Monday June 25

Chemical Regulation in Plant Stress Tolerance

Organizers **Ryoung Shin** and **Khurram Bas**hir (RIKEN Center for Sustainable Resource Science)

In this workshop, "Chemical Regulation in Plant Stress Tolerance" will be presented and discussed – how to improve the plant stress tolerance using chemical compounds and how to use the chemical biology to understand the mechanisms of plant stress tolerance. RIKEN Center for Sustainable Resource Science (CSRS), the organizer, aims to achieve a resource and energy sustainable society by combining unique interdisciplinary fields of plant science, chemistry and chemical biology. In the last a few years, RIKEN CSRS has presented successful research outcomes via this interdisciplinary approach. We would like to share our knowhow and that of others using these ideas and techniques with the *Arabidopsis* community. This workshop will consist of 5 talks (15 min talk + 3 min Q/A) on the topics of chemical regulation in plant stress tolerance.

Speakers

Ryoung Shin (RIKEN Center for Sustainable Resource Science)

Chemical compounds aid plants to clean multiple pollutes from the environment

Triin Vahisalu (University of Helsinki, Finland)

Identifying novel components in abiotic stress tolerance

Benjamin Pommerrenig (University of Kaiserslautern, Germany)

Dynamics of intracellular sugar partitioning and role of sugars for plant cold tolerance

Sibylle Bauer (Institute of Biochemical Plant Pathology, Germany)

Isoleucine acid enhances SA-related and SA-independent defense responses

Khurram Bashir (RIKEN Center for Sustainable Resource Science), Japan

Omics approach to dissect the acetic acid mediated drought tolerance in *Arabidopsis thaliana* plants

Introducing INDEPTH: Impact of Nuclear Domains On Gene Expression and Plant Traits

Organizer **Geraint Parry**

This workshop will introduce the EU funded COST action entitled 'Impact of Nuclear Domains On Gene Expression and Plant Traits (INDEPTH)'. This broad collaboration brings together cell biologists, plant physiologists and data management experts to address important questions that surround the analysis of nucleus and chromatin domains in plants.

We will introduce INDEPTH and set the agenda for the next four years of research and collaboration. This will involve outlining the activities of workgroups entitled *Quantitative imaging and analysis of the plant nucleus in 3D (WG1), Transcriptional regulation through association of chromatin domains with nuclear compartments (WG2), Structure of nuclear domains and the functional output for plant traits (WG3)* and *Storage, Data management and integrative analysis (WG4)*.

We welcome anyone to attend who wishes to learn about this exciting collaboration and how they might get involved with our activities.

Workshop Schedule

- Introduction and Overview of the INDEPTH Cost Action:
- Scientific goals of INDEPTH Action
- Highlight possible opportunities to interact with INDEPTH, via training schools and STSMs
- Extended Q+A regarding opportunities available to INDEPTH participants

Speakers

Stefanie Rosa, Swedish University of Agricultural Sciences
Geraint Parry, GARNet, Cardiff University

Reach-out with the Arabidopsis Movie and Symphonic Score

Organizer **Sander van der Krol** (Lab. of Plant Physiology, Wageningen University)

Why should I join? Because you can contribute or just to hear fun story how art interacts with science

In this workshop we want to inform you on the Arabidopsis Movie and Symphonic Score project. This project was started by scientists but has been taken over by three professional artist to make a composition produced by the life and times of Arabidopsis.

We are collecting clips of Arabidopsis growth, intracellular movement etc. and these clips are used for a musical-movie about the life of Arabidopsis, showing different dynamic aspects of Arabidopsis growth and development. Each of the clips serves as a direct input for a musical instrument, which will be assembled by a professional composer into a score that will accompany the movie. You may have assembled dynamic data on the life of Arabidopsis in your own research and we would like to use these with your permission as inputs for the composition. Dynamic data may illustrate different Arabidopsis dynamics and can be from molecular to subcellular level, up to whole plant or population level.

