Universität Zürich[UZH] | ETH zürich | Universität Basel

Zurich-Basel Plant Science Center

Annual Report

2018

Editorial

20 years PSC – plant research for the future

The PSC is celebrating its 20th anniversary. Truly a success story, the PSC has given plant sciences a voice within, and for Switzerland. The first decade was mainly spent developing a forefront education program for our students and sparking numerous interdisciplinary research collaborations that emphasized the cutting-edge plant science research in the Zurich-Basel area. The second decade has seen these programs and collaborations complemented with targeted outreach projects. The PSC pioneered with its specialized *PhD Program Science & Policy* and since then has supported more than 30 transdisciplinary research projects, bringing research results into national and international policy and decision-making channels.

At the heart of the PSC is fundamental plant science research – from molecules to landscapes – striving for a deeper understanding of the nature of plants, their biological processes and ecosystem interactions. With this knowledge come opportunities to address global challenges facing our societies. In the last few years, the PSC has accredited funding for 126 PhD and post-doctoral fellowships and coordinated three EU-funded projects.

During the life of the PSC we have witnessed many technological developments, such as metabolic profiling, proteomics, next generation sequencing, super-resolution microscopy and biotechnological breakthroughs like CRISPR/Cas9. These new avenues allow us to continuously push the boundaries of our research and offer us larger systemic insights into the world of plants and their environments. We are now entering an exciting digital age – also in plant sciences – yet, truth be told, we still lack knowledge on the specific function of the vast majority of genes in any genome. There remains much to do across the scope and scales of plant sciences and its application in agricultural, environmental and health arenas. We are proud that the PSC and its members will be at the forefront of it.

Sincerely,
Samuel C. Zeeman, PSC chair (2013–2018)

Impression of the newly rebuilt Institute of Botany at the University of Basel. © PSC

1 PSC Impact

The Zurich-Basel Plant Science Center (PSC) is an internationally recognized competence center – promoting excellence in fundamental and applied research. The center gives plant science research a strong voice in Switzerland and abroad, with the PSC serving as lead organization for several national and international research and training initiatives involving +50 collaborating institutions. The PSC has demonstrated capacity to enable research synergies through solicitation and implementation of innovative fellowships. The PSC has created new opportunities for plant science research, education and outreach by successfully securing third-party funding: **CHF 20,3 million** since 2009.

Research. So far, the PSC has funded **126 PhD and postdoctoral fellowships**; many of these projects represent interdisciplinary, collaborative and policy-relevant research. The 51 PLANT FELLOWS postdoctoral projects as well as the EU funded PhD Fellowship Programs IDP BRIDGES (14 PhD students) and PlantHUB (10 PhD students) broaden the network of collaborators, both in academia and the private sector, through mobility schemes and internships. Previously, 11 PhD Fellowships were funded by the SNSF ProDoc Doctoral Program. Further fellowships are carried out together with Mercator Foundation Switzerland (8 PhD fellowships) and Syngenta Crop Protection AG (33 PhD and postdoctoral fellowships).
The PSC fellowship programs attract excellent international researchers that apply inter- and transdisciplinary approaches at various scales (i.e., from studies on molecular level to ecosystem research). Fellows are working on technical and social **innovations and solutions tackling eminent global challenges** (food security and sustainable agriculture, adaptation and mitigation to climate change, resource efficiency and conservation of ecosystem services and biodiversity). 48 fellowships have been hosted at University of Zurich, 44 at ETH Zurich, 17 at University of Basel and 17 have been hosted internationally. The outcomes of the research projects include +117 peer reviewed publications, +3 patents, +25 outcomes at the science-policy boundary, e.g., fact sheets, green papers, stakeholder workshops, policy recommendation or input to regulative databases.

Mobility and internships. The PSC offers excellent opportunities for postdoctoral fellows and PhD students for international mobility but also for internships or research stays in academic and non-academic partner organizations (i.e., policy organizations and companies). Networking is essential to our mission. We collaborate with universities, research institutes, non-governmental organizations and industry partners, as a key element in scientific advancement and in training of early-stage researcher at the interface between science and society.

