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PlantScienceNews

Newsletter of the Zurich-Basel Plant Science Center

No 33, Spring 2018

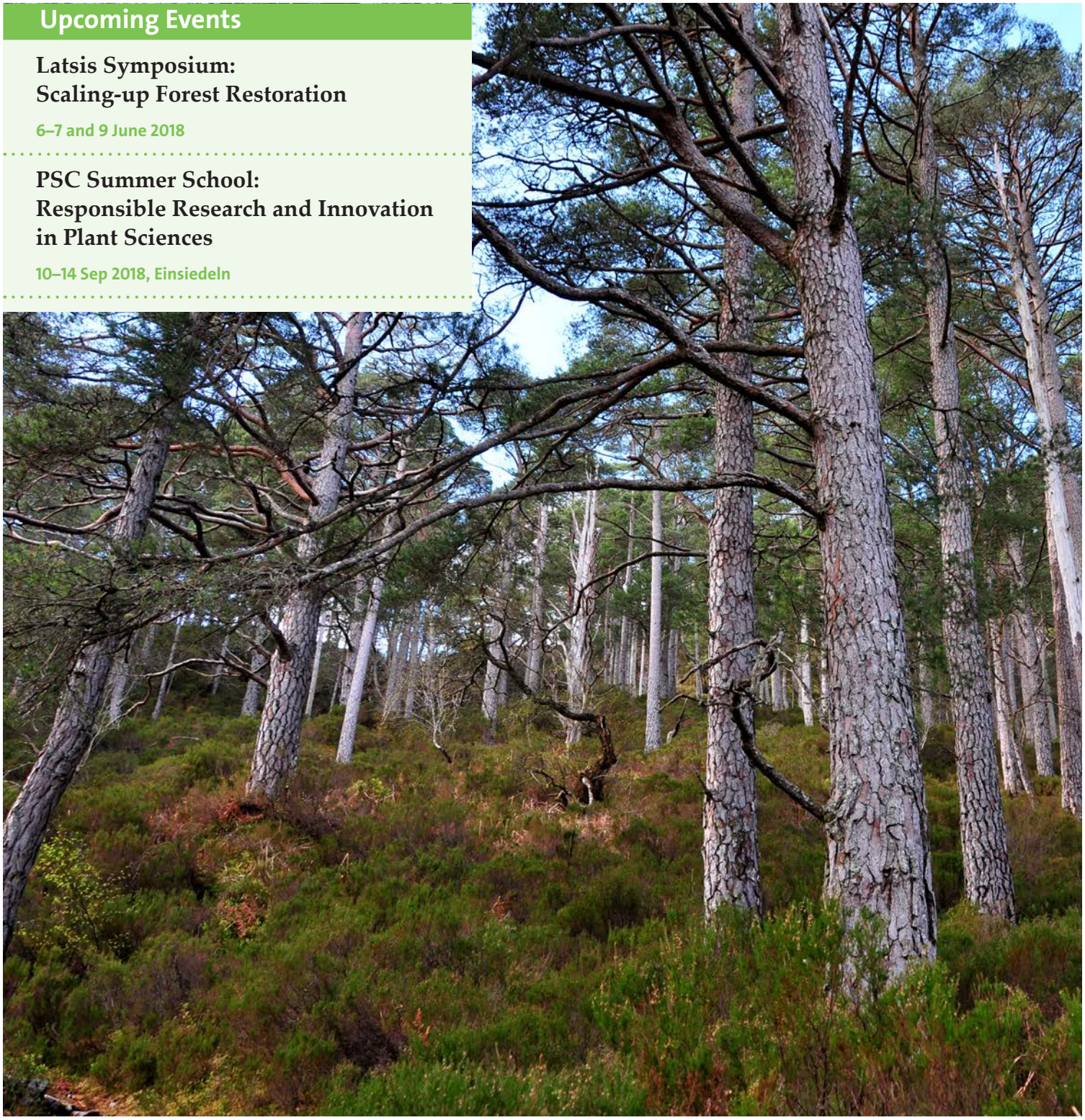
Upcoming Events

Latsis Symposium: Scaling-up Forest Restoration

6–7 and 9 June 2018

PSC Summer School: Responsible Research and Innovation in Plant Sciences

10–14 Sep 2018, Einsiedeln



Content

Newsletter No. 33, Spring 2018

Publisher
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Courtesy of PSC staff or indicated

Printing
HELLER DRUCK AG, Zurich

Paper
Lessebo bright smooth, FSC

Cover picture
Restored Caledonian pine forest at Beinn Eighe National Nature Reserve. © Jaboury Ghazoul

Editorial

Being creative

Without a doubt, scientists are creative. Creativity is centered on idea generation. But, where do good ideas come from?

While researching definitions for creativity, we were inspired by the artificial intelligence (AI) researcher Margaret Boden who posited that creativity involves not only a cognitive dimension (the generation of new ideas) but also motivation and emotion, and an adequate cultural context. Most creativity researchers (yes, it is a field of study) agree that creativity can be stimulated by curiosity, intuition and space. Barriers to creativity include: complacency, feasibility, rules, ambiguity and of course over-filled agendas. (To combat this, try Tim Harford's book *Messy: How to be creative and resilient in a tidy-minded world*. Little Brown: 2016)

In this newsletter, we highlight some of the PSC initiatives promoting creativity. First of all, the **PlantHUB program**: ten PhD students work at the interface of research and development. In their latest training course in innovation management they were introduced to the role of design thinking to stimulate a creative process. With the help of *The Lego serious play* they set up a business model for their research projects (see picture below). ***Fem*inno**: 15 young women in this PSC mentoring program learn how to generate ideas, increase connectivity and reach out, creating new opportunities for themselves. The **PSC Summer School** will focus on how to respond with research to the needs of society. What scientists count as `creative`, and what they call a `discovery`, depends largely on unarticulated values, including social considerations of various kinds. Students will be introduced to tools for deliberation in research. The **PSC Creative Camp and Creative Lab** foster playful learning for young people driven by curiosity. Here, the PSC develops workshop content combining art & science.