During the workshop I will present the history of the concept, how it has been taken over by three driven artists with a genuine interest to break the barrier between scientist, public and art. There will be a brief demonstration of musical conversion Arabidopsis clock gene expression, information on the project time line and the long term goal of 'grow your own Plant Symphony'. Most important I will tell you how your own research may contribute and become permanent part of the Arabidopsis symphony. Looking forward to see you there!

The Artists: Sound artist Tom Kortbeek has extensive experience to convert moving images in different ways to music, and he will use each clip to convert to some musical line for individual instruments. Assembly of the different (plant generated) musical lines will be by composer Dr. Falk Hübner at Utrecht Conservatory and video compilation will be by video-artist Tanja Busking.

Project financing: Bank Giro Lottery Fund, Dutch Creative Industries Fund, Research School Experimental Plant Science The Netherlands. Laboratory of Plant Physiology, Wageningen University, Netherlands. Further financial support of the project is still welcome. For this we can give in return mentioning of your contribution in the Arabidopsis Movie and Symphonic Score.

Tuesday June 26

Publishing for Posterity: How to make your published data Findable, Accessible, Interoperable and Reusable

Organizer **Leonore Reiser** (TAIR)

Biology has become a data intensive discipline; researchers have to sift through the thousands of research publications and petabytes of associated data published each year. To discover and manage all this information requires the assistance of computers and databases. While we want to have 'all the data' available at our fingertips for evaluation or incorporation into new analyses, few researchers understand how to format their data or where to deposit their results for maximum reuse. When data are unavailable or published in ways that are inaccessible, they are essentially lost to the community. In this workshop we will present the concepts underlying the Findable, Accessible, Interoperable and Reusable (FAIR) data standards and some practical tools and resources to help researchers ensure that their published data are FAIR. Specifically, we will address (1), the importance of properly documenting biological reagents, experimental data and computational workflows and making them easily discoverable and reusable and, (2) present some practical strategies, resources and tools available for managing and disseminating research data and resources.

Speakers

Geraint Parry (GARNet,School of Biosciences, Cardiff University)

Data Management and Best Practice for Plant Science

Debbie Crist (Arabidopsis Biological Resource Center (DC) and Marcos Castellanos Uribe (Nottingham Arabidopsis Stock Centre (MCU)

Title to follow

Arthur Korte (The Center for Computational and Theoretical Biology, University Würzburg)

AraPheno, a repository for Arabidopsis Phenotype Data

Naomi King (eLife)

A publisher's perspective on data management, data sharing and reproducibility

Leonore Reiser (The Arabidopsis Information Resource, Phoenix Bioinformatics)

Making published data more accessible: A curator's perspective (or How to make your published research more visible in TAIR)

Beyond Arabidopsis: advantages and challenges of emerging plant models

Organizers **Kaisa Kajala** (Utrecht University, Netherlands) and **Michael T. Raissig** (University of Heidelberg, Germany)

Plant biology would not be as advanced as it is today without the scientific insights gained and technologies and resources developed in the go-to plant model Arabidopsis thaliana. Arabidopsis will and should remain one of our most important plant models in future and funding for fundamental research in this system must not be cut. The advancement and affordability of next-generation sequencing technologies nowadays, however, allow to read the genome or transcriptome of pretty much any plant. Together with progress in plant biotechnology protocols and the possibility to knock-out any given gene through CRISPR-based genome editing tools, we can now venture into plant clades previously barren due to technological and resource constraints. This allows illuminating many research fields from a broad evolutionary perspective and allows for more curiosity-driven approaches concerning phenotypes and systems that cannot be studied in Arabidopsis. This workshop serves as a platform to present both the joys and challenges of working with emerging and non-model plant systems. The speakers will introduce advantages and challenges as well as resources and tools in their model system of choice before presenting scientific insights gained by using this model. The overall goal is to broaden the attendees awareness of alternative model systems and encourage them to push the boundaries of experimental plant biology.

Speakers

Ykä Helariutta (Sainsbury Laboratory Cambridge University; University of Helsinki)

On a two-way street between Arabidopsis and trees

Stacey Harmer (University of California Davis)

TBA

Javier Brumos (North Carolina State University)

Translation Regulation in Tomato Fruit: It's Time to Ripen!

