University of Zurich[UZH] | ETH zürich | University of Basel

PlantScienceNews

Newsletter of the Zurich-Basel Plant Science Center

No 39, Spring 2021

Editorial

A look at different epistemic cultures

In our fellowship and research programs, we support collaborations with social sciences and humanities as well as transdisciplinary approaches with different stakeholders and policymakers. But how exactly does joint knowledge production work, and what changes are apparent in contrast to traditional disciplinary knowledge production? For mutual learning it is necessary to integrate different disciplinary characteristics, methods, tools and understandings.

In this newsletter, we introduce PSC fellowships that deal with this challenge. The fellows are part of the specialized *PhD Program Science and Policy* – a unique training program for researchers in the life sciences interested in inter- and transdisciplinary research.

The transdisciplinary PSC Mercator Fellowship program (2015–2021) will close with a retreat in April. We will reflect on what it has achieved and define what we can do better. The PhD fellowships in this program were co-supervised by PIs from plant sciences and social sciences and one stakeholder. Thus, it was a quite challenging setting for all. During the retreat we will discuss different case studies and explore how successful inter- and transdisciplinary research careers can be supported and rewarded. As an outcome, the PSC will formulate recommendations on how to increase institutional capacities for inter- and transdisciplinary research projects.

The 2021 summer school will implement the Horizon 2020 Responsible Research and Innovation (RRI) framework for exemplary case studies addressing challenges of sustainable food systems, sustainable transitions in the energy sector and sustainable land use decisions. Students will become familiar with methods such as design thinking, value-based and human-centred design, the planning of social labs and citizen science approaches.

In this edition, we warmly welcome our new PSC members Sebastian Dötterl, Rachael Garrett, Stefano Mintchev, Maria João F. Santos, Klaus Schläppi and Benjamin Stocker. Their research ranges from plant-microbe interactions, soil sciences, environmental robotics, computer-assisted ecosystem sciences to earth system science, policy and economics of ecosystem services – connecting plants with the global health of our planet. Enjoy reading.

Sincerely,
Manuela Dahinden & Melanie Paschke, PSC Managing Directors

Content

PSC Managing office: Manuela Dahinden, Managing Director Research, Communications and Fundraising; **Melanie Paschke**, Managing Director Education, Science in Society and Fundraising; **Romy Kohlmann**, Finances and PlantHUB Coordinator; **Luisa Last**, Coordinator PSC PhD Programs & RESPONSE DP; **Dubravka Vrdoljak**, Assistant PSC PhD Programs; **Juanita Schläpfer**, Outreach Manager; **Ulrike von Groll & Christina Vaccaro**, Outreach Program Assistants; **Daniela Gunz**, *fem*inno Program Coordinator; **Sylvia Martinez**, Coordinator Basel & Swiss Plant Science Web; **Karolina Borg**, Internship.

Open calls

PSC-JRC COLLABORATIVE DOCTORAL PROGRAM

The PSC invites its members to submit project ideas in collaboration with the EU Joint Research Center (JRC). The JRC's mission is to support EU policy and decision-making. ETH Zurich and University of Zurich can host PhD students in the topics «Soil and land use change» and «Bio-economy and forests». PhD candidates are jointly selected and supervised for the duration of their stay at the JRC (maximum of two years). Salary and research costs during the stay at JRC will be funded by the JRC. Participating PhD students will be enrolled in the *PhD Program Science and Policy* coordinated by the PSC.

Contact: Manuela Dahinden, mdahinden@ethz.ch

www.plantsciences.uzh.ch/en/research/fellowships/jrc

RESPONSE DOCTORAL PROGRAM (DP)

RESPONSE DP combines inter-sectoral research with the empowerment of 35 new PhD students to interact with stakeholders, policymakers and the public in the fields of «Sustainable food system», «Sustainable transitions in the energy sector» and «Sustainable land use decisions». PhD students will be enrolled in the *PhD Program Science and Policy* and will collaborate with a partner organization at the science / policy / society interface or with a private organization (enterprise) – a secondment of 3 to 12 months is mandatory. This program receives funding from the EU's Horizon 2020 research and innovation program under the Marie Skłodowska-Curie grant agreement No 847585 – RESPONSE.

4th open call for PhD candidate applications from 1 Mar until 1 July 2021

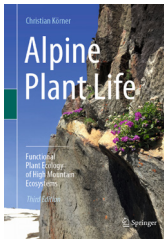
Open positions are announced on the RESPONSE website.

Applications have to be submitted via the online platform of the Life Science Zurich Graduate School (https://join.lszgs.uzh.ch/, Choose: PhD Program Science and Policy).

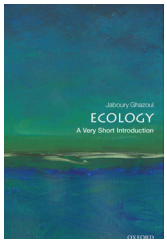
Contact: Luisa Last, llast@ethz.ch

www.plantsciences.uzh.ch/en/research/fellowships/response

Books



Christian Körner
Alpine Plant Life
Third Edition
Springer International Publishing, 2021
ISBN 978-3-030-59537-1



Jaboury Ghazoul
Ecology: A Very Short Introduction
Oxford University Press, 2020
ISBN 9780198831013

Awards

Highly Cited Researcher 2020

Each year the Web of Science publishes a list recognizing world-class researchers. They are selected for their exceptional research performance, demonstrated by producing multiple highly cited papers that rank in the top 1% by citations for field and year in the Web of Science.

Environment & Ecology:
Jordi Bascompte, University of Zurich

Plant & Animal Science:
Enrico Martinoia, emeritus, and **Cyril Zipfel**, University of Zurich

Cross-Field:
Christian Körner, emeritus, University of Basel; **Johan Six**, ETH Zurich; **Marcel van der Heijden**, University of Zurich & Agroscope

Marcel van der Heijden elected new president of the International Mycorrhiza Society (IMS).

PSC Symposium 2020 Poster Award

First Prize: Lea Frey, ETH Zurich. Poster title: Elucidating the genetic control of southern anthracnose resistance in a diverse set of red clover accessions (Bruno Studer group). **Second Prize:** Unnikannan Prabhullachandran, CEITEC Masarykova Univerzita, Bohunice CZ. Poster Title: Unravelling the process of thermoregulation in development of *Brassica napus*. **Best poster awarded by the audience:** Alicia Abarca Cifuentes, University of Zurich. Poster title: Unravelling the RALF peptide family (Cyril Zipfel group).

Grace Crain (ETH Zurich) won poster award (1st prize) at the MELiSSA Conference 2020 dedicated to closed life support systems for her poster: Using human urine derived waste products as nitrogen and phosphorus sources for hydroponic soybean production (Emmanuel Frossard and Astrid Oberson group).

www.melissafoundation.org/

Michelle Nay (ETH Zurich) won the 2020 SFIAR PhD Award for her project: Improving smallholder farmers' food security through disease resistant common beans (Bruno Studer group).

https://sfiar.ch/award.htm#c575

Marius Hodel received an ETH Zurich Medal for outstanding Master's theses in 2020 (Bruno Studer group).

https://ethz.ch/en/the-eth-zurich/education/awards/eth-medal/outstanding-master-theses.html

RESPONSE Doctoral Program

At a glance

The RESPONSE Doctoral Program (DP) is a joint doctoral program of ETH Zurich, University of Zurich and University of Basel and their competence centers: the Zurich-Basel Plant Science Center, the World Food System Center and the Energy Science Center. RESPONSE DP is centrally managed by the PSC. RESPONSE DP started in February 2020. 14 students have already started their PhD projects. In this newsletter we introduce the fellows that started in Call 2.

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

Summer school

Responsible Research, Innovation and Transformation in Food, Plant and Energy sciences

September 13–17, 2021, Wislikofen, Switzerland

Societal transformation through innovation and research are key elements in the discussion how the global community could overcome its complex problems, related to environmental, social and economic constraints in a resource-limited world. Innovation conflicts arise when transformation is mainly technologically driven and is not taking up environmental, ethical, legal and social issues of society.
Scientists are asked to take a role in science-in-society dialogue, especially if their research is related to fulfilling the Sustainable Development Goals (SDGs). Thus, we do need knowledge, innovation and solutions that are adapted to societal needs and are co-produced between different stakeholders including scientists. In this process, public and stakeholder engagement is key – welcoming actors from civil society as partners to express their values and interests in scientific, technological and innovation choices. As a result, we have to re-think the scientific research process, opening spaces for the public at the beginning of a research project. The aim is to generate participative change and facilitate transformation of complex systems for a sustainable and equitable future.

In this summer school, we will implement the EU`s Responsible Research and Innovation (RRI) framework to exemplary case studies addressing challenges of the 21st century: in sustainable food systems, sustainable transitions in the energy sector; and sustainable land use decisions.

Tools and methodologies

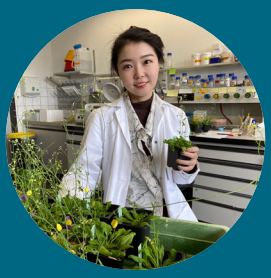
- Design thinking
- Value-based design
- Human-centred design
- Social labs and their methodologies
- Citizen science approaches

The summer school is offered jointly between Zurich-Basel Plant Science Center, World Food System Center and Energy Science Center.

RESPONSE DP combines intersectoral research with the empowerment of 35 PhD students to interact with stakeholders, policymakers and the public in the fields of «Sustainable food systems», «Sustainable transitions in the energy sector» and «Sustainable land use decisions».

This program receives funding from the European Union's Horizon 2020 research and innovation program under the Marie Skłodowska-Curie grant agreement No 847585 – RESPONSE.

Chromatin-based controls in the reproductive lineage



Fellow: Danli Fei

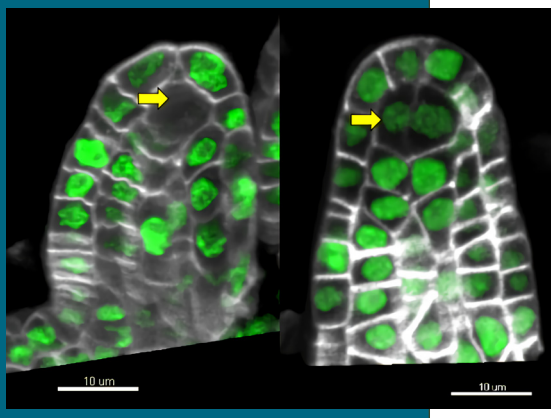
PI: PD Dr. Célia Baroux, Department of Plant and Microbial Biology, University of Zurich

Partner: Dr. Peter Majer, Bitplane AG, Zurich

The nucleus is more than a genetic container. This organelle is the chief orchestra of cellular processes by controlling and fine-tuning gene expression in response to developmental and environmental cues. The combination of DNA and histone proteins that make up the nuclear content is often referred to as chromatin. The function of chromatin is packaging long DNA molecules into more compact, denser structures. Linker histones bind the nucleosome at the entry and exit sites of the DNA. The modification of this structural proteins in chromatin alters local chromatin structure and therefore gene expression.