Research management. All members of the PSC have access to service-oriented research management structures throughout the life-cycle of the fellowships, including organization of peer-reviewed candidate selection processes, research contract administration, EU-project management, financial management and reporting and impact analysis.

Graduate and postgraduate education. Through thoughtfully designed curricula, courses and teaching, the PSC guarantees future competence in the plant sciences. The PSC has built the accredited structured curricula in *Plant Sciences* and *Science & Policy* for PhD students, as well as a *Career Development Program* for postdoctoral fellows. The PSC offered 20 *Frontiers in Plant Science* courses taking up newest technical and methodological developments. The PSC has developed 8 different **Science and Policy Training Workshops**, **raising capacities for knowledge and innovation transfer between science, policy and society.** Students acquire a portfolio of competencies and skills for implementing Responsible Research and Innovation (RRI) and for evidence-based policymaking. This unique training program includes training in (i) Recognition of the importance of policy-making to research and the importance of research to policymaking; (ii) Understanding the policy-making process including establishment of research questions and agendas; (iii) Providing scientific evidence for policy development that is socially robust; (iv) Translating of findings into policy friendly formats (policy briefs, fact sheets, scenarios and models); (v) Implementing stakeholder dialogue with the public, policy-makers, government and other; (vi) Developing practical solutions, option and foresight scenarios to complex problems; (vii) Communicating risks and uncertainties; (viii) Problem-framing, social valorisation and impact analysis. Eight **Science and**

Policy Workbooks in the series "Engaging in the Science-Policy Dialogue" are currently prepared as teaching and learning material (will be publicly available under open access license). **The program increases students' capacity to act as socially engaged scientists and undertake science diplomacy[1] beside their technical specializations.**

Training capacities. The PSC has core infrastructure and personnel to manage and implement training for +500 students per year. In-house teaching expertise in transferable skills further assures the quality of training.

Mentoring and career development. PSC PhD students and postdoctoral fellows have access to mentoring that complement the scientific supervision of the PI and thesis committee. The PSC aids in career development for example through company visits exploring non-academic collaboration or job opportunities. PSC offers individual **mentoring in carrying out science-policy dialogue, science communication, public engagement and responsible research and innovation.** The PSC promotes **internships** in policy organizations, facilitating PhD students in working not only on research outcomes but also on policy outcomes for the channels of the policy partners. Meanwhile the PSC has built up a network of +50 partner organizations, including industry, governmental organizations, NGOs, IGOs and GOs. Since 2017, the PSC is organizing the *fem*inno mentoring program for women scientists to develop their ideas at the science-innovation interface.

Outreach. The PSC organizes annual scientific symposia promoting high-level discussions on eminent societal topics. The PSC organizes public round tables and citizen fora on topics such as urban agriculture, food security and new plant breeding technologies. The *PSC Plant Science @ School* program offers teacher and school class workshops bringing cutting-edge laboratory science into classrooms. This includes advanced 3D microscopy, novel breeding methods, "omics" technologies, predictive evolutionary and climate change models. These classroom activities address the Lehrplan 21 syllabus and teachers can implement this inquiry-based science education in their classroom. The *PSC Creative Camps Program for Youth* offers holiday camp activities combining arts & science. The PSC also contributes to Scientifica, Treffpunkt Science City and the International Fascination of Plant Days, large-scale science festivals. The PSC launched a citizen science project: *Wo Samen fallen* in 2017. The PSC created the *Climate Garden 2085*, a touring art- and science exhibition. Designed as a public experiment, this exhibition targets a broad public and family groups engaging them in dialog about plants and climate change. This was put on in Zurich (2016), Berne (2017) and San Francisco (2017), California with +10'000 participants. We are currently looking at 2 more international locations and several within Switzerland. In 2018 the PSC curated and project managed a 150m^2 stand for the ETH Zurich at the Olma with +20'000 visitors and launched the *CreativeLabZ* a new innovative science education program.