Mariko Nonogaki (Oregon State University)

Arabidopsis seed research to modify germination and reserve accumulation in crop grains

Josep Villarasa-Blasi (Carnegie Institution for Science)

Identification and characterization of water sensing mechanisms across the green lineage

Stress and CO_2 perception and signaling in guard cells

Organizers **Maija Sierla** University of Helsinki, Finland) and **Hannes Kollist** (University of Tartu, Estonia)

Stomatal pores regulate the diffusion of CO_2 into leaves for photosynthetic carbon fixation and mediate over 90 % of plant water loss via transpiration. Guard cells, which form the stomatal pores, have mechanisms that allow plants to sense and respond to diverse environmental and endogenous stimuli and adjust the stomatal pore accordingly. Changes in environmental conditions, including drought, CO_2, light and ozone concentration regulate stomatal aperture through activation of signaling pathways. The different response pathways have unique early signaling components, but all ultimately target common elements, such as the anion and K^+ channels that drive stomatal movements. Recent research has shed light on the specificity and overlap between the stomatal signaling pathways.

The increased occurrence of extreme climate conditions as well as elevated ozone and CO_2 are having profound effects on global gas exchange, plant water use efficiency, growth and leaf heat stress. CO_2 regulation of stomatal conductance and development has increasing effects on plants in light of the continuing steep increase in the atmospheric CO_2concentration. Substantial advances have recently been made at isolating new mutants and characterizing the molecular and cellular signaling mechanisms and network principles by which stress stimuli control stomatal signal transduction and plant gas exchange. Furthermore, the effect of CO_2 on water use efficiency and plant growth is being unraveled.

Identification of the molecular mechanisms by which stress stimuli and CO_2 modulate stomatal conductance is fundamental to understanding the regulation of gas exchange between plants and the atmosphere and can also contribute to future engineering of improved growth or enhanced water use efficiency in selected crop plants and plant carbon sinks in the face of climate change. The aim of the workshop is to highlight recent progress and to identify key areas for future research in the field.

Speakers

Julian Schroeder (University of California San Diego, USA)

Convergence mechanism of CO_2- and abscisic acid-triggered stomatal closure and identification of an intracellular CO_2 sensing mechanism in guard cells

Deirdre McLachlan (University of Bristol, UK)

Specificity of ROS signalling in guard cells

Cezary Waszczak (University of Helsinki, Finland)

Forward genetics screen reveals a crucial role of fucose biosynthesis is stomatal closure.

Juntaro Negi (Kyushu University, Japan)

Eukaryotic lipid metabolic pathway is essential for functional chloroplasts and CO_2 and light responses in stomatal guard cells

Hannes Kollist (University of Tartu, Estonia)

Guard cell CO_2 signaling for modulating transpiration

Energy organelle function and signalling

Organizers **Olivier Van Aken** (Lund University, Sweden) and **Alexey Shapiguzov** (University of Helsinki, Finland)

Progress in plant biology and advance in research technologies have opened up a new era of integrative studies in plants. Today it is becoming clear that despite a certain level of autonomy of mitochondria and chloroplasts, the functions of these organelles are interacting in complex ways. Not only do they act in concert to carry out metabolism and energy household, they jointly orchestrate the adaptation and development of a plant. Furthermore, mitochondrial and chloroplast feedback signalling to the nucleus, known as retrograde signalling, is involved in key transcriptional reprogramming events associated with plant morphogenesis, defence against pathogens, and cell death. How processes occurring in the energy organelles are perceived and interpreted by the nuclear gene expression apparatus, how different signals merge together and how they yield in certain adaptive and developmental outcomes is the subject of this workshop.