In this project, we aim to elucidate chromatin dynamics principles underlying cellular reprogramming during developmental or physiological transitions. My project focuses on the somatic-to-reproductive cell fate transition which leads to germline differentiation and then seed formation. Our group has shown that in the model plant *Arabidopsis*, the differentiation of both male and female spore mother cells (SMC) is accompanied by large-scale chromatin reprogramming including the loss of linker histones (H1), chromatin decondensation, and large-scale epigenetic changes (She et al., 2013, 2015). Specifically, the goal of this project is to address the role and mechanisms of H1 dynamics during female sporogenesis in *Arabidopsis*, focusing on ubiquitinylation and the proteasome-degradation pathway. The purpose of this research is to contribute knowledge on the molecular and epigenetic mechanisms controlling plant reproduction, in turn influencing seed yield.

Planned outcomes of this project are the elucidation of the role of ubiquitination in H1 dynamics controlling in turn plant reproduction, as well as the higher visibility of image processing-based analyses to diversify research approaches in plant sciences. To strengthen my professional network, a three-month secondment is foreseen at Bitplane AG, focusing on the documentation of plant science case studies using Imaris as a resource for plant scientists to promote innovation. The role of Bitplane AG is to provide a training in science application communication. The result will be published on the Imaris Learning Centre webpage https://imaris.oxinst.com/learning.



Ovule primordia imaged by confocal microscopy. The cell boundary is stained in grey and nucleus with green fluorescent proteins (GFP) show the green signal. Linker histone (H1) protein is ubiquitously expressed in the cell nucleus. The cell marked with a yellow arrow is spore mother cell (SMC). The left image shows normal SMC with H1 eviction. The right image shows the mutation line with H1 not evicted at SMC. These mutants are useful for somatic-to-reproductive cell fate transition mechanism analysis.

Towards improved crop resilience – discovering essential factors that control chloroplast development

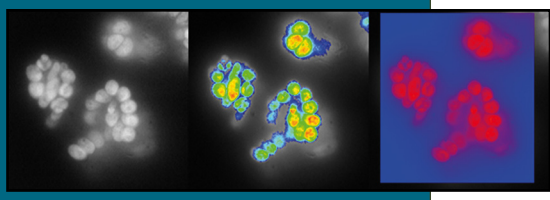
Fellow: Yuanyuan Liang

PI: Prof. Samuel C. Zeeman and Dr. Barbara Pfister, Department of Biology, Institute of Molecular Plant Biology, ETH Zurich

Partner: Dr. Klára Panzarová, PSI (Photon Systems Instruments), spol. s r.o., Drasov, Czech Republic

Understanding the mechanisms by which chloroplasts develop and maintain their function under adverse conditions is of unparalleled global significance. As they house photosynthesis, even small alterations in chloroplast function imposed by environmental stresses can result in drastic yield losses. Maintaining crop yields in the face of increasingly unfavorable environmental conditions requires innovations that allow improvements in the plastid's housekeeping metabolism and hence the stress resistance of these crucial organelles.

In this project, we aim to identify factors involved in the fundamental processes of chloroplast homeostasis. Our recent data suggests that an *Arabidopsis* protein which was predicted to be involved in carbohydrate metabolism is actually associated with components of the plastid gene expression machinery and is essential for plastid development. We will apply molecular biology approaches to understand how this protein and related factors enable the development and homeostasis of chloroplasts, thereby identifying novel targets to increase the resilience of these essential organelles in crops. In collaboration with Photon Systems Instruments (PSI) in the Czech Republic, we will explore fast and non-destructive in situ scanning methods for characterizing the photosynthetic efficiency of plants. These will not only provide valuable data for this research project but also lay the groundwork for improved technologies to capture changes in the function of individual chloroplasts in real-time. The methodological and scientific outcomes of this project will be presented at science or agricultural fairs and stakeholder meetings and published open access in international peer-reviewed journals and bioinformatic datasets, which will provide novel knowledge for breeding strategies.



An *Arabidopsis thaliana* mutant fails seedling establishment caused by defects in chloroplast gene expression (above). Kinetic chlorophyll images captured by Fluorescence Kinetic Microscope (below).

DOI: 10.1023/A:1012461407557

PHOTON SYSTEMS INSTRUMENTS

ChromoBreed: From chromatin to plant breeding

Fellow: Alberto Linares

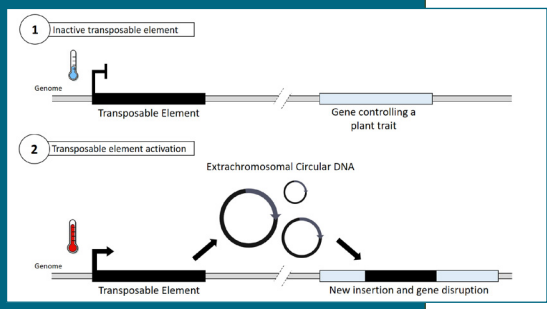
PI: Prof. Sylvain Bischof, Department of Plant and Microbial Biology, Epigenetics and Chromatin Biology, University of Zurich

Partner: Dr. Etienne Bucher, epibreed AG, Basel

The ability to engineer genetically modified crop species has promise to revolutionize plant breeding, through targeted modifications of specific plant traits. However, widespread use of this technology is currently hampered by ethical and legal barriers. A potentially exciting alternative that avoids some of the concerns in standard bioengineering is to remodel the epigenome to improve plant traits. Importantly, this approach may be subjected to less strict regulation because it does not permanently modify the DNA base sequence and may thus be more likely to gain public support.

In this project, we will characterize the epigenetic mechanisms underlying a novel breeding technology that is based on the mobility of endogenous transposable elements (TEs). In recent years, TEs have been used as a promising tool to alter plant traits. TEs are DNA sequences that can multiply and move to different genomic locations. Because they are potentially deleterious for the genome, TEs are targeted by repressive epigenetic mechanisms that silence their expression and thus prevent their ability to transpose to unwanted regions of the genome. However, certain stimuli or environmental conditions can favor the reactivation of TEs. For example, exposure to heat leads to the transcriptional upregulation of the retrotransposon ONSEN and its transposition throughout the genome. This heat-inducible transposition system has been used to screen for new ONSEN insertions resulting in expression changes of nearby genes that control plant traits. Despite its successful application in *Arabidopsis* and rice, the molecular mechanisms controlling TE reactivation for this breeding strategy remains to be elucidated.

The proposed project aims at elucidating the epigenetic pathways that regulate the activity of TEs and apply the obtained knowledge to improve transposition-mediated plant breeding. Together with the partner organization, epibreed AG, this emerging technology will be applied to improve plant traits. The obtained results will be published open access in international peer-reviewed journals and presented at international conferences. New molecular pathways leading to improved transposition-mediated breeding will be patented.



Transposable element-based plant breeding technology.

Quality-enhanced power semiconductor devices for reliable energy conversion (QEPSREC)

Fellow: Manuel Belanche Guadas

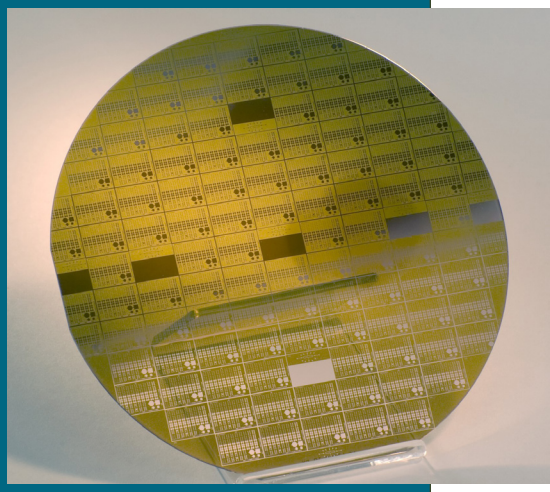
PI: Prof. Ulrike Grossner, Department of Information Technology and Electrical Engineering, Advanced Power Semiconductor Laboratory, ETH Zurich

Partner: Florian Krippendorf, mi2-factory GmbH, Jena, Germany

Power semiconductor devices are a fundamental part of the power electronics that compose all electrical energy systems required in society. From renewable energy generation to electric vehicles and power supplies markets, power semiconductor devices can strongly contribute to the reduction of global energy loss and improvement in power management. Along with the emergence during the last two decades of such markets, a remarkable amount of R&D was conducted in the field of power electronics providing solutions for the increasing semiconductor devices requirements.

However, with increasing demands on performance and efficiency, traditional Si-based devices have reached their performance limits. Consequently, a migration to more robust semiconductor materials is necessary. Wide-bandgap semiconductors, e.g., Silicon Carbide (SiC), are emergent viable alternative given their superior electrical properties. However, SiC-based semiconductor technology is rather young and hence comprehensive understanding of its electrical behavior and an improvement in device quality and reliability is needed.

The aim of the project is the development of a novel ion-implantation technology to realize SiC-based super junction devices, designated to outperform the existing wide-bandgap semiconductor devices. In collaboration with mi2-factory GmbH, given their state-of-the-art energy filters technology, the focus will be on the ion implantation process as a key process for the fabrication of efficient and reliable high-voltage devices. The modelling of super junction device structures, in addition to the development of adequate fabrication technologies, will eventually allow the prototyping of high quality and reliable super junction structures based on Silicon Carbide.



Silicon Carbide processed wafer. Wafers (10–15 cm of diameter) are the base material on which power devices are fabricated in a multi-step process of micro and nanofabrication.

www.iisb.fraunhofer.de/content/dam/iisb/de/images/presse_publikationen/pressemitteilungen/2012/MobiSiC/IISB_Wafer_SiliconCarbide.jpg

This fellowship is hosted by the Energy Science Center.

ROSE: Role of bioenergy in sustainable energy systems

Bioenergy is currently a major source of renewable energy in Europe, but its role in a 100% renewable Europe towards 2050 is uncertain. It may be able to help balance fluctuating wind and solar power. However, there are doubts about its sustainability and conflicts with other forms of land use, including for food production. Hence, this project will take a step back to investigate possible roles of bioenergy in a fully renewable and largely electrified European energy system from an interdisciplinary perspective.

Specifically, this project aims at answering three interconnected questions: (1) What different roles can bioenergy provide for power system flexibility or non-electrified energy demand in a 100% renewable Europe by 2050 – and to what extent are these two roles synergistic? (2) Can biomass supply for such roles be produced within Europe in a sustainable way with respect to fertilizer input and land use? How might a shift towards more plant-based and land demanding diets affect this endeavor? (3) What is the impact of the EU's 2030 targets and current bioenergy support policies on likely bioenergy deployment pathways, and do they help or hinder the achievement of the roles identified in (1) and (2) by 2050?

