AGRICULTURAL CHEMISTRY WINTER SCHOOL

Plant-soil-microbe interactions and ecosystem dynamics in a changing environment

School Programme
and Abstracts

10-13 February 2020 – Torino, Italy

DISAFA
Università degli studi di Torino

SICA

Welcome note

The interactions between plants, soils and their microbial communities are pivotal in controlling ecosystem dynamics, functions and the services they provide. Biotic and abiotic pressures, resulting from climate change, land-use change, pollution amongst others, can disrupt these critical interactions and consequently affect the way both natural and agricultural ecosystems work. Research in agricultural chemistry plays an important role in unravelling these interactions and how they are influenced by, or adapt to environmental change.

This edition of the Agricultural Chemistry Winter School, organized by the Italian Society of Agricultural Chemistry (SICA) and the Department of Agriculture, Forest and Food Sciences (DISAFA) of the University of Torino, will focus on these issues, and promote the importance of agricultural chemistry among young scientists in an international, friendly and casual environment.

On behalf of the organizing committee I would like to welcome you to Torino, and sincerely hope that your participation will benefit your research careers. May I also take this opportunity to thank all the speakers, moderators, organizers and sponsors that have come together to provide this opportunity for early-stage researchers.

Best Regards,

Daniel Said Pullicino
DISAFA, University of Torino

Organizing Committee

Anita Zamboni, University of Verona
Antonio Caporale, University of Naples
Daniela Pezzolla, University of Perugia
Elio Padoan, University of Torino
Laura Zanin, Univeristy of Udine
Ramona Balint, CNR-IGG
Vito Armando Laudicina, University of Palermo
Youry Pii, Free University of Bolzano

School Programme

Monday, 10 February 2020

14:00 – 14:30	Registration
14:30 – 15:15	Opening Session
Session 1	Moderator: *Antonio Caporale, University of Naples, Italy*
15:15 – 16:00	**The rhizosphere: a highly dynamic soil environment** *Mauro De Feudis, University of Bologna, Italy*
16:00 – 16:15	Coffee break
16:15 – 17:00	**Microbial ecology of the rhizosphere** *Stefano Mocali, CREA, Florence, Italy*
17:00 – 17:45	**Plant nutrient availability and uptake in the rhizosphere** *Michela Schiavon, University of Padova, Italy*
18:30	Get together

Tuesday, 11 February 2020

Session 2	Moderator: *Vito Armando Laudicina, University of Palermo, Italy*
09:00 – 10:00	**Rhizodeposition: Processes and Functions in Agroecosystems** [Keynote] *Johanna Pausch, Universitat Bayreuth, Germany*
10:00 – 10:45	**Soil organic matter dynamics and feedbacks to climate in forest ecosystems** *Emily Solly, ETH Zurich, Switzerland*
10:45 – 11:15	Coffee break
11:15 – 12:00	**Biogeochemical processes at the soil-root interface** *Antonio Caporale, University of Naples, Italy*
12:00 – 12:45	**Trace element cycling in soil-plant systems** *Roberto Terzano, University of Bari, Italy*
12:45 – 14:00	Lunch break / Poster session
Workshop 1	Moderator: *Ramona Balint, CNR-IGG, Torino, Italy*
14:00 – 14:45	**Navigating the seas of publication - getting published in international journals*** *Naoise Nunan, CNRS, Paris, France (Editor-in-chief of Geoderma)*
14:45 – 18:00	**What makes a well-written article?** [Group work activity]
20:30	Social dinner