Speakers

Alexey Shapiguzov (University of Helsinki, Finland)

Introducing the sponsor company Photon Systems Instruments and their research equipment

Peter Kindgren (University of Copenhagen, Denmark)

How the organelles communicate to prepare the plant for freezing temperatures

Inge De Clercq (VIB Ghent, Ghent University, Belgium)

Membrane-bound nac transcription factors modulate retrograde regulation of oxidative stress responses

Olivier Van Aken (Lund University, Sweden)

De novo evolution of mitochondrial proteins and incorporation into signalling networks in plants

Joachim M. Gerhold (University of Tartu, Estonia)

Studying regulation of stomatal movements under anoxic conditions

Bernard Gutmann (University of Western Australia, Australia)

Is editing a way to control gene expression in organelles?

Microscopy methods for multiscale functional imaging in Arabidopsis”

Organizers **Alexis Maizel** (Heidelberg University, Germany) and **Yvonne Stahl** (Heinrich Heine University Düsseldorf, Germany)

Plants are able to thrive in a wide range of environments due to their unparalleled morphological and physiological plasticity. In order to explore the cell biological basis of this plasticity, functional imaging of living plants at multiple scales, from whole tissue organs to individual molecules and complexes, is indispensable. A number of methodologies have been adapted or developed over the last decades that allow minimal or non-invasive live cell imaging in plant cells, tissues and organs. Combined with the ease to generate transgenic reporter lines in specific genetic backgrounds or accessions, the field of functional plant imaging is flourishing.

This workshop focuses on a number of selected techniques and tools that have recently empowered live imaging at different scales and enabled a number of discoveries in plant cell biology. The following techniques will be covered: two-photon imaging, light sheet microscopy, multiparameter FRET-FLIM and fluorescence anisotropy imaging as well as the design and use of microfluidics devices. We focus on concrete examples of how technological development have driven new and important findings. Furthermore, we want to highlight the key challenges that are inherent to live plant imaging in general (such as high levels of autofluorescence, light scattering that is caused by cell walls, or their sensitivity to environmental conditions) and each specific modalities.

Speakers

Alexis Maizel (Heidelberg University, Germany)

In toto time resolved functional imaging using light sheet imaging

Yvonne Stahl (Heinrich Heine University Düsseldorf, Germany)

Protein interactions and complex compositions measured by *in vivo* multiparameter FLIM & anisotropy imaging

Guido Grossmann (Heidelberg University, Germany)

Plants on chips – microfluidic devices for live imaging of organ development and root-environment interactions

Joop Vermeer (University of Zürich, Switzerland)

Functional deep imaging using 2-photon microscopy

Léa Rambaud-Lavigne (ENS Lyon, France)

Unraveling the mechanisms behind shoot apical meristem maintenance by coupling confocal time-lapse imaging with atomic force microscopy”

Bénédicte Desvoyes (Centro de Biología Molecular Severo Ochoa, CSIC-UAM, , Spain)

Live-cell confocal imaging of cell cycle progression in developing plants

Construction of Gene Regulatory Networks

Organizer **Wen-Hsiung Li** (Academia Sinica, Taiwan and University of Chicago, USA)

A gene regulatory network (GRN) is a collection of regulatory interactions between transcription factors (TFs) and their target genes. Constructing GRNs used to be highly challenging, but recently there have been major advances in experimental and computational methodologies. In particular, the development of the DNA Affinity Purification Sequencing (DAP-seq) method has made it much simpler to determine transcription factor binding sites (TFBSs). This method will be presented by Carol Huang, an author of the method. Another important task in GRN construction is the determination of TF target genes. Computational and experimental methods for pursuing this task will be presented in the second talk. In the past two years several tools have been developed that can generate GRNs from expression and binding data (GENIST, TF2Network, SeqEnrich, Expresso, and others). The third speaker, Nicholas J. Provart, will discuss tools for visualizing GRNs and will explain data integration and visualization requirements for GRNs. In addition, there will be a short talk on two TFs that jointly regulate root elongation and the expression of cell growth genes and a short talk on a HD-Zip class I TF that modulates growth and development in Arabidopsis.