And last not least, the PSC is celebrating its 20th anniversary this year. One of the highlights will be the **PSC Symposium** on December, 5th, on breakthroughs in plant sciences. Presenting ideas that changed the way of research and led to new inventions.

Enjoy reading!

Manuela Dahinden & Melanie Paschke
PSC Managing directors

Creativity is grounded in everyday capacities such as the association of ideas, reminding, perception, analogical thinking, searching a structured problem-space, and reflecting self-criticism.

Margaret Boden: 1998, Creativity and artificial intelligence, AI: 103, 247–368.

Example of the outcomes of the *Lego serious play* designed during a PlantHUB training course. © PSC

Do indoor experiments with plants represent reality?

Figure 1: Lettuce growth under 4 different light qualities. Light treatments *from left to right*: 33% Blue 16%Green 51% Red; 62% Blue 16% Green 22%Red; 6% Blue 16%Green 78% Red; 34% Blue 23% Green 43% Red. © Camilo Chiang

Camilo Chiang

Several studies show that there is a low correlation between plant growth in greenhouse and growth chamber experiments, and it is even lower when compared with plants grown outdoors (Porter et al., 2016). Incorporating more natural fluctuation of temperature and light quantity along the day may help to grow plants more naturally under controlled indoor conditions.

Biological research aims to understand processes in nature. In view of the immense diversity and complexity of natural systems, plant scientists often use controlled environments, i.e., greenhouses or closed chambers with controlled climates, in order to investigate plants under exactly defined and reproducible conditions. In addition, researchers often concentrate on a handful of well-described plant species, so-called model plants (e.g., *Arabidopsis thaliana*). However, we may have reached a point where our current model systems are too simple and do not at all reflect natural situations. In these cases, research results might not be transferable to natural systems. For example, when we grow plants in controlled environments like indoor growth chambers, the chambers are often set to fixed temperature, humidity and light conditions during the day and night, not accounting for natural fluctuations of these variables along the day (Figure 3). A new development in greenhouse and growth chamber technology is the introduction of long-living and energy efficient LED lightning systems. However, due to persisting technical limitations and electrical efficiency, most commercial LED lightning systems for plant growth consist basically of a mixture of pure blue and red light diodes (due to the mainly use of these two wavelengths by chlorophyll), ignoring the fact that natural sunlight is a mixture of photons with all wave-lengths between UV and near infrared (Figure 4). Such artificial growth condition might be evident when we obtain different results in our indoor and outdoor experiments with plants, but they also become of economic significance, if indoor-facilities are used for plant breeding and production (Figure 1).

With technology evolving rapidly and becoming more and more affordable, an increasing number of indoor growth facilities are reaching more dynamic climate controls and specific light spectrums through multi-wavelength LED grow lights, that allow us to reach higher levels of light than in the past. This challenges the comparability between plants experiments grown in different LED indoor facilities, especially since a universally agreed-on standard spectrum for LED plant growth chambers is missing. Additionally, we are currently facing a lack of research on the effect of dynamic and high-level light in growth facilities. A cooperation between the laboratory of PD Dr. Günter Hoch (University of Basel) and Heliospectra (Gøteborg, Sweden) is trying to understand the significance of light quality and quantity, and of dynamic *versus* static growth conditions on plant growth and physiology. The project is part of the PlantHUB European Industrial Doctoral Programe coordinated by the PSC and consists of two modules. Module 1 is currently conducted at the University of Basel. In this module, we aim to define indoor growth conditions for natural plant growth in a variety of species from different plant functional types, including herbs, grasses and trees. For this, a control treatment was established with plants grown outdoors in the Botanical Garden of the University of Basel in summer 2017. Several physiological and environmental parameters were recorded for comparison with future experiments. Indoor growth chambers (phytotrons) at the University of Basel equipped with a multichannel LED lightning system are cur-

rently used to establish specific LED-composition-setups for the most near-natural growth of different plant functional types in order to understand the relationship between light quantity and quality (Figure 2). *A posteriori*, the light and temperature dynamics will be evaluated. In a second module of the project (2019 – mid 2020), which will be conducted at the R&D department of Heliospectra in Sweden, the results of the first module will be applied to create a dynamic control software for near-natural plant growth under different multi-channel LED systems. The final goal of the project is to implement this control software in a new hardware generation of LED lightning systems for near-natural plant growth.

Reference

Poorter H, Fiorani F, Pieruschka R, Wojciechowski T, van der Putten WH, Kleyer M, Schurr U, Postma, J (2016). Pampered inside, pestered outside? Differences and similarities between plants growing in controlled conditions and in the field. *New Phytologist*, 212: 838–855.

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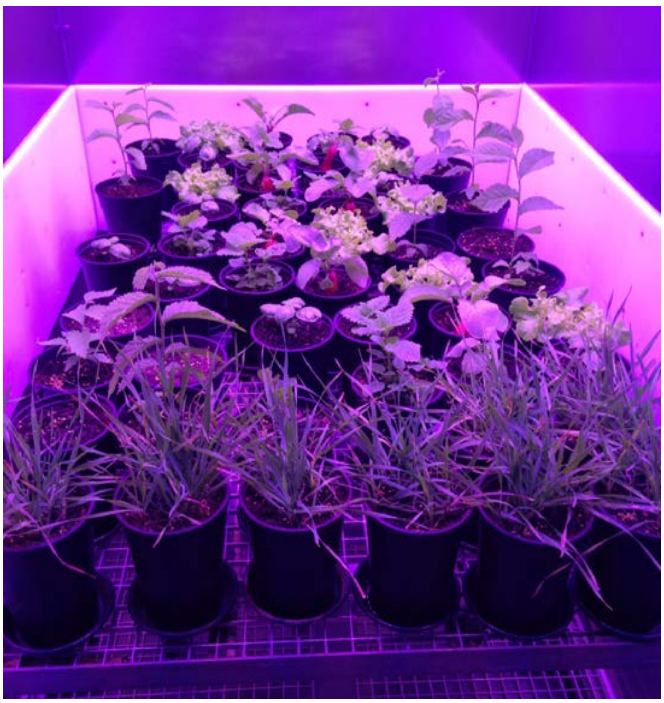