This first question will be answered by Euro-Calliope (a European energy system model developed in Anthony Patt's lab). The second one will be explored through the global mass-flow food system model SOLm, in collaboration with the Research Institute of Organic Agriculture, FiBL. The final step is to provide feedback to the first two questions through the combination of Euro-Calliope and SOLm as well as interviews with stakeholders. Besides scientific publications and open-sourced models, the project will also provide a policy brief to inform policymakers on flexible, sustainable, and cost-effective pathways highlighting the role of bioenergy in achieving a fully renewable European energy system by 2050.

This fellowship is hosted by the Energy Science Center.

Fellow: Fei Wu

PI: Prof. Anthony Patt and Dr. Stefan Pfenninger, Department of Environmental Systems Science – Climate Policy, ETH Zurich

Partner: Dr. Adrian Müller, Research Institute of Organic Agriculture (FiBL), Frick

Using versatile renewable biomass for bioenergy in industrial, transportation, and power sectors.

www.energy.gov/eere/bioenergy/bioenergy-basics

PSC-JRC Collaborative Doctoral Program

At a glance

The PSC-JRC Collaborative Doctoral Program is a hosted by ETH Zurich, University of Zurich and the Joint Research Center (JRC). The JRC's mission is to support EU policy and decision-making. The doctoral program started in 2019 and 4 PhD students are already part of it. ETH Zurich and University of Zurich can each host 5 PhD students in the topics *Soil and land use change* and *Bio-economy and forests*. The PhD students are enrolled in the *PhD Program Science and Policy* coordinated by the PSC.

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

As the European Commission's science and knowledge service, the Joint Research Centre (JRC) supports EU policies with independent scientific evidence throughout the whole policy cycle.

Soil and land use change

The JRC is the leading institution in Europe for the development of policy relevant soil data and information systems. It provides necessary scientific data, information and knowledge for supporting the numerous EU policies relevant to soils and land use. JRC scientists have expertise in soil sciences, modelling, spatial analysis, geography and agronomy.

The JRC is leading European and global scientific networks on soil data science such as: The Intergovernmental Technical Panel on Soils (ITPS) of the Global Soil Partnership (GSP) and The Land Degradation and Restoration Assessment of the Intergovernmental Platform for Biodiversity and Ecosystem Services (IPBES). Furthermore, the JRC is hosting the secretariat of the European Soil Bureau Network (ESBN), the European Soil Partnership (ESP) and the European Soil Data Centre (ESDAC).

Bioeconomy and forests

The Bioeconomy Unit provides scientific support to several EU policies related to sustainable production, as well as the use of biological resources and their conversion to value added products, such as construction material, food, feed, bioenergy and bio-based products. The three main areas of research related to:

(1) Sustainable management of forests and forest resources including the development of novel methods to monitor forest resources and carbon emissions. In the tropics, these methods focus on deforestation and forest degradation. In Europe, JRC investigates, among others, how climate change and biotic disturbance agents (e.g., pests), affect resilience in European forest ecosystems, by researching both the early detection of their effects, as well as longer term scenarios. The JRC develops remote sensing methodologies across a range of spatial and temporal scales.

(2) Enhancement of knowledge about biomass supply, demand, and flows (including waste) both at EU and global levels. JRC is in charge of assessing and modeling EU forests and the forest-based sector in support of the EU Bioeconomy Strategy and is also responsible of the EU greenhouse gas (GHG) inventory for the forest sector. In this context, JRC studies the interactions with agriculture and other biobased sectors (e.g., bioenergy, bio-based industry) and develops methods to assess the sustainability of forest-based supply chains.

(3) Assessment of environmental benefits and burdens associated to the production and consumption of products along supply chains. On-going JRC projects related to Life Cycle Assessment (LCA) embrace several scales: from micro (e.g., goods, services, organizations) and meso (e.g., industrial sectors) to macro scale (e.g., EU-wide policy options).

In addition, the JRC is supporting the development and improvement of the Environmental Footprint methodology and is involved in research activities related to the assessment of environmental impact of EU consumption in key areas such as food, mobility, housing, including their evaluation against planetary boundaries.

This program receives funding from the European Union under the Collaborative Doctoral Partnership Agreement No 35317 (ETH Zurich) and Agreement No 35594 (University of Zurich) with the European Commission Joint Research Centre.

How biodiversity can recover in the light of past and present human pressures

Fellow: Clara Antonia Klöcker

PIs: Prof. Stefanie Hellweg and Dr. Stephan Pfister, Inst. of Environmental Engineering (IIfU), Ecological Systems Design, ETH Zurich

Prof. Loïc Pellissier, Landscape Ecology at the Institute of Terrestrial Ecosystems, ETH Zurich

Dr. Serenella Sala, Scientific officer, Bioeconomy unit of the Directorate D - Sustainable Resources, European Commission, Joint Research Centre, Ispra, Italy

Biodiversity and particularly its loss, have gained increasing attention, not only in scientific circles, but also in the public and policy domain such as under the slogan of the «sixth mass extinction». Similar to the topic of climate change, science offers strong evidence that human-introduced pressures, such as increased land use and pollution have a negative impact on the natural environment including biological diversity. Yet, unlike climate change impacts that can be measured relatively easily as CO_2-equivalents as a unit, quantifying the human impact on biodiversity has proven very difficult. The concept of biodiversity is very complex and incorporates different aspects and levels, ranging from genes over species up to entire ecosystems, making it difficult to find one single denominator.

Having been fascinated by the many different life forms and the complex dynamics that have evolved to maintain a balance in the system even when experiencing disturbances, I started my PhD to investigate these dynamics. In order to contribute to a better understanding of temporal trends and spatial patterns of biodiversity recovery following human-induced disturbances, I will use computer-based methods and combine global pressure maps from satellite images with species information from available databases. Given the need to be able to measure and compare the impacts that human action has on biodiversity, I aim to improve current approaches of quantifying biodiversity impacts in the context of Life Cycle Impact Assessments with my results. Bringing different data and scientific approaches together, my project aims to bridge the gap between scientific disciplines as well as between science and policymakers, who in the end have to make the decisions on how our society and environment will look in the future to come.

Soil microbial biodiversity and ecosystem functioning across Europe

To sustain an ever-increasing population, the total area of cultivated land globally has increased considerably in recent decades, accompanied by an expanding use of fertilizers and pesticides. It is still poorly understood whether this land use intensification influences soil biodiversity.

In 2009, the European Commission launched a large-scale soil monitoring program, called LUCAS Soil with the aim of assessing the impact of land use on soil quality. The resulting database includes sampling sites distributed across Europe (from the North of Sweden to the South of Spain and from Ireland to Romania) that are visited every 3 years. In 2018, soil biodiversity was added to the survey and a total of 885 sites were sampled.

This large project focuses on the effects of land use on soil microbial diversity. Specifically we will (i) identify factors that regulate soil microorganisms and microbial networks across a gradient of land use practices and soil properties in Europe, (ii) determine key taxa within the soil microbiome, by selecting indicator taxa for specific ecosystem functions and testing whether key taxa are influenced by pesticides in the soil, and (iii) investigate whether soil biodiversity, microbiome complexity and the diversity and composition of functional soil genes are influenced by pesticide concentrations in the soil. The main hypotheses are that the intensification of agricultural practices will involve changes in the composition of soil microbial communities, affecting also the connectivity and complexity of co-occurrence networks. Specifically, we hypothesize that the use of pesticides will reduce the presence of sensitive key and non-key soil taxa, affecting the functions associated to these taxa, too. We expect a selection of pesticide-tolerant taxa under high agricultural pressure.

Three main land covers will be studied: woodland, grassland and cropland, representing a gradient of intensification in management practices. A study of the diversity within (alpha) and between (beta) communities will be conducted, as well as a co-occurrence network analysis across land-use types. Furthermore, the relative contribution of several soil physical and chemical properties in shaping microbial communities and networks will be evaluated.

Currently, most microbiologists characterize microbial taxa as operational taxonomic units (OTU), generated by grouping sequences based on a shared similarity threshold (97% of similarity in general). However, more recently, researchers also use amplicon sequence variants (ASV), based on sequence differences by as little as a single nucleotide change, avoiding similarity-based operational clustering units. Previous calculations and models will be carried out using both approaches for comparison.

Recent publication: State of knowledge of soil biodiversity: Status, challenges and potentialities, Report 2020. Rome, FAO. FAO, ITPS, GSBI, SCBD and EC. 2020.

Fellow: Maëva Labouyrie

PIs: Prof. Dr. Marcel van der Heijden, Department of Plant and Microbial Biology, University of Zurich & Plant-Soil Interactions Agroscope Reckenholz, Zurich

Dr. Alberto Orgiazzi, Project officer, European Commission, Joint Research Centre, Ispra, Italy

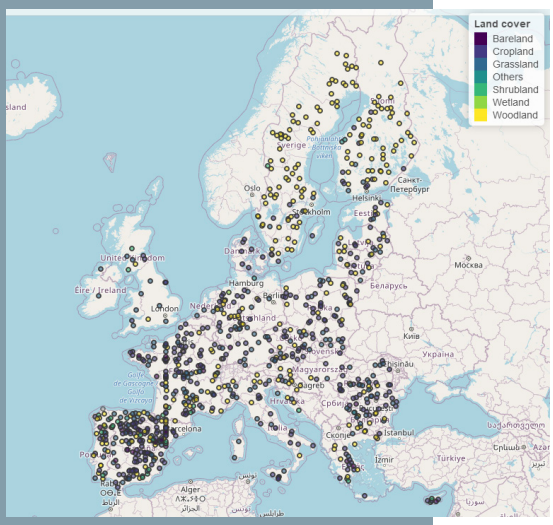
Other project team members:

Dr. Ferran Romero, Postdoctoral researcher, Plant-Soil Interactions group at Agroscope Reckenholz, Zürich

Dr. Arwyn Jones, Scientific officer, European Commission, Joint Research Centre, Ispra, Italy

Dr. Panos Panagos, Scientific officer, European Commission, Joint Research Centre Ispra, Italy

Prof. Dr. Leho Tedersoo, Professor in Mycorrhizal Studies, University of Tartu, Institute of Ecology and Earth Science, Estonia



Points where LUCAS soil samples were taken for biodiversity assessment in 2018, colored by land cover type.

Constraining historical and future estimates of land cover and land management effects on climate

Land-based carbon storage, combining vegetation and soils, contains more than double the amount of carbon than currently present in the atmosphere. Especially forests are known for their potential of assimilation of CO_2, hence mitigating a significant part of human greenhouse gas emissions. Concurrently, forests play a major role in shaping their own environment by changing the local energy and water cycle. Combining these processes are fundamental to understand forest growth dynamics for the purpose of modelling future climate (local and global), since they contribute a potentially valuable tool for climate change mitigation strategies.

