: \$500
- US Students: \$750
- Students from outside North America: \$1500

We received a total of 71 submissions and were able to grant 28 Rhizosphere 5 Travel Awards with a total of \$37,750 in student travel support.

Jumana Akhtar

University of Leeds | Leeds, West Yorkshire, United Kingdom

Nataliya Bilyera

Christian-Albrecht-University of Kiel Kiel, Germany

Alexa Byers

Lincoln University | Christchurch, Canterbury, New Zealand

Daire Carroll

University of Warwick | Coventry, United Kingdom

Carmina Falcato Cabral

Aarhus University | Slagelse, Denmark

Melanie Ford

University of Adelaide | Urrbrae, South Australia, Australia

Adrien Frémont

Plant Biology Research Institute, Montreal University | Montreal, QC, Canada

Stephano Haarhoff

Stellenbosch University Stellenbosch, South Africa

Bora Kim

University of Amsterdam Amsterdam, Netherlands

Andrea Leptin

Lincoln University | Lincoln, Canterbury, New Zealand

Reuben Margerison

The University of Manchester Manchester, United Kingdom

Sarick Matzen

University of California-Berkeley Berkeley, California, United States

Katie McMahan

University of British Columbia Vancouver, British Columbia, Canada

Lenka Meszárošová

Institute of Microbiology of the CAS Prague, Czech Republic

Diego Michelini

Faculty of Agronomy, Universidad de la Republica | Salto, Uruguay

Ellis Monaghan

University of Warwick | Warwickshire, United Kingdom

Salma Mukhtar

Forman Christian College | Lahore, Punjab, Pakistan

Aditi Pandit

TERI-Deakin Nanobiotechnology Centre | Gurugram, Haryana, India

Irum Perveen

Quaid-i-Azam University | Rawalpindi, Punjab, Pakistan

Pauline Sophie Rummel

Georg-August-Universität Göttingen Göttingen, Germany

Jennifer Schmidt

University of California | Davis, California, United States

Xiaona Song

University of Göttingen | Göttingen, Germany

Terri Tobias

Western Illinois University | Augusta, Illinois, United States

Naomi Waldman

Ben Gurion University of the Negev Midreshst Ben Gurion, Israel

Yumika Watanabe

Nagoya University, Joint-PhD program between Nagoya University and the University of Western Australia Nagoya, Aichi, Japan

Kankan Zhao

Institute of Soil and Water Resources and Environmental Science, College of Environmental and Resource Sciences Hangzhou, Zhejiang, China

Xiaoran Zhou

Forschungszentrum Jülich | Linnich, Nordrhein-Westfalen, Germany

Anna Znoj

Institute of Biochemistry and Biophysics Polish Academy of Science Warszawa, Poland

Image Analysis Tools for Roots and Seedlings



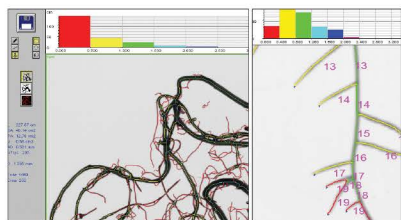
Basic, Regular & Pro

Automatic Analysis Systems for Washed Roots

Scan washed roots with Regent's scanners and root positioning systems.



See analysis results summarized on screen after scanning.



- ✓ Root morphology in function of root diameter and color: length, area, volume and number of tips
- ✓ Number of forks and crossings
- ✓ Root overlap detection for accurate measurement
- ✓ Topology, link and architecture with fractals
- ✓ Developmental classification

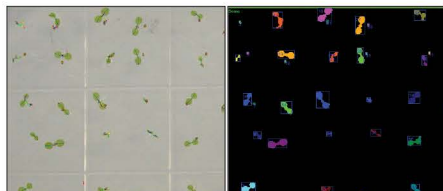
*** Available measurements and features vary according to WinRHIZO's version. See our website for details.

Arabidopsis

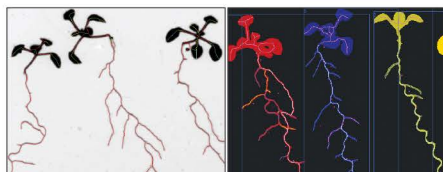
Automatic Analysis System for Washed Roots and Seedlings grown in Petri Dish

Analyse seedlings and leaves:

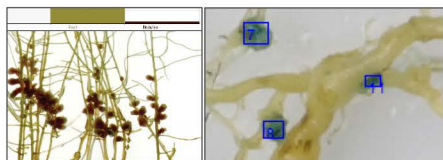
Globally one analysis per image Individually multiple analyses per image



- ✓ Leaf area of seedlings in Petri dish
- ✓ Germination Count



- ✓ Leaf area - leaf/hypocotyl distinction
- ✓ Root morphology
- ✓ Topology and developmental analysis

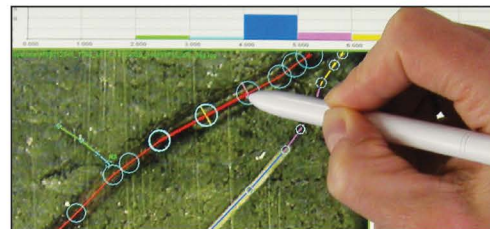


- ✓ Surface area and automatic count of non-touching nodules
- *** All measurements and features of the WinRHIZO Pro version are included.