Figure 2: Light quality treatment with 33% Blue 16% Green 51% Red.
© Camilo Chiang

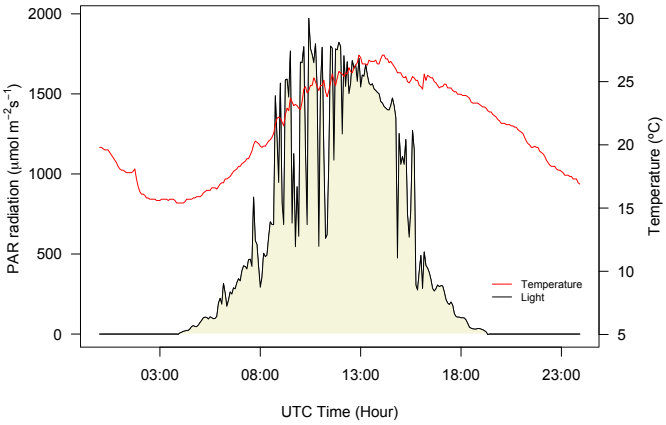


Figure 3: Daily variation of temperature (°C) and light quantity (as photosynthetic active light, PAR) along a summer day. Data recorded in Basel, Switzerland.

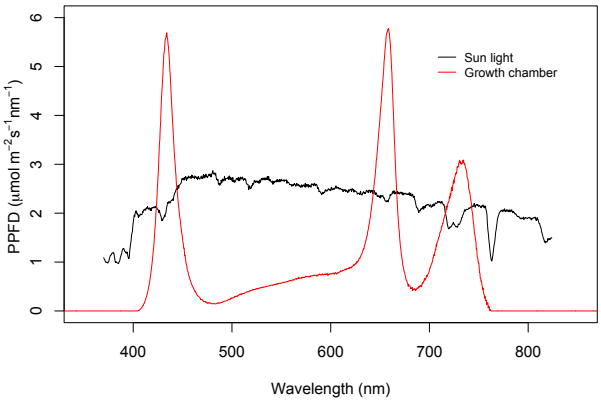


Figure 4: Sun spectra at the middle of the day (UTC) on a clear day *versus* growth chamber spectra as photosynthetic photon flux density (PPFD). The spectra correspond to 1900 and 356 µmol $m^{-2}s^{-1}$ PAR, respectively.

The project is supported by a PSC PhD fellowship as part of the PlantHUB European Industrial Doctoral Programme funded by the H2020 PROGRAMME Marie Curie Actions – People, Initial Training Networks (H2020-MSCA-ITN-2016).

www.plantsciences.uzh.ch/en/research/fellowships/PlantHUB.html

At a Glance

Awards

• **Jordi Bascompte, Enrico Martinoia, Bernhard Schmid,** and **Johan Six** rank among the Web of Science «Highly Cited Researchers 2017» published by Clarivate Analytics.

• **Monika Maurhofer** received the ETH Golden Owl teaching award as the best lecturer at the Department of Environmental Systems Science, ETH Zurich.

• **Emilia Schmitt** received the Hans Vontobel award 2017 for her outstanding dissertation on «Comparing Local and Global Food – a Definition Framework and Sustainability Assessment» (Johan Six group).

• **Janina Dierks** received the best presentation award at the Isocycles 2017 conference at Monte Verità, Switzerland (Johan Six group).

• **PSC Symposium 2017 Poster Award:** 1st prize to **Chow Lih Yew**, for her poster: A single dominant mutation conferred self-compatibility in allotetraploid *Arabidopsis kamchatica* (Kentaro Shimizu group), 2nd prize to **Hicham Chatane**, for his poster: A specific quorum sensing dependent molecule inhibits *Arabidopsis* germination through DELLA and ABA signaling (Luis Lopez-Molina group, University of Geneva,), 3rd prize to **Melanie Abt** for her poster: Protein networking: novel actors in starch metabolism (Samuel Zeeman group).

From left to right: Hicham Chatane, Melanie Abt and Chow Lih Yew © PSC

Open call

PSC Syngenta Fellowship Program

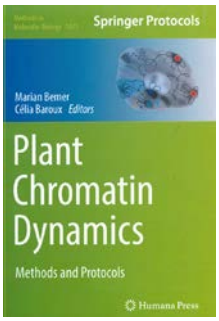
Applications for PhD and postdoc fellowships can be submitted until November, 1st, 2018. The funds are intended to promote innovative research in plant sciences. In addition to the scientific quality of the project, research co-operation within PSC will be an important criterion in the project selection.

This call is reserved for PSC professors and group leaders.

For application templates please contact:
Manuela Dahinden
mdahinden@ethz.ch

or visit
www.plantsciences.ch/research/fellowships/syngenta.html

Books

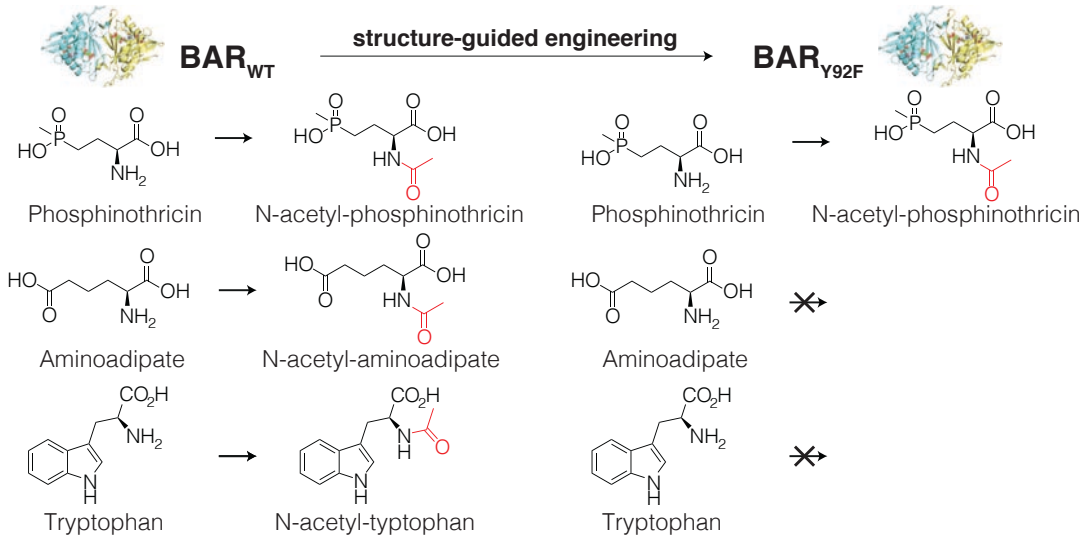


Plant Chromatin Dynamics
Methods and Protocols
Marian Bemer, Célia Baroux (Eds.)