Speakers

Carol Huang (New York University, USA)
Efficient mapping of genome-wide regulatory elements by DAP-seq

Wen-Hsiung Li (Academia Sinica, Taiwan; University of Chicago, USA)
How to construct gene regulatory networks?

Nicholas J. Provart (University of Toronto, Canada)
GRN inference tools and visualization packages

June-Sik Kim (RIKEN, Center for Sustainable Resource Science, Tsukuba, Japan)
Two ER-anchored transcription factors BZIP17 and BZIP28 jointly regulate root elongation and cell growth genes expression

Shuchao Dong (Max-Planck-Institute for Molecular Plant Physiology, University of Potsdam, Germany)
The HD-Zip class I transcription factor JUB2 modulates growth and development by regulating *JUNGBRUNNEN1* in Arabidopsis

Thursday June 28

Modeling of Plant Metabolic Networks

Organizers **Samuel Seaver** and **Zoran Nikoloski**

The aim of the workshop is to bring together plant biologists and computational scientists to facilitate discussion on generating, testing, and validating novel hypotheses in plant metabolism and its relations to development, growth, defense, and reproduction. To this end, we plan to invite a diverse range of speakers to discuss research done in both the computational and biological communities. The covered areas are intended to stir the exchange, deepen the discussion between modelers and wet-lab researchers, and foster new collaborations. Therefore, we expect that such a workshop would be of great interest to the audience at ICAR 2018, with the expectation to transfer some of the findings of the model plant Arabidopsis to other higher plants and, eventually, crops.

Speakers

Zoran Nikoloski (University of Potsdam, Germany)

Updates about constraint-based modeling in plants and crops: Challenges and opportunities

Steven Kelly

Mind the gaps: addressing the errors in gene and genome annotation

Debolina Sarkar (Pennsylvania State University, USA)

Developing genome-scale whole-plant models for switchgrass (Panicum virgatum) and poplar (Populus deltoides)

Sophie Colombie (INRA UMR1332 Biologie du Fruit et Pathologie, France)

Constraint-based modelling in developing fruits to estimate fluxes in primary metabolism

Nina Sipari (University of Helsinki, Finland)

Metabolic responses of Arabidopsis Thaliana RCD1 to Paraquat reflect high tolerance to chloroplastic oxidative stress due to altered primary metabolism and enhanced antioxidant defense

Communicating Science in the Age of Fake News: Broadening Your Impact

Organizer **Roger Innes** (North American Arabidopsis Steering Committee and Indiana University, USA)

The North American Arabidopsis Steering Committee (NAASC) will host a workshop that focuses on effectively communicating science with the general public. The plant biologists that will be attending ICAR2018 are making tremendous advances in the understanding of plant biology from the molecular to the ecosystems levels. The value of this work, however, is not generally appreciated by the broader public and scientists in all fields face challenges to convey facts and data in a society that increasingly appears skeptical of scientists and other experts. This lack of understanding of plant science by the general public results in resistance to applying newly gained knowledge in plant biology to crop improvement, biofuels, and other plant-related industries, as well as to a lack of support for public funding of basic plant research. To make a strong case for continued investments in basic plant research it is imperative that the plant biology community more effectively engage the public about plant biology research and education and make a clear connection between healthy plants, healthy people, and a healthy planet. Furthermore, it is necessary that these conversations involve a diverse group of scientists, including those at early stages in their careers, e.g. students, postdoctoral scholars, and junior faculty, for they comprise the upcoming leaders, both within academia and beyond, and are poised to make significant impacts on the public discourse with respect to priorities for science education, funding, and training. Unfortunately, most plant scientists have no formal training in public engagement and thus often lack the tools for effective outreach. The goals of this workshop are to share state-of-the-art information on best practices for promoting public engagement with plant science and to enable conversations amongst participants that can lead to future discussions and implementation of novel ideas and approaches.