Although forest dynamics at a local scale are well known and studied for centuries, the global distribution and future trajectories of forest growth and stability remain relatively uncertain. This project aims to take advantage of new global remote sensing technologies to obtain a better understanding of the global constraints of forest carbon assimilation. It will consist of disentangling the net effect of the various drivers of growth (climate, water availability, soil characteristics etc.) and studying the occurrences of both natural and human-caused disturbances on forests. Together, they will be used to create a framework for comparing and assessing forest management strategies that stimulate forest growth and limit forest losses to disturbances. The project will be executed partly at ETH Zurich (in the Institute for Atmospheric and Climate Sciences) and partly at the JRC in Ispra, Italy, taking advantage of the respective expertise in global climate modelling and remote sensing analysis.

Fellow: Caspar Roebroek

PIs: Prof. Sonia Seneviratne and Dr. Edouard Davin, Institute for Atmospheric and Climate Science (IAC), ETH Zurich

Dr. Alessandro Cescatti and Gregory Duveiller, Senior researchers, European Commission, Joint Research Centre, Ispra, Italy

The Institute for Environment and Sustainability (IES) is one of the seven institutes of the JRC (European Commission). The mission of IES is to provide scientific and technical support to EU strategies for the protection of the environment and sustainable development.

Modelling phosphorus cycle in EU agricultural soils and assessing land impact and land mitigation options

Fellow: Anna Muntwyler

PI: Prof. Stefanie Hellweg and Dr. Stephan Pfister, ETH Zurich, Inst. of Environmental Engineering (IfU), Ecological Systems Design

Dr. Panos Panagos and Dr. Emanuele Lugato, D3 - Land Resources, European Commission, Joint Research Centre, Ispra, Italy

Dr. Adrian Müller, Research Institute of Organic Agriculture FiBL

Agriculture currently feeds 7.7 billion people globally and will have to feed ~10 billion in 30 years. Concomitantly, food production is causing various negative impact on the environment, including a quarter of the world's greenhouse gas emissions, three-quarters of the global ocean and freshwater eutrophication and it is threatening half of the endangered species. In order to mitigate these problems, we need to know how to produce enough food to feed the world while causing less impact on the environment. The environmental impact of single food items can be assessed in a Life Cycle Assessment (LCA) that considers all product life stages, from the moment it is produced to its going to waste.

This research project aims at identifying the most sustainable agricultural practices considering their environmental impacts with a focus on nutrient management. The LCA of agricultural management will be enhanced by using a spatially explicit crop and ecosystem model together with an erosion model. Subsequent integration with a mass-flow model capturing the global food system will help to analyze the effects, benefits and trade-offs of different nutrient managements and production systems for providing adequate food for the global population. Assessing the environmental impacts of different agricultural management systems with improved nutrient cycle modelling will allow to identify environmental hotspots of impacts as well as regions, where a transition to organic production would be favorable from a life cycle perspective.

The outcome will consist of scientific publications as well as a vehicle to assess policy goals in agriculture, such as the Green Deal of the European Commission. Therefore, research results will contribute to responsible decisions making with regard to agricultural land use.

Nature (2020)
doi: 10.1038/s41586-020-2549-5

New Guinea has the world's richest island flora

Rodrigo Cámara-Leret, ..., **Michael Kessler**, ..., PC van Welzen

New Guinea is the world's largest tropical island and has fascinated naturalists for centuries. Home to some of the best-preserved ecosystems on the planet and to intact ecological gradients-from mangroves to tropical alpine grasslands-that are unmatched in the Asia-Pacific region, it is a globally recognized centre of biological and cultural diversity. So far, however, there has been no attempt to critically catalogue the entire vascular plant diversity of New Guinea. Here we present the first, to our knowledge, expert-verified checklist of the vascular plants of mainland New Guinea and surrounding islands. Our publicly available checklist includes 13,634 species (68% endemic), 1,742 genera and 264 families-suggesting that New Guinea is the most floristically diverse island in the world. Expert knowledge is essential for building checklists in the digital era: reliance on online taxonomic resources alone would have inflated species counts by 22%. Species discovery shows no sign of levelling off, and we discuss steps to accelerate botanical research in the 'Last Unknown'.

A catalogue of the vascular flora of New Guinea indicates that this island is the most floristically diverse in the world, and that 68% of the species identified are endemic to New Guinea.

Nature (2020)
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The calcium-permeable channel OSCA1.3 regulates plant stomatal immunity

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Perception of biotic and abiotic stresses often leads to stomatal closure in plants. Rapid influx of calcium ions (Ca^{2+}) across the plasma membrane has an important role in this response, but the identity of the Ca^{2+} channels involved has remained elusive. Here we report that the *Arabidopsis thaliana* Ca^{2+}-permeable channel OSCA1.3 controls stomatal closure during immune signalling. OSCA1.3 is rapidly phosphorylated upon perception of pathogen-associated molecular patterns (PAMPs). Biochemical and quantitative phosphoproteomics analyses reveal that the immune receptor-associated cytosolic kinase BIK1 interacts with and phosphorylates the N-terminal cytosolic loop of OSCA1.3 within minutes of treatment with the peptidic PAMP flg22, which is derived from bacterial flagellin. Genetic and electrophysiological data reveal that OSCA1.3 is permeable to Ca^{2+}, and that BIK1-mediated phosphorylation on its N terminus increases this channel activity. Notably, OSCA1.3 and its phosphorylation by BIK1 are critical for stomatal closure during immune signalling, and OSCA1.3 does not regulate stomatal closure upon perception of abscisic acid—a plant hormone associated with abiotic stresses. This study thus identifies a plant Ca^{2+} channel and its activation mechanisms underlying stomatal closure during immune signalling, and suggests specificity in Ca^{2+} influx mechanisms in response to different stresses.

Nature (2020)
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Multiple wheat genomes reveal global variation in modern breeding

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Advances in genomics have expedited the improvement of several agriculturally important crops but similar efforts in wheat (*Triticum* spp.) have been more challenging. This is largely owing to the size and complexity of the wheat genome, and the lack of genome-assembly data for multiple wheat lines. Here we generated ten chromosome pseudomolecule and five scaffold assemblies of hexaploid wheat to explore the genomic diversity among wheat lines from global breeding programs. Comparative analysis revealed extensive structural rearrangements, introgressions from wild relatives and differences in gene content resulting from complex breeding histories aimed at improving adaptation to diverse environments, grain yield and quality, and resistance to stresses. We provide examples outlining the utility of these genomes, including a detailed multi-genome-derived nucleotide-binding leucine-rich repeat protein repertoire involved in disease resistance and the characterization of Sm1, a gene associated with insect resistance. These genome assemblies will provide a basis for functional gene discovery and breeding to deliver the next generation of modern wheat cultivars.

Science (2020)
doi: 10.1126/science.abd7015

Novel trophic interactions under climate change promote alpine plant coexistence

Patrice Descombes, Camille Pitteloud, G Glauser, E Defossez, A Kergunteuil, P-MaAllard, S Rasmann, **Loïc Pellissier**

Herbivory and plant defenses exhibit a coupled decline along elevation gradients. However, the current ecological equilibrium could be disrupted under climate change, with a faster upward range shift of animals than plants. Here, we experimentally simulated this upward herbivore range shift by translocating low- elevation herbivore insects to alpine grasslands. We report that the introduction of novel herbivores and increased herbivory disrupted the vertical functional organization of the plant canopy. By feeding preferentially on alpine plants with functional traits matching their low-elevation host plants, herbivores reduced the biomass of dominant alpine plant species and favored encroachment of herbivore-resistant small-stature plant species, inflating species richness. Supplementing a direct effect of temperature, novel biotic interactions represent a neglected but major driver of ecosystem modifications under climate change.

Science (2020)
doi: 10.1126/science.abd8911

Increased growing-season productivity drives earlier autumn leaf senescence in temperate trees

Deborah Zani, Thomas W. Crowther, Lidong Mo, SS Renner, **Constantin M Zohner**

Changes in the growing-season lengths of temperate trees greatly affect biotic interactions and global carbon balance. Yet future growing-season trajectories remain highly uncertain because the environmental drivers of autumn leaf senescence are poorly understood. Using experiments and long-term observations, we show that increases in spring and summer productivity due to elevated carbon dioxide, temperature, or light levels drive earlier senescence. Accounting for this effect improved the accuracy of senescence predictions by 27 to 42% and reversed future predictions from a previously expected 2- to 3-week delay over the rest of the century to an advance of 3 to 6 days. These findings demonstrate the critical role of sink limitation in governing the end of seasonal activity and reveal important constraints on future growing-season lengths and carbon uptake of trees.

Nature Communications (2020)
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Methanol-dependent *Escherichia coli* strains with a complete ribulose monophosphate cycle

Philipp Keller, E Noor, **Fabian Meyer, Michael A Reiter, Stanislav Anastassov, Patrick Kiefer, Julia A Vorholt**

Methanol is a biotechnologically promising substitute for food and feed substrates since it can be produced renewably from electricity, water and CO_2. Although progress has been made towards establishing *Escherichia coli* as a platform organism for methanol conversion via the energy efficient ribulose monophosphate (RuMP) cycle, engineering strains that rely solely on methanol as a carbon source remains challenging. Here, we apply flux balance analysis to comprehensively identify methanol-dependent strains with high potential for adaptive laboratory evolution. We further investigate two out of 1,200 candidate strains, one with a deletion of fructose-1,6-bisphosphatase (fbp) and another with triosephosphate isomerase (tpiA) deleted. In contrast to previous reported methanol-dependent strains, both feature a complete RuMP cycle and incorporate methanol to a high degree, with up to 31 and 99% fractional incorporation into RuMP cycle metabolites. These strains represent ideal starting points for evolution towards a fully methylotrophic lifestyle. The engineering of methanol-dependent growth in Escherichia coli is challenging. Here, the authors predict and experimentally validate methanol-dependent strains with a complete RuMP cycle and high potential for the development of a methylotrophic platform organism.

Nature Communications (2020)
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Adaptive reduction of male gamete number in the selfing plant *Arabidopsis thaliana*

Takashi Tsuchimatsu, Hiroyuki Kakui, Misako Yamazaki, C Marona, **Hiroki Tsutsui, Afif Hedhly,** D Meng, Y Sato, **Thomas Städler, Ueli Grossniklaus,** MM Kanaoka, M Lenhard, M Nordborg & **Kentaro K. Shimizu**

The number of male gametes is critical for reproductive success and varies between and within species. The evolutionary reduction of the number of pollen grains encompassing the male gametes is widespread in selfing plants. Here, we employ genome-wide association study (GWAS) to identify underlying loci and to assess the molecular signatures of selection on pollen number-associated loci in the predominantly selfing plant *Arabidopsis thaliana*. Regions of strong association with pollen number are enriched for signatures of selection, indicating polygenic selection. We isolate the gene REDUCED POLLEN NUMBER1 (RDP1) at the locus with the strongest association. We validate its effect using a quantitative complementation test with CRISPR/Cas9-generated null mutants in nonstandard wild accessions. In contrast to pleiotropic null mutants, only pollen numbers are significantly affected by natural allelic variants. These data support theoretical predictions that reduced investment in male gametes is advantageous in predominantly selfing species. Reduction of pollen grain number is widespread in selfing plants, but the determining gene is unknown. Here, the authors show that a ribosome-biogenesis factor encoding gene RDP1 is responsible for adaptive reduction of male gamete number in *Arabidopsis thaliana*.