P**erspectives.** Thanks to its diversity of members, its staff with broad expertise in education, research management, the PSC has a unique capacity to seek and administer fellowship funding. The research programs are linked to innovative curricula, internships with industry and NGOs, and exchange with other academic institutions. Thus, the center gives our members access to funds from foundations, agencies and companies that would otherwise be difficult to access on a case-by-case basis. With these efforts, the PSC offers graduate students and postdoctoral fellows a broad-based background from which they can smoothly move into academia or non-academic careers. Finally, the PSC offers the broader public opportunities to interact with plant scientists and to help shape the roles of the plant sciences in society.

[1] European Commission (2017). Europe's future: Open innovation, open science, open to the world.

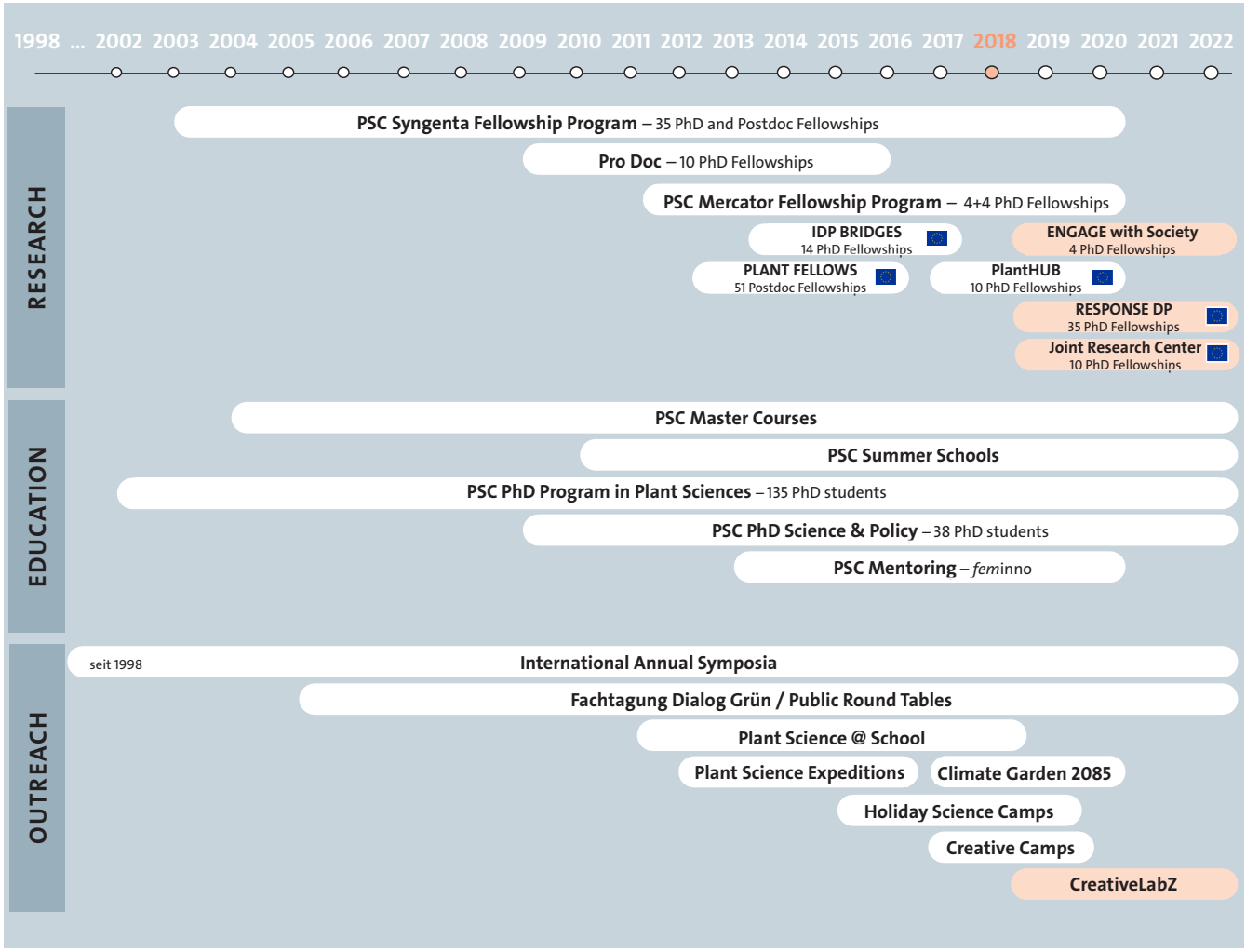


Figure 1. Timeline of PSC Research, Training, Mentoring and Outreach Programs.

2 PSC Members

With over 600 members, the PSC is one of the largest competence centers in Switzerland. By end of 2018, 38 professorships were involved: 19 from ETH Zurich, 4 from University of Basel, and 15 from University of Zurich. In addition, 58 group leaders, +175 postdoctoral fellows, approx. 230 PhD students* and +50 staff members in education, lab management.

* 173 PhD students were registered in the PSC PhD Programs as of 31.12.2018 and approx. 50 PhD students are members in PSC groups and registered within other PhD Programs.

Table 1. PSC Affiliate Professors.

ETH Zurich	Department	Research Group
Nina Buchmann	Department of Environmental System Science	Grassland Science
Tom Crowther	Department of Environmental System Scienc	Climate Change and Land Use
Consuelo De Moraes	Department of Environmental System Science	Biocommunication
Emmanuel Frossard	Department of Environmental System Science	Plant Nutrition
Jaboury Ghazoul	Department of Environmental System Science	Ecosystem Management
Jonathan Levine	Department of Environmental System Science	Plant Ecology
Bruce McDonald	Department of Environmental System Science	Plant Pathology
Loïc Pellissier	Department of Environmental System Science	Landscape Ecology
Christian Schöb	Department of Environmental System Science	Agricultural Ecology