Springer Protocols
ISBN: 978-1-4939-7318-7

Discovery and reduction of nonspecific activities of the herbicide resistance gene BAR

This research was supported by a PLANT FELLOW postdoc fellowship in the group of Professor Stefan Hörtensteiner at the University of Zurich.



BAR acetylates phosphinothricin, thereby inactivating the herbicide action of this compound. However, in off-target reactions in respective transgenic plants, BAR also acetylates aminoadipate and tryptophan. Using structure-guided protein engineering, BAR variants, such as BARY92F were designed that possess increased specificity.
© Bastien Christ and Sylvain Aubry

Bastien Christ and Sylvain Aubry

The chemical diversity of plants is remarkable. Because plants cannot escape from predators or search for new food sources when supplies run low, they often must grapple with an array of environmental insults using what is readily available — chemical defenses through their own internal biochemistry. Nowadays, we can gain an unprecedented view of chemical diversity in plants because of cutting-edge techniques like metabolomics, allowing us to analyze metabolites on a broad scale.

While screening `classic` *Arabidopsis* mutant collections, we made a purely serendipitous observation: two metabolites, identified as acetyl-aminoadipate and acetyl-tryptophan, were found at high levels in senescent leaves and seeds of plants resistant to the herbicide phosphinothricin, also known as glufosinate, but were absent in wild-type plants. Resistance to phosphinothricin is conferred by the bialaphos resistance (BAR) gene, used as transgene in a variety of major genetically-engineered (GE) crops and transgenic plants in basic research. Despite the prevalent use of BAR in many crop species, it has not been rigorously investigated, whether this bacteria-derived enzyme may possibly interfere with a plant's endogenous metabolism. Combining metabolomics, plant genetics and biochemical approaches, we confirmed that BAR indeed converts two plant endogenous amino acids, aminoadipate (a lysine degradation product) and tryptophan, to respective acetylated products. These additional activities of BAR have so far been completely overlooked. To gain insight into the structural basis for its substrate selectivity, we used crystal structures of BAR to unravel its detailed catalytic mechanism. Through structure-guided protein engineering, we generated several BAR variants that displayed significantly reduced nonspecific activities in comparison with the wild-type enzyme in vivo.

More generally, enzymes can often latch on to unintended substrates: this concept, known as enzyme promiscuity, has a variety of implications in enzyme evolution. The most famous example of promiscuous enzymes in plants is probably ribulose-1,5-bisphosphate carboxylase/oxygenase, the key enzyme of photosynthesis. Gathering structural and mechanistic knowledge about how an enzyme's structure may influence its function can help improving biotechnology tools in the future.

We believe that our study makes a strong case for considering metabolomics as part of the review process for GE crops. When BAR crops were first evaluated by regulatory bodies in the 1990's, metabolomics was largely non-existing. Nevertheless, acetyl-aminoadipate and acetyl-tryptophan, which are normally present in humans, have recently been reviewed by the US-FDA and appear safe for human and animal consumption. Our story is a precautionary tale that will help to adapt risk assessment procedures to tackle the future challenges of GE crops. As Charles Darwin wrote: «The greatest amount of life can be supported by great diversification of structure.»

Reference

Christ B, Hochstrasser R, Guyer L, Francisco R, Aubry S, Hörtensteiner S, Weng J-K (2017). Non-specific activities of the major herbicide-resistance gene BAR. *Nature Plants*, 3: 937.

© ETH Zürich / Giulia Marthaler

Professor Christian Schöb

Crop fields are plant communities as are beech forests or alpine meadows. At the Agricultural Ecology Group we take a community ecological perspective on crop fields. Our main activities involve the investigation of competitive and facilitative interactions among plants and their evolutionary and environmental context dependence in crop fields. We study the mechanisms of how crop plants interact and the outcome of those interactions for a range of ecosystem functions and services, such as nutrient cycling, weed suppression, pest resistance and grain yield. We are particularly interested in exploring the potential of biodiversity, i.e., to take advantage of beneficial plant-plant interactions for a sustainable production of crops. To do so, we conduct greenhouse, garden and field experiments under different climates and on different soils with both monocultures and mixed crop plant communities including many different crop species. The transfer of ecological knowledge to agricultural systems in order to achieve a more sustainable, yet productive agriculture motivates our research. Based on our ecological background we are convinced of the potential of biodiversity and beneficial plant interactions for agricultural production. Ecological experiments have demonstrated the benefits of functional and genetic diversity for a wide range of ecosystem services. Our research aims at investigating this potential in an agricultural setting, without neglecting the significant advances that have been made in crop sciences in the past.

Curriculum vitae

Christian Schöb received his PhD in Plant Ecology in 2008 from the University of Bern. His PhD dealt with the study of the sensitivity of alpine snowbed plant communities to climate change, with particular emphasis on the changes in plant-plant interactions and their consequences for plant community composition. After his work as a lecturer in Biology at PH Bern and as a scientific author for Schulverlag Plus AG he continued his scientific career in 2010 as a SNSF Postdoc at the Spanish National Research Council (CSIC) in Almería (Spain). There he studied the functional mechanisms of plant-plant interactions with alpine cushion plants. In 2012 he moved for another SNSF-funded postdoc position to the James Hutton Institute (UK) to study the consequences of plant-plant interactions for ecosystem services in barley variety mixtures. In 2014, he was awarded an SNSF Ambizione grant at the University of Zurich to study the evolutionary consequences of plant-plant interactions in alpine and agricultural ecosystems. Since 2017, Christian Schöb is a SNSF Professor for Agricultural Ecology at ETH Zurich, where he will investigate the functional and evolutionary roles of plant-plant interactions in mixed cropping systems, and their consequences for ecosystem functioning and services.