Nature Communications (2020)
doi: 10.1038/s41467-020-18343-6

Rapid climate change results in long-lasting spatial homogenization of phylogenetic diversity

B Saladin, **Loïc Pellissier,** CH Graham, MP Nobis, N Salamin, NE Zimmermann

Scientific understanding of biodiversity dynamics, resulting from past climate oscillations and projections of future changes in biodiversity, has advanced over the past decade.

Little is known about how these responses, past or future, are spatially connected. Analyzing the spatial variability in biodiversity provides insight into how climate change affects the accumulation of diversity across space. Here, we evaluate the spatial variation of phylogenetic diversity of European seed plants among neighboring sites and assess the effects of past rapid climate changes during the Quaternary on these patterns. Our work shows a marked homogenization in phylogenetic diversity across Central and Northern Europe linked to high climate change velocity and large distances to refugia. Our results suggest that the future projected loss in evolutionary heritage may be even more dramatic, as homogenization in response to rapid climate change has occurred among sites across large landscapes, leaving a legacy that has lasted for millennia. How past climate change has affected biodiversity over large spatial scales remains underexplored. Here, the authors find marked homogenization in flowering plant phylogenetic diversity across Central and Northern Europe linked to rapid climate change and large distances to glacial refugia.

Nature Communications (2020)
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Multiplying the efficiency and impact of biofortification through metabolic engineering

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Ending all forms of hunger by 2030, as set forward in the UN-Sustainable Development Goal 2 (UN-SDG2), is a daunting but essential task, given the limited timeline ahead and the negative global health and socio-economic impact of hunger. Malnutrition or hidden hunger due to micronutrient deficiencies affects about one third of the world population and severely jeopardizes economic development. Staple crop biofortification through gene stacking, using a rational combination of conventional breeding and metabolic engineering strategies, should enable a leap forward within the coming decade. A number of specific actions and policy interventions are proposed to reach this goal.

Nature Ecology & Evolution (2020)
doi: 10.1038/s41559-020-01316-9

Plant traits alone are poor predictors of ecosystem properties and long-term ecosystem functioning

F van der Plas, T Schroeder-Georgi, A Weigelt, K Barry, S Meyer, A Alzate, RL Barnard, **Nina Buchmann,** ...; **Pascal A Niklaus,** ..., **Bernhard Schmid,** ED Schulze, V Temperton, T Tscharntke, W Voigt ,W Weisser, W Wilcke, C Wirth

Earth is home to over 350,000 vascular plant species that differ in their traits in innumerable ways. A key challenge is to predict how natural or anthropogenically driven changes in the identity, abundance and diversity of co-occurring plant species drive important ecosystem-level properties such as biomass production or carbon storage. Here, we analyse the extent to which 42 different ecosystem properties can be predicted by 41 plant traits in 78 experimentally manipulated grassland plots over 10 years. Despite the unprecedented number of traits analysed, the average percentage of variation in ecosystem properties jointly explained was only moderate (32.6%) within individual years, and even much lower (12.7%) across years. Most other studies linking ecosystem properties to plant traits analysed no more than six traits and, when including only six traits in our analysis, the average percentage of variation explained in across-year levels of ecosystem properties dropped to 4.8%. Furthermore, we found on average only 12.2% overlap in significant predictors among ecosystem properties, indicating that a small set of key traits able to explain multiple ecosystem properties does not exist. Our results therefore suggest that there are specific limits to the extent to which traits *per se* can predict the long-term functional consequences of biodiversity change, so that data on additional drivers, such as interacting abiotic factors, may be required to improve predictions of ecosystem property levels.

Nature Ecology & Evolution (2020)
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Integrating agroecological production in a robust post-2020 Global Biodiversity Framework

TC Wanger, F DeClerck, LA Garibaldi, **Jaboury Ghazoul, D** Kleijn, AM Klein, C Kremen, H Mooney, I Perfecto, LL Powell, J Settele, M Sole, T Tscharntke, W Weisser

To the Editor — The 15th Conference of the Parties (COP) meeting to the Convention on Biological Diversity in China — now to be held in 2021 due to the coronavirus pandemic — will provide new opportunities for biodiversity conservation (https://go.nature.com/31YAVNF) through the decision on the post-2020 Global Biodiversity Framework (GBF). In short, the GBF is a global and solution-oriented framework aiming for transformative action by governments, civil society and businesses, to help biodiversity recover for the benefit of people and planet. Agriculture is the most extensive form of land use, occupying more than one-third of the global landmass, and imperilling 62% of all threatened species globally. Habitat conversion and conventional farming practices — including heavy use of agrochemicals — have negative effects on biodiversity, even spilling into protected areas. However, if designed appropriately, agricultural landscapes can provide habitats for biodiversity, promote connectivity between protected areas, and increase the capacity of species to respond to environmental threats. While halting the loss of protected and intact nature is essential to halt species loss, bending the curve on biodiversity will require sustainable agriculture. We argue that the GBF must include conservation actions in agricultural landscapes based on agroecological principles (sensu High Level Panel of Experts) in the three '2030 Action Targets' (hereafter 'Targets') to reach its goals of biodiversity recovery. Agroecology is widely recognized as a necessary transformation in order to achieve food system sustainability.

In this Correspondence the authors elaborate on how agroecological production can help to support the GBF targets.

Professor Sebastian Dötterl, ETH Zurich

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Land use change in tropical Africa causes a massive increase in soil erosion and unsustainable soil loss creating a serious threat for the future food supply of a growing population. In picture: Fields in hilly regions nearby the Congolese city of Bukavu. Converted from forest just a few decades ago, yields already decreases due to the loss of soil fertility as a consequence of soil degradation. © M. Barthel

Established in 2019 at ETH Zurich's Department of Environmental Systems Science, the group Soil Resources joined PSC at the end of 2020. Group leader Sebastian Dötterl is Assistant Professor at ETH Zurich and holds a PhD in Geosciences (2013, University of Louvain) as well as a Diploma in Physical Geography with focus on Soil Science and Geoecology (2008, University of Regensburg). He is also the head of the DFG funded Emmy Noether research group TropSOC and co-founder of the Congo Biogeochemistry Observatory (CBO).

Sebastian and his group aim to understand how biogeochemical cycles in soils vary and interact, and how soil resources are affected by human activity. The group studies environmental systems, rather than isolated mechanisms, and it views soils as part of complex landscapes that change over time while being highly diverse in space. Scientists in the group are particularly interested to bridge the gap between process understanding from experimental data and model development in order to reach a better spatial representation of biogeochemical cycles. All projects in the group are highly interdisciplinary.

At global scales, soil dynamics are studied in collaboration with Earth system modelers. At regional scales, biogeochemical cycles are studied using remote sensing and geostatistics. At local and the plot scale, experiments are conducted on plant-microbiota-soil interactions in relation to pedogenesis, geochemistry, climate and human activity.

Current research in the group is oriented towards understanding soils across geo-climatic gradients, with a focus on the effects of anthropogenic disturbances on soil development and degradation. We particularly target understudied regions and areas that are hotspots of global change, such as tropical, arctic and alpine regions. Studying these regions is critical to our understanding of soil processes and plant-soil interactions, as knowledge gained in more accessible regions (temperate climate zones or lowland ecosystems) can often not be transferred into regions where soils and ecosystems have very different development histories. In these less studied places, drivers and controls on soil dynamics and the future trajectories of these systems often vary greatly compared to the systems we could investigate next door.

Ongoing key projects in the group focus on (i) arctic and alpine environments and the interactions between soil development and warming as drivers for arctic greening, (ii) tropical Africa and the role of parent material geochemistry in sustaining soil functions after soil degradation, and (iii) large-scale gradients in sub-Saharan Africa and the South American Andean cordillera for the study of geo-ecological controls on soil development and biogeochemical cycles.

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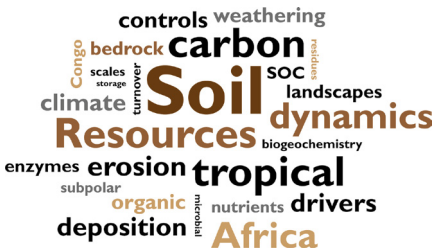

Professor Rachael Garrett, ETH Zurich

Rachael Garrett on a cattle farm in the Eastern Brazilian Amazon.
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Rachael Garrett is a tenure track Assistant Professor of Environmental Policy at ETH Zurich at the Departments of Humanities, Social and Policies Sciences and Environmental Systems Science. She moved to ETH in July 2019 from an Assistant Professorship at Boston University. Prior to this position she held a Giorgio Ruffolo Postdoctoral Fellowship in Sustainability Science at Harvard University as well as a US National Science Foundation Science, Engineering, and Education for Sustainability Fellowship. She received her PhD in Environment and Resources at Stanford University in 2013 and holds a MPA from Columbia University and a BA in History and Environmental Analysis and Policy from Boston University.

Rachael's research is situated at the nexus of terrestrial conservation, sustainable development, food systems, and environmental policy. As a land system scientist, her work revolves around three general areas: (i) identifying the causes of land change and its impacts on both people and ecosystems, (ii) assessing the effectiveness of policies aimed at promoting conservation and sustainable development, and (iii) understanding the opportunities and challenges to scaling up more sustainable land use practices. Over the last five years she obtained competitive grants totaling more than CHF 5 million, including awards from the US National Science Foundation, NASA, Fulbright, Swiss National Science Foundation, and European Research Council. In 2020 she was awarded an ERC Starting Grant for research on the effectiveness and equity of forest-focused supply chain policies.

Rachael's Environmental Policy Lab combines intensive fieldwork interviewing rural households with statistical analysis and modeling based on novel integration of supply chain and remotely sensed data. The research focuses on the tropics, especially Brazil, with additional projects in South America, Southeast Asia, and West Africa. Rachael's major contributions to the field of land system science are an improved understanding of: (i) causal pathways affecting land change in South America, (ii) non-monetary motivations of land use behaviors and the structural barriers influencing adoption of specific land use practices, and (iii) drivers and impacts of private sector forest governance initiatives. This information has been used to inform public and private policies to promote sustainable development and reduce the environmental impacts of global supply chains. She serves on the Scientific Advisory Board of the Transparency for Sustainable Economies Initiative of the Stockholm Environment Institute, the Research Council for Evidensia, a Nonprofit institute to provide credible evidence on supply chain initiatives and is a Contributing Author to the UN Science Panel for the Amazon and UN Intergovernmental Panel on Climate Change Sixth Assessment Report.