Johan Six	Department of Environmental System Science	Sustainable Agroecosystems
Bruno Studer	Department of Environmental System Science	Molecular Plant Breeding
Olivier Voinnet	Department of Environmental System Science	RNA Biology
Achim Walter	Department of Environmental System Science	Crop Science
Alex Widmer	Department of Environmental System Science	Plant Ecological Genetics
Wilhelm Gruissem	Department of Biology	Biotechnology
Clara Sánchez Rodríguez	Department of Biology	Plant Cell Biology
Antia Rodrigues-Villalon	Department of Biology	Plant Development Biology
Julia Vorholt	Department of Biology	Microbial Physiology
Samuel C. Zeeman	Department of Biology	Plant Biochemistry

University of Basel	Department	Research Group
Bruno Baur	Department of Environmental Science	Conservation Biology
Thomas Boller*	Department of Environmental Science	Plant Physiology
Ansgar Kahmen	Department of Environmental Science	Sustainable Land Use
Yvonne Willi	Department of Environmental Science	Plant Ecology

University of Zurich	Department	Research Group
Jordi Bascompte	Department of Evolutionary Biology and Environmental Studies	Ecology
Bernhard Schmid*	Department of Evolutionary Biology and Environmental Studies	Biology of Species Interactions
Kentaro Shimizu	Department of Evolutionary Biology and Environmental Studies	Evolutionary and Ecological Genetics
Marcel van der Heijden	Department of Evolutionary Biology and Environmental Studies	Biodiversity and Microbial Diversity
Leo Eberl	Department of Plant and Microbial Biology	Microbiology
Ueli Grossniklaus	Department of Plant and Microbial Biology	Plant Development Genetics
Beat Keller	Department of Plant and Microbial Biology	Molecular Plant Biology
Enrico Martinoia*	Department of Plant and Microbial Biology	Molecular Plant Physiology
Anne Roulin	Department of Plant and Microbial Biology	Plant Evolutionary Genomics
Joop Vermeer	Department of Plant and Microbial Biology	Plant Cell Biology
Cyril Zipfel	Department of Plant and Microbial Biology	Plant Physiology
Elena Conti	Department of Systematic and Evolutionary Botany	Molecular Systematics and Evolution
Florian Schiestl	Department of Systematic and Evolutionary Botany	Evolution of Plant-Pollinator Interactions
Alexander Damm	Department of Geography	Remote Sensing of Water Systems
Maria Ferreira dos Santos	Department of Geography	Social-Ecological Systems