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Field trial investigating monoculture and mixture effects of barley on common weed suppression and the facilitation of rare arable weeds. © Christian Schöb

Nature (2017)
doi: 10.1038/nature24273

Indirect effects drive coevolution in mutualistic networks

Guimaraes PR, Pires MM, Jordano P, **Bascompte J**, Thompson JN

Ecological interactions have been acknowledged to play a key role in shaping biodiversity. Yet a major challenge for evolutionary biology is to understand the role of ecological interactions in shaping trait evolution when progressing from pairs of interacting species to multispecies interaction networks. Here we introduce an approach that integrates coevolutionary dynamics and network structure. Our results show that non-interacting species can be as important as directly interacting species in shaping coevolution within mutualistic assemblages. The contribution of indirect effects differs among types of mutualism. Indirect effects are more likely to predominate in nested, species-rich networks formed by multiple-partner mutualisms, such as pollination or seed dispersal by animals, than in small and modular networks formed by intimate mutualisms, such as those between host plants and their protective ants. Coevolutionary pathways of indirect effects favour ongoing trait evolution by promoting slow but continuous reorganization of the adaptive landscape of mutualistic partners under changing environments. Our results show that coevolution can be a major process shaping species traits throughout ecological networks. These findings expand our understanding of how evolution driven by interactions occurs through the interplay of selection pressures moving along multiple direct and indirect pathways.

Science (2017)
doi: 10.1126/science.aao5467

RALF4/19 peptides interact with LRX proteins to control pollen tube growth in Arabidopsis

Mecchia MA, Santos-Fernandez G, Duss NN, Somoza SC, Boisson-Dernier A, **Gagliardini V**, Martinez-Bernardini A, Fabrice TN, **Ringli C**, Muschietti JP, **Grossniklaus U**

The communication of changes in the extracellular matrix to the interior of the cell is crucial for a cell's function. The extracellular peptides of the RAPID ALKALINIZATION FACTOR (RALF) family have been identified as ligands of receptor-like kinases of the CrRLK1L subclass, but the exact mechanism of their perception is unclear. We found that *Arabidopsis* RALF4 and RALF19 redundantly regulate pollen tube integrity and growth, and that their function depends on pollen-expressed proteins of the LEUCINE-RICH REPEAT EXTENSIN (LRX) family, which play a role in cell wall development but whose mode of action is not understood. The LRX proteins interact with RALFs, monitoring cell wall changes, which are communicated to the interior of the pollen tube via the *Cr*RLK1L pathway to sustain normal growth.

Nature Methods (2017)
doi: 10.1038/nmeth.4458

Critical assessment of metagenome interpretation – a benchmark of metagenomics software

Sczyrba *et al.*, including **Vorholt, JA**

Methods for assembly, taxonomic profiling and binning are key to interpreting metagenome data, but a lack of consensus about benchmarking complicates performance assessment. The Critical Assessment of Metagenome Interpretation (CAMI) challenge has engaged the global developer community to benchmark their programs on highly complex and realistic data sets, generated from 700 newly sequenced microorganisms and 600 novel viruses and plasmids and representing common experimental setups. Assembly and genome binning programs performed well for species represented by individual genomes but were substantially affected by the presence of related strains. Taxonomic profiling and binning programs were proficient at high taxonomic ranks, with a notable performance decrease below family level. Parameter settings markedly affected performance, underscoring their importance for program reproducibility. The CAMI results highlight current challenges but also provide a roadmap for software selection to answer specific research questions.

Cell (2017)
doi: 10.1016/j.cell.2017.09.030

Insights into land plant evolution garnered from the Marchantia polymorpha genome

Bowman *et al.*, including **Grossniklaus U, Rovekamp M, Schmid MW**

The evolution of land flora transformed the terrestrial environment. Land plants evolved from an ancestral charophycean alga from which they inherited developmental, biochemical, and cell biological attributes. Additional biochemical and physiological adaptations to land, and a life cycle with an alternation between multicellular haploid and diploid generations that facilitated efficient dispersal of desiccation tolerant spores, evolved in the ancestral land plant. We analyzed the genome of the liverwort *Marchantia polymorpha*, a member of a basal land plant lineage. Relative to charophycean algae, land plant genomes are characterized by genes encoding novel biochemical pathways, new phytohormone signaling pathways (notably auxin), expanded repertoires of signaling pathways, and increased diversity in some transcription factor families. Compared with other sequenced land plants, *M. polymorpha* exhibits low genetic redundancy in most regulatory pathways, with this portion of its genome resembling that predicted for the ancestral land plant.

Alpine Plant Ecology Summer School

15–21 July 2018, Furka

This summer school is offered by the University of Basel and the Zurich-Basel Plant Science Center for advanced biology students with basic plant science training. Course topics include microclimatology, ecophysiology, biodiversity, reproductive biology, vegetation and ecosystem ecology. The summer school will include lectures, field excursions and project work. Participation is limited to 24 students. Full board costs are CHF 400 (exclusive travel expenses). Registration is free of charge for PSC PhD students.