* Seminar and following workshop sponsored by Geoderma, Elsevier BV

Wednesday, 12 February 2020

Session 3	Moderator: *Youry Pii, Free University of Bolzano, Italy*
09:00 – 10:00	**Biogeochemical interface in soil: Heterogeneity and functioning** [Keynote] *Naoise Nunan, Centre National de la Recherche Scientifique, Paris, France*
10:00 – 10:45	**Effects of plant genotypes and soil management interactions on microbial communities and their feedback** *Paola Corneo, University of Trento, Italy*
10:45 – 11:15	Coffee break
11:15 – 12:00	**Mycorrhizal fungi: beneficial symbionts for plants and ecosystem processes** *Luisa Lanfranco, University of Torino, Italy*
12:00 – 12:45	**The role of root-associated bacteria in plant stress alleviation and growth promotion** *Tanja Mimmo, Free University of Bolzano, Italy*
12:45 – 14:00	Lunch break / Poster session
14:00 – 14:45	**Stable isotopes in soil-plant systems**** *Johanna Pausch, Universitat Bayreuth, Germany*
Workshop 2	Moderators: *Daniela Pezzolla, University of Perugia; Elio Padoan, University of Torino, Italy*
14:45 – 18:00	**Presenting your research:** Poster pitches and poster session

Thursday, 13 February 2020

Session 4	Moderators: *Anita Zamboni, University of Verona; Ramona Balint, CNR-IGG, Torino, Italy*
09:00 – 10:00	**Principles of redox regulation in plants** [Keynote] *Paolo Trost, University of Bologna, Italy*
10:00 – 10:45	**Group work presentations**
10:45 – 11:15	Coffee break
11:15 – 12:00	**Group work presentations**
12:00 – 13:00	Closing session

** Seminar sponsored by Elementar Italia SpA

Abstracts

Characterization of changes in root membrane proteomes in maize (*Zea mays* L.) in responses to nitrogen sources

Muratore C.[1], Espen L.[1], Prinsi B.[1]

[1]Dipartimento di Scienze Agrarie e Ambientali - Produzione, Territorio, Agroenergia , University of Milan, via Celoria 2, I-20133 Milano, Italy.

Key words: nitrogen, membrane proteome, root.

Plant roots can uptake nitrogen (N) either in inorganic forms, such as nitrate (NO_3^-) or ammonium (NH_4^+), and in organic forms, mostly as free amino acids and short peptides. Among N inorganic sources, NO_3^- is the predominant form in agricultural soils. Plants can develop biochemical and morphological responses (for example, the regulation of the uptake activities and changes in root architecture) to balance the amount of N acquired from the soil with what is needed for growth and development. This N requirement is emphasized regarding cereal crops, for which maize (*Zea mays L.*) is worldwide accepted as a model species. In root cells, the membrane system plays key roles in sensing and signaling of N availability as well as in ion transport and storage.

This work is part of a wider project, whose final purpose is to study how roots perceive and adapt to different kinds of N nutritional sources, both inorganic and organic, provided singly or in combination. In detail, the aim of this study is to optimize the proteomic approaches needed to analyse the changes in root membrane protein patterns of maize plants grown in hydroponic systems, and exposed to different N availabilities, consisting in NO_3^-, NH_4^+ and co-provision.

Firstly, different nutritional conditions have been tested in order to appreciate the effects on plant growth, root morphology and plant metabolism.

Proteomic analyses of subcellular compartments have been also considered in order to clarify localized cellular responses and investigate relations among subcellular compartments. Since the sample preparation represents one of the most crucial steps in plant proteomics, the research was directed to the examination of different experimental approaches, in order to select the most valuable methods that can assure an adequate quality and reliability in the proteome characterization for the subsequent research activity. At this stage, some methods for obtaining the purified fraction of plasma membrane and microsomal proteins were evaluated.

Studies on quality, purity and protein recovery by means of large-scale proteomic approaches based on one-dimensional (1D) Gel Liquid Chromatography-Mass Spectrometry (1D GeLC-MS/MS), are ongoing.

This research paves the way for the future project steps in which the proteomic profiles will be compared among different nutritional conditions and their changes will be related to the physiological and biochemical evaluations, in order to individuate possible molecular determinants involved in perception and adaptation to N inputs in maize roots.