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Professor Stefano Mintchev, ETH Zurich

Conceptual view of the CYbER drones during flight and sampling inside tree canopies. © Stefano Mintchev

© Raffaello Ferone

In April 2020, Stefano Mintchev started as Professor of Environmental Robotics at the Institute of Agricultural Sciences in the Department of Environmental Systems Science at the ETH Zurich. He began his scientific career in Pisa, where he obtained his PhD in biorobotics at The BioRobotics Institute of the Sant'Anna School of Advanced Studies under the supervision of Prof. Cesare Stefanini. In the period 2014–2018, Stefano carried out postdoctoral research at EPFL with Prof. Dario Floreano, where he worked on aerial robotics. Between 2018–2020, Stefano co-founded and served as chief technology officer of the start-up FOLDAWAY Haptics. In this period, he developed origami-inspired methods for the design and manufacturing of haptic interfaces and gained considerable experience in industrial collaborations. He is a recognized leader in bioinspired robotics and has spent over 10 years developing robotic systems with animal-like capabilities to explore complex and difficult to access natural and artificial environments. In his work, he studies novel design approaches and materials that make robotic systems more adaptable, versatile and robust. Key principles in this endeavor include bioinspired design, soft architectures, unconventional fabrication techniques, and bioinspired sensing and mobility.

Past research by Stefano has provided some of the very first examples of «mechanically intelligent» drones. Inspired by nature, these machines exploit reconfigurable body structures, soft and multi-functional materials for robust, agile, and efficient flight. Examples are morphing drones that fold to explore confined environments, drones with artificial feathers that fly in very different atmospheric conditions and the first 100-grams drone capable to fly for almost three hours thanks to its insect inspired wings. For his research activities, Stefano received multiple patents and awards, in 2017 and 2018 from the IEEE society, and in 2019 from NASA.

In 2020 he was awarded with the SNSF Eccellenza Professorship to study robotics in the context of today's environmental challenges. He coordinates the activity of the newly born Environmental Robotics Laboratory. With his lab, Stefano aims at addressing the following question: how can robots break out of factories and succeed in the natural environment? For example, the CYbER (CanopY Exploration Robots) project studies the science and technology of new multi-modal robots for comprehensive canopy exploration. The goal is to develop semiautonomous drones to navigate within forest canopies, and to collect data and biological samples at different spatial and temporal scales. In the long term, the activity of the lab will be fundamental for developing robotic methods to improve environmental studies, but also for other domains, such as precision agriculture and mitigation of natural disaster. This research is the foundation for the more ambitious goal of creating robots that can merge into the environment for continuous monitoring, rapid intervention, and restoration.

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Professor Maria João F. Santos, University of Zurich

In February 2018, Maria J. F. Santos started as the new Chair of Earth System Science at the Department of Geography of the University of Zurich. She moved there from Utrecht University where she was an Assistant Professor in Environmental Sciences since 2014. Currently, Maria is also the co-Director and Director of Innovation of the University Research Priority Program in Global Change and Biodiversity at the University of Zurich. Prior to her appointment as professor, she held the prestigious Stanford University Postdoctoral Fellowship granted by the Bill Lane Center for the American West, the Center for Spatial and Textual Analysis and the Spatial History project between 2012–2013. She also carried out postdoctoral research at the University of California Berkeley, with Prof. Craig Moritz. Maria received her PhD in ecology with particular emphasis in landscape and ecosystem functioning from the University of California Davis in 2010 under the supervision of Prof. Susan Ustin.

Maria has been a leading scholar in understanding the coupling between social and ecological processes. In her work she combines Earth observations and in situ and historical empirical data with statistical and process-based modeling to answer pressing research questions on the role of biodiversity, ecosystem processes and nature's contributions to people, the sustainability of social-ecological systems, and the role of applied interventions in achieving the multiple goals necessary for sustainable development. Her work at this interface has led to several breakthroughs, and she has secured prestigious Fulbright, UC Berkeley and Stanford University fellowships as well as funding from H2020 from the European Union. In 2020, she was elected to the Biodiversity Forum of the Swiss National Academy of Sciences and in 2021 to the Scientific Advisory Board of the Managing Natural Capital working group of the OECD. Past research by Maria and her group have provided some of the very first examples of how tightly coupled are social processes of decision making to land use decisions regarding invasive species, water management and food production that enable biodiversity and its functioning.

This research has advanced the fields of social-ecological systems research and sustainability science, but as an interdisciplinary program, has also contributed to the fields of biodiversity science, environmental science, and application-oriented ecology (agriculture, forestry and conservation). In its current work, the Earth System Science group lead by Maria follows four main research thrusts: (i) biodiversity science and Earth observations (Biodiversity science from space), (ii) biodiversity science and global change drivers, (iii) biodiversity-dependent social-ecological systems (SES), and (iv) integrating biodiversity science with sustainability science. To pursue these aims her group collects longitudinal ecological and social data for an unprecedented greater understanding of the complexities that tie social and ecological systems and to determine their dynamics and resilience in the face of rapid and accelerating global change. Understanding the complexity of the co-existence between humans and natural systems may provide much needed insight into how to sustainably develop and maintain fundamental Earth System processes and biodiversity.

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Above: Coffee landscape in Colombia where we have been examining ecosystem service development since the small holder farmers have implemented agroforestry. Middle: Pastoralists in Tanzani.
Below: The Village council after a meeting where we introduced the charcoal project and listened to the community's concerns regarding the charcoal sector.
© Maria João F. Santos & Jamal Hatib

Professor Klaus Schläppi, University of Basel

Bottom-up view into a maize root system as sampled from a microbial feedback experiment. © Klaus Schläppi

© S. Cattin (scattin.ch)

In June 2020, Klaus Schläppi started as Professor of Plant Microbe Interactions at the Department of Environmental Sciences at the University of Basel. He moved there from the University of Bern where he was a senior group leader (2018–2020), hosted in the group of Prof. Matthias Erb. Work included research on plant-soil feedbacks and root microbiome contributions to food web health. Prior, he was junior team leader (2013–2018) in the group of Prof. Marcel van der Heijden at Agroscope in Zurich investigating plant root microbiome functioning and its manipulations in agriculture. As postdoctoral fellow (2010–2013), supported by the Swiss National Science Foundation, he pioneered plant microbiota research in the laboratory of Prof. Paul Schulze-Lefert at the Max Planck Institute for Plant Breeding Research in Cologne (Germany). Newly developed methodology permitted to define the root microbiota of the model plant *Arabidopsis* and to unravel microbiota diversification among related *Brassicaceae* species. During his postdoc (2009–2010) and PhD (2006–2009) in the laboratory of Prof. Felix Mauch at the University of Fribourg, he worked on secondary metabolites in plant-pest and plant-pathogen interactions.

He is a recognized leader in root microbiome research, having worked on fundamental and applied aspects using multiple plant species. Past research has mainly focused on cues that define the assembly of plant root microbiomes as well as drivers of microbial (agro-)ecology. The work was complemented with microbiota manipulation experiments using symbionts such as rhizobia and mycorrhiza or using synthetic bacterial communities to uncover root microbiome functions. Recent work expanded to the chemical dialogue between plants and their microbiome. Combining genetics, analytics and microbiomics, a novel mechanism where benzoxazinoids in root exudates of maize structure the surrounding rhizosphere microbiota, which then improves defense and affects growth traits in the subsequent plant generation, was uncovered. With his team he investigates (i) how plants communicate with their root microbiota and take influence on their activities, and in return (ii) how the root microbiota supports the plant in growth and defense. *Arabidopsis* and maize are used in field and laboratory experiments combined with methods in microbiomics, molecular biology, microbiology, plant genetics and bioinformatics. Current research lines include mechanistics of microbiome induced systemic disease protection and plant responsiveness to microbial feedbacks. The ultimate motivation for his research is to implement beneficial plant microbiome interactions, e.g., in form of beneficial microbial traits or plant loci for positive microbiota feedbacks, in smart and sustainable agriculture.

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Professor Benjamin Stocker, ETH Zurich

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Benjamin Stocker investigates how plants, ecosystems, and the entire terrestrial biosphere are affected by climate change. His research group integrates the largest possible diversity of available data to develop predictive methods. The aim is to understand impacts of climate extremes, where thresholds of ecosystem function lie, and how the altered cycling of carbon, water, and nutrients feed back to man-made climate change. As such, Benjamin`s research is connecting different scales.

For example, they make use of insights from ecosystem experiments and combine them with satellite remote sensing data and mechanistic models that resolve plant physiological processes to understand effects of temperature stress. Or, by combining ecosystem carbon and water flux measurements, satellite data and mechanistic modelling, they can learn from a wide diversity of observations and integrate them with our theoretical understanding to simulate plant responses to water stress at multiple time scales.

The terrestrial biosphere is diverse, and so are the approaches and angles from which Benjamin`s research group tackles research challenges. As a group, they are currently looking into a set of key questions to better understand how shifting resource availabilities affect plant functioning, and how plants may acclimate and adapt to cope with global environmental change. Their approach is to identify the governing principles and develop mathematical descriptions and model-data integration methods. The models enable a better understanding of the general controls on plant functioning and vegetation structure and make projections of global change impacts. They serve a better understanding of the role of the terrestrial biosphere in providing vital ecosystem services and mitigating man-made climate change.

Benjamin Stocker received his PhD in Climate Science in 2013 from the University of Bern. His PhD dealt with the quantification of feedbacks between the terrestrial biosphere and man-made climate change, and the role of land use change in the Earth system. He then moved to Imperial College London with an SNF Early Postdoc Mobility fellowship and joined the lab of Prof. Colin Prentice, where he focused on developing new modelling approaches to simulate plant adaptations rising CO_2 and nitrogen inputs. After a brief postdoc back at ETH Zurich in the group of Prof. Sonia Seneviratne he moved to CREAF, Barcelona, to join the group of Prof. Josep Peñuelas as a Marie-Sklodowska Currie Fellow and to continue his research on developing data science methods for the quantification of water stress effects on photosynthesis. Since 2019, Benjamin is a SNSF Assistant Professor for Computational Ecosystem Sciences at ETH Zurich.

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https://computationales.ethz.ch

PSC Educational Retreat

How to implement impactful transdisciplinary research, mentoring and education programs

Online event, 14 April 2021, **Registration**
https://ethz.doodle.com/poll/5izd9frc42kuw5qu?utm_source=poll&utm_medium=link

During this retreat, PSC members, students and collaborators will reflect on past and current projects and formulate recommendations on implementing transdisciplinary research, education and mentoring formats in higher education.