* emeritus

List of affiliated group leaders: www.plantsciences.uzh.ch/en/aboutus/groupleaders.html

3 PSC Governance

Board of Patrons

The PSC Board of Patrons is composed of: The Vice President for Research and Corporate Relations (ETH Zurich), the Vice Rector for Research (University of Basel), the Vice President for Research (University of Zurich) and an external expert.

Steering Committee

The PSC Steering Committee is composed of at least one representative of each partner institute. It is responsible for management and strategic development of the competence center. Steering Committee members elect a colleague as chair for two-year terms.

General Assembly

The PSC General Assembly is composed of all affiliate professors and one additional representative from each research group (nominated by the professor) and meets once a year. March 21, 2018, 25 participants. Every General Assembly is followed by a 1-hour retreat. March 21, 2018: Feedback on PSC strategic plan 2019–2022.

Management Office

The PSC Management Office supports the Steering Committee in the fulfillment of its functions. Primary services to members are strategic fundraising, curriculum development and education programs, management of the international fellowship programs, coordination of research activities, the organization of conferences, symposia, workshops and public events, as well as science education. The PSC Managing Directors, Drs. Melanie Paschke and Manuela Dahinden, have authored most of the successful and fundraising proposals of PSC and oversee all activities and are ex-officio members of the Steering Committee.

Table 2. PSC Board of Patrons.

Member	Affiliation
Prof. Dr. D. Günther	Vice President for Research and Corporate Relations (ETH Zurich)
Prof. Dr. E. Constable	Vice Rector for Research (University of Basel)
Prof. Dr. M. E. Schaepman	Vice President for Veterinary Medicine and Science (University of Zurich)
Prof. Dr. C. S. Hardtke	Department of Plant Molecular Biology (University of Lausanne)

Table 3. PSC Steering Committee.

Member	Institution	Dates
Prof. Bruno Studer	ETH Zurich	Chair from 2019
Prof. Samuel C. Zeeman	ETH Zurich	Chair 2013–2018
Prof. Jonathan Levine	ETH Zurich	2012–2018
PD Dr. Thomas Städler	ETH Zurich	since 2012
Prof. Ueli Grossniklaus	University of Zurich	Chair 2008–2012
Prof. Elena Conti	University of Zurich	since 2010
Prof. Stefan Hörtensteiner	University of Zurich	since 2013
Prof. Kentaro Shimizu	University of Zurich	since 2013
PD Dr. Günter Hoch	University of Basel	since 2016
Prof. Yvonne Willi	University of Basel	since 2016

Table 4. PSC Management Office.

Name	Position	Function	Dates
Dr. Melanie Paschke	Managing Director	Education, Mentoring, Fundraising, Finances	since 2008
Dr. Manuela Dahinden	Managing Director	Research, Communications, Outreach, Fundraising	since 2008
Romy Kohlmann, M.Sc.	EU Program Manager, Financial Administrator	PLANT FELLOWS and PlantHUB	since 2012
Dr. Juanita Schläpfer	Outreach Manager	Climate Garden, Creative Camps, ETH @ Olma, CreativeLabZ	since 2012
Sylvia Martinez M.Sc.	Coordination Basel	PSC Newsletter, Webmaster, Coordinator Swiss Plant Science Web	since 2008
Dr. Luisa Last	Program Coordinator	PhD Programs Science & Policy and Plant Sciences	since 2015
Dr. Ute Budliger	Program Coordinator	*fem*inno mentoring program	since 2017
Dr. Aurelie Brehmer	Project Assistant	EU project proposals, TNAM organization	since 2018
Dr. Alexandra Rosakis	Outreach Assistant	Plant Science @ School	since 2018
Urlike von Groll	Outreach Assistant	CreativeLabZ, Climate Garden, ETH @ Olma	since 2018
Dr. Sascha Ismail	Project Assistant	ENGAGE with society, PhD Programs	2017–2018
Dr. Carole Rapo	Program Coordinator	Plant Science @ School, PhD Programs	2013–2018