Organized by:
Erika Hiltbrunner, Christian Körner, Jürg Stöcklin (University of Basel), and Jonathan Levine (ETH Zurich)

Location
ALPFOR Alpine Research and Education Station Furka Pass, 2440 m a.s.l

Registration
www.alpfor.ch/teaching.shtml

Furka pass © PSC

PhD Courses, spring 2018

Scientific Writing Practice II
22 Jan – 8 Feb

Introduction to R
29 & 30 Jan

***Science & Policy:* Understanding Policy Evaluation**
15 Feb & 15 Mar

Responsible Conduct in Research
9 Mar & 18 May

Concepts in Evolutionary Biology
12 & 13 Mar

Scientific Presentation Practice
22 Mar & 11 Apr

Introduction to UNIX/Linux and Bash Scripting
22 May

Dealing with the Publication Process
25 May & 8 Jun

***Science & Policy:* Contributing to Policy Action**
28–30 May

Advanced Data Management and Manipulation using R
4–5 Jun

Basic Plant Disease Diagnostics
11–13 Jun

Genetic Diversity: Analysis
11–15 Jun

Models and Scenarios of Biodiversity and Ecosystem Services
11–15 Jun

Registration
https://spsw.registration.ethz.ch

Frontiers in Plant Sciences

Next-Generation Sequencing for Model and Non-Model Species

Kentaro Shimizu, Jun Sese, Rie Inatsugi, Masaomi Hatakeyama, Hiromi Matsumae

23 & 24 May 2018

Handling the huge data amounts produced by next generation sequencers (NGS) requires experimental knowledge and computational skills. The aim of this course is to familiarize participants with experimental methods and data analysis, regarding NGS. Topics will include: fundamental analysis of the sequence data, UNIX tools, and RNA-seq analysis.

Next-Generation Sequencing II: Transcriptomes, Variant Calling, and Biological Interpretation

Stefan Wyder, Heidi Lischer, Kentaro Shimizu

29 & 30 May 2018

NGS applications (such as RNA-seq and advanced SNP calling) and their data analysis principles. In particular, students will analyze an RNA-seq experiment and call SNP variants using multiple software tools. Students will learn how to compare results from different tools, possible problems due to biases and artifacts will be discussed.

Advanced Course on 3D Microscopy Imaging of Plant Tissues and Image Processing

Célia Baroux, Joop Vermeer, Alexis Maizel

17–19 April 2018

Overview of available microscopy imaging solutions and practice confocal laser scanning microscopy imaging of *Arabidopsis* tissues using different mounting and clearing agents. The course also offers a brief introduction to high-resolution two-photon microscopy for deep tissue imaging.

Protein-coding Evolution and Detecting Natural Selection

Maria Animisova

18–20 June 2018

Introduction to computational molecular evolution, phylogeny inference and statistical hypothesis testing in phylogenetics with a focus on evaluating natural selection. Exercises will include data analysis using software packages PhyML and PAML.

Visualisation of Biological Data

Kay Nieselt

3–5 Sept

Modern visual analytic methodologies applied to biological data.

Contact
Carole Rapo, psc_phdprogram@ethz.ch

Make innovation happen

*fem*inno

Career program for Life Sciences for female PhDs, postdocs, and group leaders

Ute Budliger

The *fem*inno career program has started its first round. Twelve female PhD students and postdocs with eight nationalities were selected from different disciplines in Life Sciences, with topics such as stress response in plants, cellular dormancy, antibiotic resistance or neural disorders. We look forward to an exciting journey that will bring the participants' ideas towards innovation and provide alternative opportunities outside of academia. In parallel, the program aims at strengthening the necessary skills and competencies for a successful career development in collaboration with industry, or starting a company.

Invited experts guide the participants towards future career choices but they are equally interested in shaping ideas and discussing general frameworks, including gender-sensitive topics, to facilitate the journey.

The kick-off event (5–8 Feb 2018) was a 4-day Career Retreat organized by the Career Services at the University of Zurich. It focused on career counseling, and provided clarification of the participant's demands and expectations for their future career pathways. The panel discussion with the topic: WHAT IS NEEDED IN INDUSTRY? was open for all female students in Life Sciences upon registration but fully booked one day after publication. The whole event was a great success. «I found it a great source of motivation and extremely useful information!» said one of the participants.

The participants have the opportunity to visit PWC, Roche Bruker and the Biopark Schlieren. During the industry visits participants enhance their understanding about work and career opportunities in different companies outside of academia with the focus on gender specific topics, working models, careers in Resesearch & Development. Further, participants should present themselves, discuss their innovative ideas, and build their network.

Enrolment

The program addresses female researchers from the Life Sciences currently working as a PhD student, postdoc, or group leader at the University of Zurich, ETH Zurich, or University of Basel. A maximum of 20 women per call will be admitted.

This program is coordinated by the Zurich-Basel Plant Science Center and supported by the Swiss Federal Office for Gender Equality for the period 2017–2019.

Project partners

Life Science Zurich – University of Zurich and ETH Zurich

Office for Gender Equality – University of Zurich and University Basel

Next call

Opens on 1st of June 2018
Closes on 20th of Aug 2018 (12:00)
Notification of acceptance on 30th of Sept 2018

Guidelines for applicants

www.plantsciences.uzh.ch/en/mentoring.html

Contact

ute.budliger@usys.ethz.ch

Upcoming Lunch Talks

What I need to know when applying for a job in industry

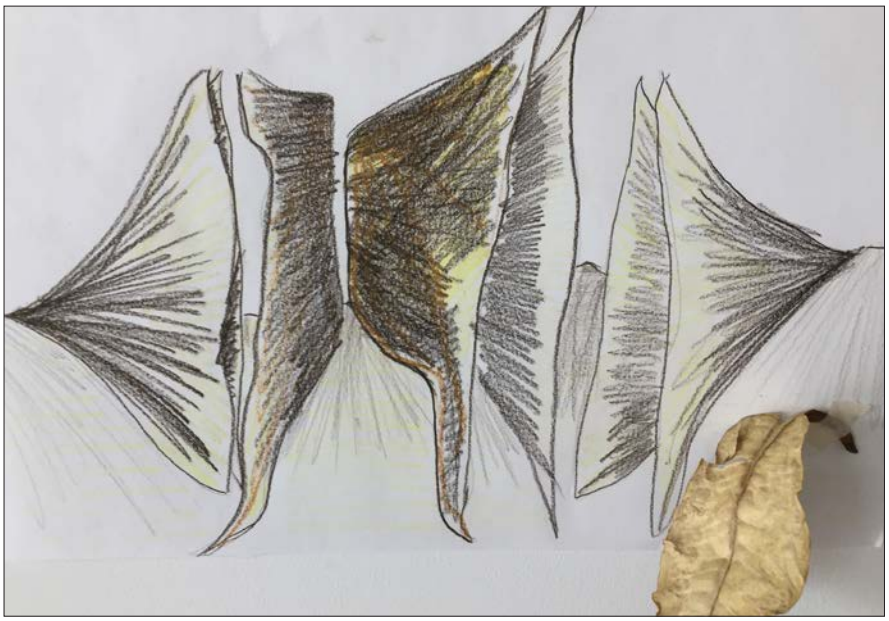
18 April 2018, University of Zurich
Dr. Roger Gfrörer/ UZH Career Services

Why diverse teams perform better

1 June 2018, University of Basel
Klaus Gehmann/ Syngenta

Registration needed.