Following a brief introduction each presenter will describe their public science engagement activities and will emphasize: the approaches that have proved effective, how they assess impact, challenges they encounter, and pitfalls to avoid. The presenters will cover a diverse set of public engagement activities (e.g. hands-on activities at public gatherings, YouTube videos, educational modules for schools, social media, etc.). After each presentation there will be a brief Q&A opportunity. At the conclusion of the presentations participants will break into small groups to discuss their experiences with public outreach, including successes, failures, and challenges followed by a brief report out to the larger group of two or three success stories or notable challenges that were overcome.

Dr. Roger Innes will moderate the workshop, collect group notes, draft a summary of the workshop's major points, outcomes, and conclusions and share the summary with participants and others via social media. If appropriate, the summary, alone or as part of a larger article on science outreach and impact, may be submitted for publication (to ensure privacy, summarized comments will exclude participant names or identifying features.)

Speakers

Roger Innes (NAASC and Indiana University, USA)

Introduction and Workshop Objectives. Roger Innes, NAASC and Indiana University.

Ottoline Leyser (Sainsbury Laboratory Cambridge University, UK)
The public engagement imperative.
Anna N. Stepanova and **Jose M. Alonso** (North Carolina State University, USA)
Reaching out to K-12.
Karen Sims-Huopaniemi (University of Helsinki, Finland)
Overcoming the language barrier with fascinating plants.
H. Peter van Esse (The 2Blades Foundation, Illinois, USA)
The 2Blades Foundation

Break into small groups for discussion
Roger Innes moderates small group report back to larger group.

Seeing the invisible – young researchers presenting fluorescent based sensors as potent analytical tools

Organizers **Vilde Olsson** (Oslo University, Norway) and **Meike Breiden** (Heinrich-Heine-University Düsseldorf, Germany)

Intracellular signaling relies on rapid changes in sub cellular localization or concentration of signaling components, such as secondary messengers and hormones, as well as structural modifications of signal relaying molecules. Understanding intracellular changes of signaling components is crucial to understand how plants react to developmental, biotic and abiotic stimuli. The emergence of fluorescence-based sensors designed to follow and visualize changes in signaling components have made it possible to increase the knowledge of intracellular communication by in-vivo imaging techniques. New fluorescence-based sensors are developed constantly facilitating the investigation of different cellular processes. In addition, development of better imaging techniques makes it possible to perform faster imaging with higher resolution, making the use of florescence-based sensors increasingly more important in future research. The cameleon FRET based sensor designed to investigate Ca2+ concentrations was one of the first fluorescence-based sensors. Today we see a broad palette of sensors developed to measure the presence and concentration gradients of a variety of signaling components such as phytohormones, second messengers and DNA methylation. This workshop will highlight the current experience with live cell imaging using fluorescence sensors, and provide a platform for young researchers with hands on experience with sensors to present their work.

Speakers

Meike Breiden (Heinrich-Heine-University Düsseldorf, Germany) and **Vilde Olsson** (Oslo University, Norway)

Welcome

Rainer Waadt (University of Heidelberg, Germany)

Visualization of signaling molecules using genetically encoded fluorescent indicators

Anja Liese (Dahlem Centre of Plant Sciences, Department of Plant Biochemistry, Freie Universität Berlin, Germany)

In vitro and *in vivo* imaging of calcium-sensor kinase conformational change using a fret-based approach

Sonhita Chakraborty (University of Toronto, Canada)

Uncovering the role of CYCLIC NUCLEOTIDE GATED ION CHANNEl 2 in responses beyond plant defense signalling

Maike Breiden (Heinrich-Heine-University Düsseldorf, Germany)

CLE40 activated downstream signaling cascade in the root meristem

Panel discussion - How will fluorescence-based sensors be used in future research?

Vascular Development

Organizers **Ari Pekka Mähönen** (University of Helsinki, Finland) and **Laura Ragni** (ZMBP, University of Tübingen, Germany)

The specialized vasculature system is at basis of the evolutive success of seed plants and it contributed to shape earth landscape, as we know today. The vasculature not only contribute to the transport of assimilate, ions, water and signaling molecules but it confers mechanical strength, it sculptures the plant body and represents a source of biomass accumulation as wood.