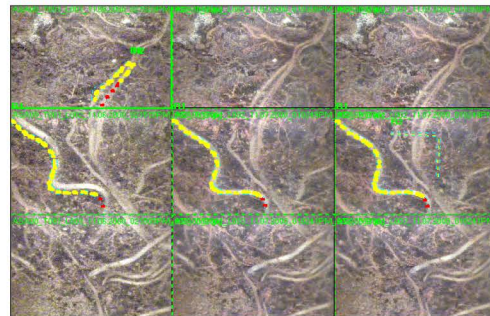
Tron & Tron MF

Software Programs for Interactive Analysis of Images of Roots in Soil and Rhizotron

Trace roots manually with a mouse or by touching the screen of all-in-one or tablet computers.



Monitor root growth by analysing Multiple Frames (images) of a root system taken at different times.



- ✓ Root morphology in function of root diameter and color: length, area, volume and number of tips
- ✓ Topology and developmental analysis
- ✓ Data retrievable from file names using the ICAP naming scheme
- ✓ Previous analysis can be retrieved to resume analysis of the same location at a later time simply by adding new or dead roots since the last analysis.



Social Events

Welcome Reception

Sunday, July 7 from 17:45 to 20:00 in the Foyer & Salon A, D, E

Admission included with delegate registration

Additional Guest at \$50 CAD, please inquire at the registration desk

Join us for the opening event of the conference. Catch up with old friends and meet new ones at the Welcome Reception held at TCU Place.

Gala Dinner

Tuesday, July 9 from 19:00 to 23:00 in the Centennial Hall

Admission included with delegate registration

Additional Guest at \$85 CAD, please inquire at the registration desk

Celebrate Rhizosphere 5 success by sharing a lovely dinner and entertainment with your colleagues in the Centennial Hall at TCU Place.