4 PSC Fellowship Programs

The PSC fellowship programs represent a full spectrum of topics in the plant sciences. Our vision is to initiate new research collaborations. For example, the PSC-Syngenta fellowships offer seed money for interdisciplinary or inter-university collaborative research. Our observation of these fellowships showed that many of these initial research projects have been followed-up by ongoing collaboration between the principal investigators.

The following components are integrated into the PSC fellowship programs:

- international research collaborations;
- science–policy and science-society components;
- relevant industrial component at the interface science-innovation; and
- strengthen interdisciplinary research.

One of our priorities is the initiation of research at the science-policy interface. More than 23 of the research fellowships funded during the evaluation period explicitly involved interdisciplinary, collaborative and/or policy-relevant research. The fellows working on these projects are enabled with training and partner networks to build these bridges between plant science research and other disciplines and societal institutions. At the policy interface, they carried out internships with their policy partners and worked together on outcomes of their research for policy and society.

Additionally, the PSC has developed and implemented an academic-industry PhD program for a cohort of 10 PhD students in collaboration with 6 European companies.

Completed PSC Fellowship Programs

- The PSC ProDoc Doctoral Program Plant Sciences and Policy, funded by the Swiss National Science Foundation (SNSF) was completed in 2012. 11 PhD projects were approved and funded.
- PSC-Mercator PhD Fellowships "Bridging Plant Sciences and Policy" was completed in 2016. 168 fellowship months implemented.
- FP7-PEOPLE-2010-COFUND – The International Postdoctoral Fellowship Programme in Plant Sciences, PLANT FELLOWS, was successfully completed in 2017. 1201,48 fellowship months implemented.
- FP7-PEOPLE-2013-IDP BRIDGES / Marie Curie Initial Training Networks (ITN): Innovative Doctoral Program BRIDGING PLANT SCIENCE AND POLICY was completed in 2018. 493 fellowship months implemented.

Ongoing PSC Fellowship Programs

- PSC-Mercator PhD Fellowships "Bridging Science and Society", 2015–2020. 192 fellowship months to be implemented.
- H2020-MSCA-ITN-2016-European Industrial Doctorates: PlantHUB, 2016–2020. 360 fellowship months to be implemented.
- In 2018, we renewed our successful partnership with Syngenta in the PSC-Syngenta Fellowship Program for another 3 years. This fellowship program is ongoing since 2003.

Upcoming PSC Fellowship Programs

RESPONSE Doctoral Program

In February 2020, the PSC will launch the RESPONSE Doctoral Program (RESPONSE DP) co-funded by the European Commission (MSCA-COFUND-H2020). It aims to contribute to the EUs' coordinated efforts for stewardship in transformation to sustainable food and energy systems and to ensure sustainable land use. RESPONSE DP combines excellent inter-sectoral research with the empowering of 35 new PhD students to interact with stakeholders, policy-makers and the public to make sure that research is responsive to the needs of society.

RESPONSE DP addresses challenges in the fields of sustainable food system, sustainable transitions in the energy sector and sustainable land use decisions. PhD students will benefit from the research environment of ETH Zurich, University of Zurich and University of Basel and the support of three competence centers: the PSC, the World Food System Center and the Energy Science Center of ETH Zurich.

The RESPONSE DP research and training program is unique, since PhD students will collaborate with a partner organization at the science/policy/society interface or with enterprises. In addition, they will spend a mandatory secondment of 3–12 months. With their partner organization and stakeholders, PhD students will co-create societally relevant and novel research and innovation outcomes. Each PhD student will contribute to one Stakeholder Meeting and one Citizen Consensus Conference.