Program

9:00–9:15	**Welcome**	Manuela Dahinden, PSC
9:15–9:45	**Input talk**	**Melanie Paschke**, PSC *Balancing needs: Lessons learnt for supervising and mentoring PhD students in transdisciplinary research*
9:45–10:00	**Movie**	**PhD students** of PSC fellowship programs & their experiences
10:30–11:15	**Input talk**	Keynote speaker **Catherine Lyall**, University of Edinburgh *Rethinking research excellence to drive institutional change*
11:15–11:45	**Input talk**	**Rachael Garrett**, ETH Zurich *Transdisciplinary research for forest conservation: Balancing needs and perspectives from farmers to international companies and conservation institutions*
13:00–13:30	**Input talk**	**Rebekka Reichold**, University of Zurich *Studying at the interface of disciplinarity, academia and society*
13:30–14:30	**Workshops**	**1: needs of PhD students** The role and importance of supervision, mentoring and education within transdisciplinary programs **Moderation: Melanie Paschke** **2: needs of researchers** The role of partners and stakeholder in transdisciplinary programs **Moderation: Rachael Garrett & Brian Belcher** **3: needs of organisations** How can transdisciplinary research and the generation of impact be rewarded and embedded in an institution's culture? **Moderation: Manuela Dahinden & Catherine Lyall**
14:30–15:00	**Summary and reflection in plenum**	

Organized by PSC-Mercator Fellowship Program (2015–2021)
www.plantsciences.uzh.ch/en/research/fellowships/mercator.html

PSC Workbook series and training courses

1_Evidence-based policy making
2_Stakeholder engagement
3_Communicating science through the media
4_Risk and uncertainty communication
5_Building models & scenarios
6_Building political support
7_Generating impact chains
8_Collective inquiry

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

New PSC science-policy workbook

Workbook 4 of the series «Engaging in the Science-Policy Dialogue» explains risk perception. It offers guidelines for students and scientists on how to communicate risk and uncertainties to policymakers and to the public, focusing on different areas such as public health and climate change. The authors, Melanie Paschke and Christoph Beuttler, argue for the need of deliberation at the science-society interface and provide tools and methods for the design of public engagement processes.

Competencies for students to be gained:

- Understand concepts of uncertainty, ignorance and risk.
- Develop effective strategies for communicating risk and uncertainty.
- Become aware of biases in risk perception, including your own.
- Understand how deliberative systems can help to structure risk and uncertainty.
- Know the phases and deliberative formats for planning a public engagement process.

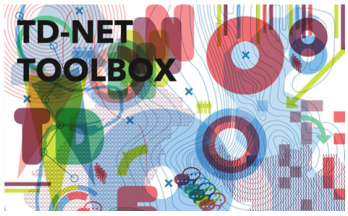
The PSC Science & Policy Workbooks are targeted towards researchers in life science wishing to communicate research findings to policymakers and society. Educators can use them as a learning resource to advance education in life sciences at the science-policy interface.

Full list of publications:
www.plantsciences.uzh.ch/en/publications/sciencepolicyworkbooks.html

Toolbox for td-research

The Swiss Academies of Arts and Sciences (a+) host the Network for Transdisciplinary Research (td-net) that provides platforms for mutual learning between inter- and transdisciplinary researchers and lecturers across thematic fields, languages and countries and thereby supports community building.
Researchers may make use of the td-net webportal for co-producing knowledge, where concrete methods and tools as well as experience reports of method applications are presented. Furthermore, the Swiss Young Academy gives young researchers the opportunity to carry out inter- and transdisciplinary projects.

https://naturalsciences.ch/co-producing-knowledge-explained/methods/td-net_toolbox



PhD Courses in Plant Sciences

The Microbiome of the Plant-Soil System: Part I (Theory, Methods and Case Studies)
25.02. - 03.06.2021; weekly

Project Management for Research
08.03. - 09.03.2021; 2 days

Responsible Conduct in Research
23.03. - 27.05.2021; 2 days

Scientific Presentation Practice
13.04. - 27.04.2021; 2 days

Introduction to UNIX/Linux and Bash Scripting (BIO609)
20.04.2021; 1 day

Next-Generation Sequencing for Model and Non-Model Species (BIO610)
21.04. - 22.04.2021; 2 days

Research with Biological Material from Abroad – International Regulations and Due Diligence in Research
22.04. - 23.04.2021; 2 days

Get going with Statistics in Functional Genomics
17.05. - 19.05.2021; 3 days

QTL Analysis in Arabidopsis – Theory and Practical Applications
01.06. - 02.06.2021; 2 days

Scientific Writing Practice II
03.06. - 09.06.2021; 3 days

Taming the Beast
07.06.- 11.06.2021; 5 days

Managing your Publication Workflow and your Open Data
09.06. - 11.06.2021; 2 days +1 day

The Microbiome of the Plant-Soil System: Part II (Processing next-generation sequencing data to…)
14.06.2 - 17.06.2021; 4 days

Basic Plant Disease Diagnostics
15.06. - 17.06.2021; 3 days

Genetic Diversity Analysis
21.06. - 02.07.2021; 2 weeks

Advanced Data Management and Manipulation using R
01.07. - 15.07.2021; 2 full days + work in between

Alpine Plant Ecology – International Summer School
18.07. - 24.07.2021; 5 days

Responsible Research, Innovation and Transformation in Food, Plant and Energy sciences – PSC Summer School
13.09. - 17.09. 2021, 5 days

Science & Policy Courses

Workshop E: Contributing to Policy Action – Analysis and Communication of Risks and Uncertainties
15.03.2021 - 17.03.2021; 3 days

Workshop F: Understanding Policy Evaluation
25.05.2021 - 28.06.2021; 2 days

PSC course registration
www.ethz.ch/services/en/service/courses-continuing-education.html
Select: Plant Sciences

Contact:
psc_phdprogram@ethz.ch

Upcoming

Digital skills development

In 2021 and 2022 PSC will further develop its educational offers in digital competencies. Thanks to funding from the swissuniversities' program P-8 «Stärkung von Digital Skills in der Lehre» PSC will expand its existing curriculum to focus on components such as: Assisting PhD students in reaching (i) an enhanced understanding of possible applications of machine learning in their own research, and (ii) with advanced data imaging courses that integrate machine learning. PSC will also offer basic training as an introduction to cluster analysis within the different data facilities of ETH Zurich such as the Genetic Diversity Center (GDC) and the Functional Genomics Center Zurich (FGCZ).

Contact: Melanie Paschke
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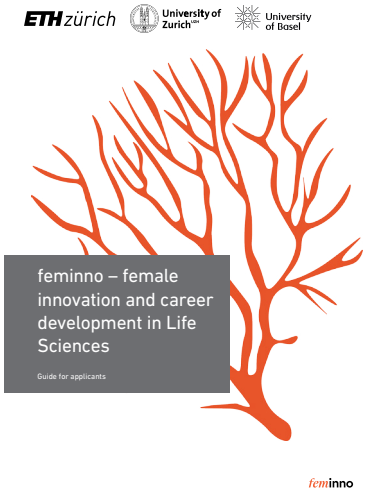

Call for applications

Young female scientists interested in joining feminno can apply for the next six-month training round in autumn 2021. The application process will start in May 2021, with a start of the program in September.

www.feminno.ch

Contact: Daniela Gunz
daniela.gunz@uzh.ch

Participants of the feminno career retreat 2020. © PSC

feminno– Career program for innovative women

The feminno program offers female scientists the opportunity to bridge academic life sciences research with innovation, entrepreneurship and industry. PSC started with this initiative in 2018. So far 77 women took part, and the program published some guidelines:

Successful Innovation. A Guideline for Female Scientists in the Life Sciences at Swiss Universities.
https://doi.org/10.3929/ethz-b-000443822

A glance into the last round: In September 2020, we started well into round 4 with a 3-day career retreat and a 2-day innovation workshop in person, with all the COVID-19 measures in place! Since November we are in virtual mode and the innovation seminars on pitching, intellectual property etc. took place via Zoom, incl. networking drinks. Also, our company visit to Lonza (who is by the way doing most of the production of the drug substance for Moderna's COVID-19 vaccine!) was held virtually and we gained an overview on Lonza's hiring procedures and had the chance to speak to various people in break-out rooms to learn more about their jobs and responsibilities. The 2-day negotiation workshop and virtual company visit to Roche took place end of January 2021. With a speed-dating event with Accenture in February we closed this training round.
At the final event on 4th of March, our 22 young promising female scientists pitched their business ideas ranging from new treatment strategies in cancer and other diseases to health apps, science for kids, to new fertilizers and detection of pesticides in food.

Climate Garden 2085

In a two-year project supported by the Federal Office for the Environment (FOEN), we are bringing our *Climate Garden 2085* back to life. As of April, the do-it-yourself art science experiment will be planted at nine grammar and vocational schools in German-speaking Switzerland. Different climate scenarios are simulated in the two greenhouses in order to experience the effects on crops. The greenhouses are lent to the schools and subsequently planted and cared for by the pupils. Several high school diploma (Matura) projects are planned, and schools are encouraged to open their greenhouses to neighboring schools and their community. The physical installation is supported by a framework program of PSC workshops and discussions for pupils. These debates with doctoral students from ETH Zurich D-MAVT on carbon excretion and storage, D-HEST on nutrition of the future and D-USYS on gas exchange in stressed plants, will provide exciting scientific input. System analysis workshops on sustainable nutrition and the effects of climate change on agriculture in Switzerland are planned for participating schools. At the same time, it is a concern of the project to enable an aesthetic approach to plants and nature. Participating classes receive instructions for creative work with plants in the form of monoprinting processes and a newly developed botanical clock. Based on an ancient parapegma, the clock allows you to play with vegetative / phenological time.

www.klimagarten.ch

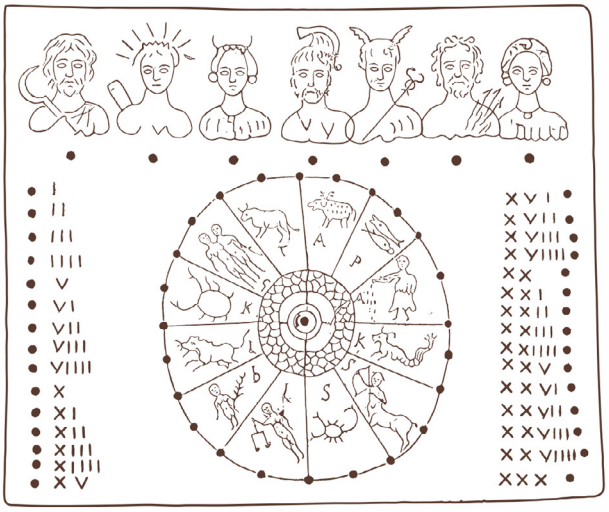

Image of the Therma Traiani Parapegm. © https://commons.wikimedia.org/wiki/File:Roman_calendar_-_parapegma_(III_-_IV_c._C.E.).svg

With this new outreach program, PSC connects research, sustainability and the people in Zurich. Every household in Zurich can change its eating habits to support a sustainable food system. In fact, households are needed to reach SDG 12 «Ensure sustainable consumption and production patterns» . They are multipliers of necessary changes as for example the planetary health diet and supporters of a local food system. This spring, PSC is organizing so called «Quartierdialoge». Participants discuss and explore (i) how to choose sustainable food, and (ii) how to participate in local food systems. PSC in collaboration with the Nutrition Forum Zurich, Preserving Library and GZ Buchegg brings knowledge, practical examples and systems approaches. Events will be held in German.

www.deinquartiernachhaltig.ch

5 March 2021
Co-designing local food supply
15:30–18:00, online

16 April 2021
Eating without food waste
15:30–18:00, GZ Buchegg

28 May 2021
My eating habits, my choices, my healthy planet
15:30–18:00, GZ Buchegg

Supported by the 3fo Foundation.