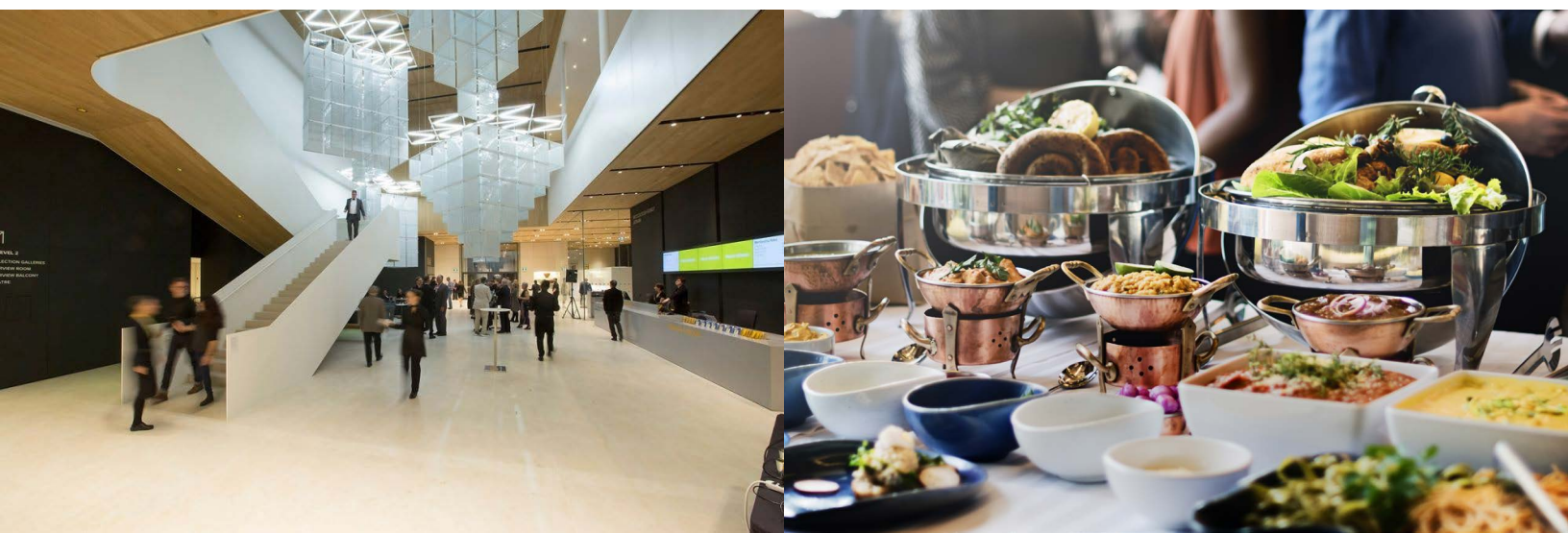
Joint Reception with CSSS

Wednesday, July 10 from 18:00 to 21:00 at Remai Modern Art Gallery

Admission included with delegate registration

Additional Guest at \$115 CAD, please inquire at the registration desk

Come network with the Canadian Society of Soil Science at our joint reception held in the beautiful Remai Modern Art Gallery, just a short walk from TCU Place.



Social Tours

Wanuskewin Heritage Park

Sunday, July 7, 2019 from 11:30 to 14:30

\$35.00 CAD (Pre-registration was required)

Rhizosphere 5 invites you to visit the longest running archaeological dig in Canada or the most northerly medicine wheel in the world and discover for yourself why Wanuskewin has been named to the Parks Canada tentative list for UNESCO World Heritage designation.

The tour includes round-trip transportation, park admission and lunch at Wanuskewin Heritage Park.

Black Fox Farm & Distillery

Monday, July 8, 2019 from 18:00 to 21:00

\$95.00 CAD (Pre-registration was required)

Black Fox is a unique farming operation that combines traditional methods of farming with modern technology to utilize the land as efficiently as possible. 90% of the ingredients for producing their award-winning Black Fox Gin, Black Fox Vodka and Black Fox Liqueur are grown on the farm.

The tour includes round-trip transportation, a distillery tour and tasting, a farm tour and a light catered dinner.

Prairie Lily Riverboat Cruise

Thursday, July 11, 2019 from 16:00 to 17:00

\$45.00 CAD (Pre-registration was required)

The cruise travels under four of Saskatoon's nine bridges, past the downtown core with its elegant landscaped parks, natural areas, and some of the city's most opulent residences. This beautiful river is recognized as one of the finest and best kept in the world.

The tour includes round-trip transportation, cruise admission and a one-hour cruise along the scenic South Saskatchewan River.

Fort Carlton Provincial Park & Batoche National Historic Site

Friday, July 12, 2019 from 09:00 to 17:00

\$95.00 CAD (Pre-registration was required)

Journey back in time and visit two of Saskatchewan's beloved historic sites. Located on the North Saskatchewan River, Fort Carlton was an important hub for the Hudson's Bay Company (HBC) from 1810–1885. Batoche was the site of the historic Battle of Batoche during the Northwest Rebellion of 1885.

The tour to these two historic sites includes round-trip transportation, interpretive tours at both sites, and a bag lunch to enjoy at the Fort Carleton picnic area.



Scientific Tours

Walking tour of U of S campus

Monday to Wednesday (July 8 – 10) over the 1.5-hour lunch break & Thursday, July 11 from 14:00 to 15:30

FULL

Join us for an informative introduction to the University of Saskatchewan campus through our walking tour, and explore over 100 years of growth and innovation. Your interpreter will highlight the university's history, important achievements, and unique architecture by focusing on the buildings around "The Bowl."

The tour includes round-trip transportation, a 40-minute guided tour and a bag lunch.

Canadian Lightsource Synchrotron (CLS)

Tuesday, July 9 over the 1.5-hour lunch break & Thursday, July 11 from 14:00 to 15:30

FULL

Located on the University of Saskatchewan campus, the CLS is the only Synchrotron in Canada. The Canadian Light Source Synchrotron (CLS) is comprised of several components including an Electron Gun, Linear Accelerator, Booster Ring, and Storage Ring. Each of these sections contribute to producing a beam of synchrotron light, which is then harnessed in a beamline.

The tour includes round-trip transportation, a 40-minute guided tour and a bag lunch.

Saskatchewan Centre for Cyclotron Sciences (SCCS)

Monday, July 8 & Wednesday, July 10 over the 1.5-hour lunch break

FULL

This is the province's first cyclotron and radioisotope facility. Operated by the Fedoruk Centre, the SCCS is focused on innovations in radioisotope production, the synthesis of molecular imaging agents, the development of imaging technology, and the production of radiopharmaceuticals for clinical use.

The tour includes round-trip transportation, a 40-minute guided tour and a bag lunch.