PhD students will be enrolled in the *PSC PhD Program Science and Policy*. They will be trained in different fields such as: communication of scientific evidence to policy-makers and the public; involvement of different stakeholder groups in a participative process to co-produce knowledge; policy development and endorsement in Europe and at global level; and establishing contacts to policy-implementing organizations, industry, national and international NGOs, GOs and IGOs.

RESPONSE DP aims to become a flagship example of inter-sectoral research, underpinned with a dedicated training curriculum to foster awareness, know-how, expertise and competence in Responsible Research and Innovation (RRI).

The European Union will co-fund 35 PhD fellowships (each 36 months) with € 1'935 per person-month (living allowance).

PSC-JRC Collaborative Doctoral Program

In 2017, the PSC submitted a proposal for a Collaborative Doctoral Program to the Joint Research Center (JRC). The JRC's mission is to support EU policy and decision-making. PSC has been selected and is now preparing collaboration agreements between ETH Zurich and JRC as well as for University of Zurich and JRC. 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". 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. The PhD students will be enrolled in *PSC PhD Program Science and Policy* coordinated by the PSC.

ENGAGE with Society

In ENGAGE with Society, societal actors and research groups decide together on the research question, the design of the research process, the products resulting from the gain of knowledge, or the effect that is to be achieved in order to generate solutions that are oriented to social needs. Social actors can apply with a project idea. They formulate questions and needs for which they seek answers or solutions and they address them to PSC researchers. This can result in up to four projects, which the PSC then will propose to a well-known foundation for funding. If the funding decision is positive, the PSC will receive dissertation project(s) over a period of 4 years each. The initiators become research partners in the project. Research topics must be in the area of agro-ecological farming practices and alternative food systems, e.g., soil fertility, resilience through farming methods, smart farming and the application of technologies in heterogeneous, small-scale agricultural and horticultural systems, in niche production and in agro-ecological farming, diversification and agro-biodiversity or alternative food systems.

Who can apply? Swiss representatives of civil society organizations, such as associations, NGOs, environmental and agricultural interest groups, local and regional citizens' initiatives; representatives of the executive, environmental and agricultural offices at municipal to national level, regional tourism associations and farmers' organizations.

5 Activity Report of PSC Fellowship Programs

PlantHUB Fellowship Program

PlantHUB is an Innovative Training Network in the field of plant breeding and production. The program has started in December 2016 and hosts 10 PhD students. In addition to the program management, the PSC offers training in technical and research skills, technology transfer, innovation management, entrepreneurship, risk assessment, stakeholder and public engagement and bioethics.
The PlantHUB students are enrolled at ETH Zurich (4), University of Zurich (4) and University of Basel (2) and participate in the *PSC PhD Program in Plant Sciences*. The students spend 50% of the PhD time at one of the industry partners, including Carlsberg Group/Carlsberg Research Laboratory, Deutsche Saatveredlung AG, BaseClear BV, Agroisolab GmbH, Heliospectra AB and LemnaTec GmbH.

Science
The research projects reflect on different angles of innovation in plant breeding and production. The expected outcomes are new molecular tools for plant breeding, new crop varieties, non-invasive imaging and phenotyping technologies, intelligent lighting systems for plant growth, new software and services for complex genomic analyses and plant product quality.

Training
PlantHUB provides a PhD training at the interface of plant production and responsible innovation by placing promising research into the context of commercial exploitation. The non-academic partners offer formal and informal learning activities in R&D processes and quality management.

Training workshops organized by PSC:

2018: **Entrepreneurship** with Prof. Dr. Lukas Schmid, Head of the Institute for Innovation, Design and Engineering (IDEE-FHS) at University for Applied Science St. Gallen.

2018: **Making the most out of my research – Patents and other things I cannot afford to ignore** with Prof. Heinz Müller, Swiss Federal Institute of Intellectual Property.

2018: **Summer School – Responsible Research and Innovation (RRI) in Plant Sciences.**

2017: **Innovation Management** with Prof. Dr. Andreas Peter, University for Applied Science St. Gallen.