Vascular development starts with the specification of the pro-vascular initial cells during embryogenesis and culminate with the massive production of phloem and xylem by the vascular cambium during secondary growth. The field of vascular development has seen a blooming in recent years and early steps in tissue formation could be linked to differentiation and patterning by signaling networks.

In this workshop we will discuss new techniques and themes of plant vascular development, covering both primary and secondary growth.

Speakers

Annelie Carlsbecker (University of Uppsala, Sweden)
Limited water availability affects xylem development in the Arabidopsis root

Thomas Greb (COS, Heidelberg, Germany)
Cell fate decision during radial plant growth - making a case for phloem formation

Jung-ok Heo (Sainsbury lab, Cambridge, UK)
A high-temporal-resolution gene expression atlas of the phloem sieve elements in the Arabidopsis root

Sebastian Wolf (University of Heidelberg, Germany)
Integration of brassinosteroid and phytosulfokine signalling controls vascular cell fate in the Arabidopsis root

Flash presentations:

Bernadette Sztojka (Umeå Plant Science Centre, Sweden)
Pirin2 suppresses non-cell-autonomous lignification in arabidopsis XYLEM

Robertas Ursache (University of Lausanne, Switzerland)
Endodermis remodeling during lateral root formation in Arabidopsis thaliana

Jinsu Lee (Chungbuk National University, Korea)
Brassinosteroids-controlled local auxin homeostasis is essential for secondary xylem developments in tomato

Ondřej Smetana (University of Helsinki, Finland)
Cells with xylem identity position stem cell niche of vascular cambium

Minji Seo (Seoul National University, Korea)
At-hook motif nuclear localized proteins in the xylem pattering of Arabidopsis root

Findable, Accessible, Interoperable and Reusable, aca. FAIR, Arabidopsis phenotyping data?

Organizers **Roland Pieruschka** (Forschungszentrum Jülich FZJ, Germany), **Markku Keinänen** (University of Eastern Finland, National Plant Phenotyping Infrastructure NaPPI) and **Kristiina Himanen** (University of Helsinki, Finland, National Plant Phenotyping Infrastructure NaPPI)

Plant phenomics represents an emerging research field that is committed to the FAIR principles (Findable, Accessible, Interoperable and Reusable) in data management. To facilitate long-term data sharing and storage, the Minimal Information About Plant Phenotyping Experiment (MIAPPE) data standards are implemented. The ICAR Arabidopsis conference represents an ideal platform to present the status of these data management principles as well as a number of already existing Arabidopsis phenomics databases.

Plant phenotyping produces complex data because multiple sensors are needed to analyze genotype performance under diverse environmental conditions. Non-invasive, usually image-based methods have been developed and integrated in experimental and analysis pipelines to extract architectural and physiological plant traits. Particularly, research on model plants such as Arabidopsis represent the cornerstone for the understanding of gene function and their link to molecular, structural and functional plant properties. Quantitative analysis of plant phenotypes is still the bottleneck despite the increasing effort to develop plant phenotyping facilities. Within Europe, a number of initiatives and projects have been initiated to synergistically advance plant phenotyping based on demand of diverse users. In this workshop session, we will outline the status of the plant phenotyping activities in Europe to advance Arabidopsis research. Specifically the workshop will focus on the EU funded project EPPN2020 providing access to plant phenotyping facilities and the ESFRI listed project EMPHASIS aiming at a long term development of a demand driven pan European infrastructure.

Speakers

Cyril Pommier (French National Institute for Agricultural Research INRA, France)

Standards for distributed Plant Phenotyping data integration: from crop and forest trees to model species.

Roland Pieruschka (Forschungszentrum Jülich, Germany)

Integrating plant phenotyping in Europe

Rhonda C. Meyer, **Astrid Junker** (Leibniz Institute of Plant Genetics and Crop Plant Research IPK, Germany)

Gene discovery using high-throughput phenotyping under constant and fluctuating growth conditions

Stijn Dhondt (Department of Plant Systems Biology, VIB, Ghent University, Belgium)

Plant phenotyping: happily ever after with data management using PIPPA