Science & Art

Our long-term collaboration with the Art Education Department of the Zurich University of the Arts continues this year with an internship for four art educators at the PSC. Over an eleven-week period they will get scientific input from researchers, and then with our outreach team create new science-art activities for children and youth.

Smart Dress

In the last newsletter we introduced our new program of evening science-art events for young people. Not surprisingly the first two events of the year have been postponed but we are hoping that the COVID-19 situation will soon improve and we will be able to start with the Design Museum, not the least because the evening program is so exciting. The show at the museum is «Wild Things» featuring Swiss fashion and the scientific contribution will focus on environmentally friendly garment technology using bio-materials such as shoes made from fungi. Participants will be able to engage with designers using kombucha as a substitute for leather and explore the viability of a smart T-shirt that measures your heart rate and stress level. These futuristic fashion trends combine sustainability and high-tech and will be presented by Empa's Materials Meet Life department, ETH spin-offs Nanoleq and Dimpora AG, and the Biodesign Hub.

30 April 2021, 19:00–22:30
Design Museum, Zurich

150 Years Anniversary

Modern agricultural research is fun, exciting, low- to high-tech, spans the entire food system and contributes to a more sustainable future. This is the theme of Open Week Education as part of the 150 years Anniversary of the Agricultural Sciences at ETH Zurich this year. Between 31 May and 11 June 2021, PSC will contribute with its online school class workshops on Genome Editing and visits at the *Climate Garden 2085*.

Citizen Conference

As part of the RESPONSE Doctoral Program and in collaboration with the World Food System Center and Green Buzz, the PSC is organizing a Citizen Consensus Conference on 2nd of June 2021. The topic will be «Building Climate Resilience». The RESPONSE fellows will act as subject matters experts for industrial participants. They will engage in breakout rooms with a pitch format.

Call for participation

Climate Garden 2085

The greenhouses provide research material for numerous school projects from gas exchange to plant ecology. This year we have nine new schools installing a Climate Garden and two schools now have a *Climate Garden* as a semi permanent installation to do long-term experiments. We are looking for support from scientists to give workshops or short talks in the schools.

www.klimagarten.ch

CreativeLabZ for youth

This PSC outreach project for youth is running in the Student Project House of the ETH Zurich, the Startbahn 29 in Dübendorf and other venues. The workshops combine art and science for young people aged 12–16. Short talks from researchers are welcome (also in English). Or you can come and tinker and help make stuff with us in the makerspace.

www.creativelabz.ch

Nachtaktiv (Nocturnal)

For this monthly party event for youth, we are looking for students, who can present their work in a humorous and entertaining way. Hands-on experiments and things to try out are welcome. Themes vary a lot, if you have a cool project, we will find the right *Nachtaktiv* event for it.

www.nachtaktiv.live

PSC @ Scientifica

The 2021 theme of Scientifica is «Natürlich – künstlich», and PSC will contribute with a stand to discuss with the public what is natural and what is artificial in the plant world. We will have a hands on activity where visitors can make their own bio-plastic. If you would like to contribute with your ideas, you are most welcome.

Contact:
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juanita.schlaepfer@usys.ethz.ch

Ulrike von Groll
ulrike.vongroll@usys.ethz.ch

8. Fachtagung Dialog Grün

De-novo-Domestikation

Erforschung und Erschliessung pflanzengenetischer Ressourcen

Mittwoch, 2. Juni 2021

09:15 – 16:45 Uhr , online via Zoom

Vorträge in deutscher Sprache.

Anmeldung

https://www.plantsciences.uzh.ch/de/outreach/fachtagung.html

Organisationskommitee

Manuela Dahinden, Geschäftsleiterin, Zürich-Basel Plant Science Center

Bruno Studer, Professor für Molekulare Pflanzenzüchtung, ETH Zürich

Markus Hardegger, Leiter Fachbereich Genetische Ressourcen und Technologien

Bundesamt für Landwirtschaft (BLW)

Roland Peter, Leiter des Strategischen Forschungsbereichs Pflanzenzüchtung bei Agroscope

Christina Vaccaro, Journalistin und Doktorandin, ETH Zürich

PROGRAMM

9:15 Begrüssung

Manuela Dahinden, PSC

9:20 – 9:45 Keynote

Verlust der Agrarbiodiversität

Kakoli Ghosh, FAO

STAND UND PERSPEKTIVEN DER GENOMFORSCHUNG

9:45 – 10:15
Die Vielfalt von Weizen beruht auf der Überschreitung von Artgrenzen: die Rolle von Wildgräsern und verwandten Kulturpflanzen in gegenwärtiger und zukünftiger Züchtung

Beat Keller, Universität Zürich

10:15 – 10:45
The Good, the Bad and the Ugly – Genomforschung in Gerste, Weizen und Roggen als Investition in die Zukunft

Nils Stein, Leibniz-Institut für Pflanzengenetik und Kulturpflanzenforschung (IPK), Gatersleben

Kaffeepause

11:00 – 11:30
Entschlüsselung und Nutzung natürlicher genetischer Vielfalt der Tomate mithilfe neuer Züchtungsmethoden

Sebastian Soyk, Universität Lausanne

11:30 – 12:00
Neues Wissen dank alten Apfelsorten – die Schweizerische Apfel-Kernsammlung

Giovanni Broggini, ETH Zürich

Mittagspause

NATIONALE UND INTERNATIONALE INITIATIVEN

13:00 – 13:30
Nationaler Aktionsplan zur Erhaltung und nachhaltigen Nutzung der pflanzengenetischen Ressourcen in Ernährung und Landwirtschaft (NAP-PGREL)

Christina Kägi, Bundesamt für Landwirtschaft (BLW) Fachbereich Genetische Ressourcen und Technologien

13:30 – 14:00
Die Bedeutung von digitalen Herbarien für die Kulturpflanzenzüchtung: aktueller Stand und Potential für die Zukunft

Reto Nyfeller, Kurator der Vereinigten Herbarien der Universität und ETH Zürich

14:00 – 14:30
Pre-breeding Komponenten der Crop Wild Relatives Initiative

Benjamin Kilian, Global Crop Diversity Trust

14:30 – 15:00
Austausch von Zuchtmaterial in der deutschen Winterweizenzüchtung: Eine ökonomische Analyse für Deutschland

Sophia Lüttringhaus, Department für Agrarökonomie, Humboldt-Universität zu Berlin; Potsdam Institut für Klimafolgenforschung & HFFA Research GmbH

Kaffeepause

EINBLICKE IN DIE ZÜCHTUNGSPRAXIS

15:15 – 16:00
Michelle Nay
Grässerzüchterin bei Agroscope

Charlotte Aichholz
Gemüsezüchterin bei Sativa

Sebastian Kussmann
Getreidezüchter bei GZ Peter Kunz

Moritz Köhle
Gemüsezüchter bei Lubera

PANELDISKUSSION

16:00 – 17:00

Save the date

PSC Symposium 2021

ETH Zurich, AudiMax, 8 Dec 2021

Patterns in nature and plant sciences

Highlighting latest plant science research and outputs to solve key scientific problems from micro- to macroscale. Touching the art of data science. Answering key questions such as: How to find patterns in data? How to find patterns in nature? And what do they reveal?

Scientific Committee: Manuela Dahinden & Sylvia Martinez, PSC; Rie Shimizu-Inatsugi, UZH; Anne Roulin, UZH; Cyril Zipfel, UZH; Benjamin Stocker, ETH; Klaus Schläppi, UBasel

www.plantsciences.uzh.ch/en/outreach/conferences.html

Swiss Plant Science Society

Coordinated by Sylvia Martinez & Thomas Boller, the dormant Societé Suisse de Physiologie Végétale (Swiss Plant Physiology Society) has been revitalized. During its General Assembly on 27 January 2021, it was agreed to search for a timely name and new by-laws to better suit current needs of plant sciences. A similar process happened years ago, when the former American Society of Plant Physiologists was renamed the American Society of Plant Biologists (https://aspb.org) to reflect changes in research development.
Objectives of the reactivated society are:
- invigorating its association to the Swiss Academy of Sciences (SCNAT);
- being inclusive and representing plant science as a whole;
- retaining its Annual SwissPLANT symposium; and
- maintaining the website with research portfolios of all its members.

www.spsw.ch

Board members: Christian Frankhauser, UniL, chair; Kirsten Bomblies, ETH; Thomas Boller, UBasel; Cyril Zipfel, UZH
PSC members are invited to join the society: Membership fee is CHF 40 p. a. An extraordinary General Assembly will be held on Tuesday 8 June 2021, 11:00–13:00 Genopode Building, Auditoire B, Dorigny Campus, University of Lausanne (in person and online meeting).

Contact: Sylvia Martinez

EPSO General Assembly

1–2 July 2021, Turin (online). Together with Plant Biology Europe 2021.

https://europlantbiology2020.org

www.plantsciences.ch

The Zurich-Basel Plant Science Center is a competence center linking and supporting the plant science research community at ETH Zurich, University of Zurich and University of Basel.
The center promotes plant and environmental research, education and outreach. It provides platforms for interactions with peers, policymakers, industry, stakeholders and the public.

PSC MEMBER INSTITUTIONS

ETH Zurich
Department of Environmental Systems Science
Department of Biology

University of Zurich
Department of Evolutionary Biology and Environmental Studies
Department of Geography
Department of Plant and Microbial Biology
Department of Systematic and Evolutionary Botany
Institute of Evolutionary Medicine

University of Basel
Department of Environmental Sciences

Zurich-Basel Plant Science Center, Managing Office

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Newsletter No 39, Spring 2021

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Pictures
Courtesy of PSC staff or indicated. Front image: Samples of mycelium (fungi) and algae can be used as bioleather. The colors are biobased from plant and fruits. ©Aline Ochoa, Biodesign-HUB.

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