Creative Camps



Leaf surface structure – sketch from the Vermittlungslabor. ©Juanita Schläpfer

In collaboration with art educators from the Zurich University of the Arts (ZHdK), scientists at the PSC develop creative and inquiry based workshop activities for young people aged 8-14.

Juanita Schläpfer

Art Education students and lecturers visited the ETH Zurich and the University of Zurich in September 2017 and got to see the labs of Consuelo De Moraes, Joop Vermeer, Diana Santelia and Loïc Pelissier.

The students had to create an exercise for their fellow students, inspired by their lab visits. Many chose to examine the processes of observing and discovering. What information is needed about an object in order to make a verbal description or a drawing? What is the difference between the information available from being able to observe in real life an object (say a fruit or flower) compared to a photo of the same object. Many of the exercises were concerned with the visual representation of things and the communication of this information. Or they were concerned with experimental methods: for example, the «Banana Lab» where participants were allowed to first look at a banana but not touch it and then in a second-round use dissection tools to examine it.

The students were also interested in the scale at which an object was looked at and the information available at different dimensions.

Next steps

Two Art Education students decided to come to the PSC for their internship this spring. This involves them being with us for 3 days a week and working on activities for the Creative Camps in the spring, summer and autumn holidays. We will report on the camps in the next newsletter.

The PSC Creative Camps for Youth are supported by the Agora funding scheme of the SNSF (Project CRAGP3_171682).

Dates

Creative Camp: Biocommunication
17–28 April 2018
In Magliaso, Tessin

Creative Camp: Ecological networks
15–20 July 2018
On a boat on the lake of Zug, Canton Zug

Creative Camp: Zoom in zoom out – nature from different scales
6–11 Aug 2018

Lab visit by ZHdK students
21 Sep 2018

Creative Camp: Cyberkids – tinkering with nature
8–13 Oct 2018

More info
www.plantsciences.uzh.ch/de/outreach/ferienlager

New Creative Lab

The combination of art and science has tremendous creative potential, particularly in the multidisciplinary field of plant sciences. The interplay of different working methods, materials, ideas and visions allows for a new form of design and project work, from which all of us, but especially young people can profit. They learn to be innovative and courageous, to try new things, to think critically, to ask questions and to initiate their own projects. Competencies that are gaining importance for current and future societal challenges.

The Creative Lab project aims to specifically target children and youth who do not directly come into contact with art and science through their everyday lives and enable them to engage with a participatory art and knowledge process.

The PSC is pleased to announce that the Drosos foundation is funding a four-year project to create art-science activities for a pop-up maker space in different locations. We aim to create a space for creative encounters between researchers, artists, students and youth.

There will be opportunities for students from the ETH Zurich and University of Zurich to volunteer and coach youth with their individual projects, thereby developing their own creativity.

Contact
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Climate Garden 2085 exhibit moves to Brazil

We are currently working with partners, including swissnex to install the Climate Garden in Rio de Janeiro in 2018. Rio is famous for the climate conference which made cariocas aware of the importance of the impact of climate changes. Rio city is among few cities in the world that can boast of being situated in a natural enclave as striking as Rio de Janeiro.

Green areas cover an immense portion of the city which faces the Atlantic Ocean. The Tijuca Forest is the most imposing of Rio's nature icons and with 3,000 hectares is the largest urban forest in the world. It plays a fundamental role in the life of the city as it preserves the watershed, mitigates atmospheric pollution, prevents erosion and flooding, regulates climate and, of course, is a habitat for a rich flora and fauna that includes many endemic and endangered species.

It will be a challenge to represent even a fraction of this in the Climate Garden Rio!

Olma 2018

As part of its strategic development the ETH Zurich will be present at the OLMA (Agricultural fair) in October 2018 as a pilot project, this year's theme is «Getreide» – grain.
The ETH President and his office of Strategic Development have asked the PSC to coordinate this event. It is not an exclusive event and if you have interesting images or video of crops from the macro to the cellular level please contact us. We are also looking for demos or hands-on experiments for the general public – adults as well as children.

Contact
juanita.schlaepfer@usys.ethz.ch

Save the date

PSC Mercator Fellowships: Retreat and public event

24 Oct 2018, ETH Zurich

After two years in this special PhD program, the four fellows will meet for a midterm retreat with their PIs and collaboration partners. The aim is to share results and experiences from transdiciplinary research. After the retreat, the four fellows invite to a public round table with the topic: Urban Agriculture – Fad or Future.

PlantHUB 2nd Annual Meeting & Midterm Review

19–23 Nov 2018, ETH Zurich

PlantHUB offers training to 10 PhD students in skills and competencies needed to apply Responsible Research and Innovation (RRI) in the area of plant breeding and production. The consortium will meet for its midterm review on 21st of November 2018. The students will take part in two training courses in entrepreneurship and patenting.

PSC Symposium 2018: Breakthroughs in plant sciences – from the laboratory to the world

5 Dec 2018, ETH Zurich

In 2018, the PSC is celebrating its 20th anniversary. This year's symposium is devoted to some of the breaktroughs in plant sciences. New ideas that changed our way of thinking or opened new research avenues. The symposium will be organized together with PhD students of the PSC: Claudio Cropano, Sabrina Flütsch, Miguel Loera Sanchez, Maximillian Vogt, Tiago Miguel Castelo Dias Cruz.

Beinn Eighe, 2015 © Jaboury Ghazoul

Latsis Symposium 2018
Scaling-up forest restoration

6–7 and 9 June 2018

ETH Zurich, Auditorium Maximum, HG F30

Jaboury Ghazoul

The Latsis Symposium 2018 brings together some of the world's leading forest restoration scientists to address the ecological, economic, and societal challenges for scaling up forest restoration. It is motivated by the challenge of delivering an effective global response to two major environmental threats, climate change and forest degradation. The key purpose of this 2-day symposium is to work towards a conceptual understanding and scientifically grounded guidelines for scaling up forest restoration efforts, as well as to evaluate how barriers to the scaling up of global forest restoration efforts might be overcome. The symposium will draw on experiences and examples of what has succeeded, and what has not, in reforestation and restoration projects across temperate and tropical regions of the globe. Presentations will be given by experts from academia, non-governmental organisations, and the business sector, with time set aside for discussions.

Forest restoration has broad interest across society, as attested by many media articles on, and major investments in, forest and landscape restoration for climate change mitigation, biodiversity conservation, recreation, physical and psychological health, and landscape aesthetics. We are capitalising on this public interest by running three public events.

The public events will give members of the public and students the opportunity to engage with restoration scientists in a Public Forum debate and Science Café. We will also have a Children's Event in which kids and teenagers can explore issues in conservation management through fun role-playing games. Alongside the symposium will be a photographic exhibit in collaboration with Arnaud De Grave, to explore public perceptions of forest and landscape degradation and restoration.

Organizers

Jaboury Ghazoul & Nicole Kalas,
ETH Zurich

Public events:
Carole Rapo,
Zurich-Basel Plant Science Center

Registration & program

http://latsis2018.ethz.ch

Contact

latsis2018@usys.ethz.ch

The symposium is supported by a generous grant of the Latsis Foundation and is being hosted by ETH Zurich.

Speakers

Pedro Brancalion, University of São Paulo
Robin Chazdon, University of Connecticut
Adrienne Grêt-Regamey, ETH Zurich
Manuel Guariguata, CIFOR
Victoria Gutierrez, WeForests
Stephanie Mansourian, Mansourian.org
Marc Metzger, University of Edinburgh
Adrian Newton, University of Bournemouth
Michael Perring, University of Ghent
Sabine Reipecke, University of Freiburg
Katharine Suding, University of Colorado
Mathew Williams, University of Edinburgh
Annelies Zoomers, University of Utrecht

PSC Summer School 2018

Responsible Research and Innovation in Plant Sciences

10–14 September 2018, Einsiedeln, Switzerland



Melanie Paschke

Social transformation through innovation and research are key elements in the discussion on how the global community could overcome its complex problems related to environmental and economic constraints in a resource-limited world. Innovation conflicts arise when transformation is mainly technological driven and not integrating ethical, legal and social issues. In response, scientists are asked to take a role in science-in-society dialogue.

What does science-in-society mean?

Knowledge that is adapted to societal needs is co-produced between different stakeholders including scientists. Spaces for social learning and transformation are created. Public engagement is key in this process – welcoming civil society actors as partners to express their values and interests in techno-scientific and innovation choices. Scientists are encouraged to re-think the research process, open spaces for the public at the beginning of a research project and reflect on questions such as: which innovation and research should be fostered; by whom, why, in which way, an according to whom?

In this summer school, we will implement the Responsible Research and Innovation (RRI) framework of the European Union in exemplary research fields of plant sciences, inlcuding plant breeding, smart farming, digitalization in agriculture or genome editing (CRISPR/Cas-method). Students have the opportunity to reflect their own research projects.

We guide through the science-in-society research processes that includes the following dimensions: **Anticipating** a wide range of possible futures with the public and stakeholders. **Become reflective** about involved values and interests. **Opening the research process** to all actors, providing them with meaningful information, including different perspectives and expertise across a diversity of communities. And, be **responding and adapting research** to societal needs and views.

Invited speakers will give insight into their research field, conduct interactive workshops and take part in discussions. They will act as mentors in the case studies group work, which will be available as summer school proceedings.

By the end of the summer school, participants will: (i) understand the RRI framework, (ii) gain tools for co-producing knowledge, (iii) know how to carry out constructive ethical assessment, technology assessment and anticipation techniques, (iv) be able to apply design thinking, (v) understand public engagement and deliberation in research, (vi) understand transition management, and (vii) build a responsible research and innovation process for your own project through case studies and best practice examples.

Speakers

Christian Pohl (ETH Zurich, CH)
Daan Schuurbiers (De Proeffabriek, NL)
Grégory Grin (Fri Up, CH)
Monika Messmer and Bernadette Oehlen (FiBL, CH)
Eduardo Pérez (WFSC, ETH Zurich, CH)
Jochen Markard (ETH Zurich, CH)
Melanie Paschke (PSC)
...and others

Final program available at the end of March 2018 at:
www.plantsciences.uzh.ch/teaching/summer-school.html

Application

www.registration.ethz.ch/spsw/

Contact

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This summer school is supported by swissuniversities and PlantHUB, a European Industrial Doctoral Programme (EID) funded by the H2020 PROGRAMME Marie Curie Actions – People, Initial Training Networks (GA 722338).

The Zurich-Basel Plant Science Center is a competence center linking and supporting the plant science research community of the University of Zurich, ETH Zurich and the University of Basel. The center promotes fundamental and applied research in plant sciences. We seek creative approaches to research mentoring and coursework for students and postdocs, and we provide platforms for interactions with peers, policymakers, industry, stakeholders and the public.

PSC Member Institutions

Department of Environmental Systems Science, ETH Zurich
Department of Biology, ETH Zurich
Department of Evolutionary Biology and Environmental Studies, University of Zurich
Department of Geography, University of Zurich
Department of Plant and Microbial Biology, University of Zurich
Department of Systematic and Evolutionary Botany, University of Zurich
Department of Environmental Sciences, University of Basel

Zurich-Basel Plant Science Center, Coordination Office

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