2017: **Stakeholder Engagement** with Dr. Minu Hemmati, Berlin, and Dr. Luisa Last, PSC.

Outreach
Mercedes Thieme: starch-in-grains demo at the OLMA – Agricultural fair in Switzerland.

Maximilian Vogt: Project presented at DLG Feldtage – Agricultural fair in Germany.

Maximilian Vogt: Project presented in DSV Press release.

Camilo Chiang: Public guided tour on indoor lightning – Botanical Garden of the University of Basel.

Aya Yokata: Contribution to Swiss National Radio Website RTS Découverte.

Camilo Chiang: Project presentation in PSC Newsletter Spring 2018: Do indoor experiments with plants represent reality?

Florian Cueni: Project presentation in PSC Newsletter Spring 2019: Real-time stable isotope models can predict the geographical origin of agricultural products.

Anton Hochmuth, Aya Yokota: Participation in PSC Future Fora in 2017. Topics: Sustainable Food Production / Urban Food Supply in 2030.

Anton Hochmuth: Workshop on the role of starch in plants and for the production of biofuel – Scientifica 2017.

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

PlantHUB is funded by the H2020 PROGRAMME Marie Skłodowska-Curie Actions Innovative Training Networks – GA No. 722338

Table 5. PlantHUB Fellowships.

Title	Principal Investigator	PhD Student	Industry Partner
Exploiting genetic variation in barley for crop quality improvement	Prof. Samuel C. Zeeman, ETHZ Dr. Ilka Braumann, CLAB	Mercedes Thieme	Carlsberg Group, Carlsberg Research Laboratory (CLAB), Denmark
Using advanced imaging and profiling technologies to map starch biosynthesis in barley endosperm	Prof. Samuel C. Zeeman, ETHZ Dr. Ilka Braumann, CLAB	Anton Hochmuth	Carlsberg Group, Carlsberg Research Laboratory (CLAB), Denmark
Self-fertility for powerful grass hybrids	Prof. Bruno Studer, ETHZ Dr. Michael Koch, Dr. Nic Boerboom, DSV	Claudio Cropano	Deutsche Saatveredlung AG (DSV), Germany
Exploiting reproductive traits for hybrid breeding in grasses	Prof. Bruno Studer, ETHZ Dr. Michael Koch, Dr. Nic Boerboom, DSV	Maximilian Vogt	Deutsche Saatveredlung AG (DSV), Germany
Efficient capturing and third-generation sequencing of complex genomic regions	Prof. Elena Conti, UZH Dr. Daniël Duijsings, BaseClear	Giacomo Potente	BaseClear BV, The Netherlands
Large-scale isolation and sequencing of full chromosomes	Dr. Peter Szövényi, UZH Dr. Daniël Duijsings, BaseClear	Issa Seydina Diop	BaseClear BV, The Netherlands
Integrating hyperspectral imaging into phenomic applications for plant stress assays	Dr. Diana Santelia, UZH Dr. Marcus Jansen, LemnaTec	Aya Yokota	LemnaTec GmbH, Germany
Plant phenotyping to understand mechanisms of salinity tolerance	Dr. Diana Santelia, UZH Dr. Marcus Jansen, LemnaTec	Franco Conci	LemnaTec GmbH, Germany
Dynamic control system for multi-channel LED illumination systems to enable near-natural plant growth	PD Dr. Günter Hoch, UBASEL Daniel Bankestad, Heliospectra	Camilo Chiang	Heliospectra AB, Sweden
Dynamic isotope model to trace the geographical origin of agricultural products	Prof. Ansgar Kahmen, UBASEL Dr. Markus Boner, Agroisolab	Florian Cueni	Agroisolab GmbH, Germany

PSC-Mercator Fellowships – Bridging Plant Science and Society

The Mercator Foundation Switzerland is supporting 4 PhD fellowships between 2015–2020. The call was launched in Autumn 2015. In total, 11 proposals were submitted by PSC members. 24 international experts as well as the TdLab at ETH Zurich were involved in the evaluation process.

The PSC supports the 4-years research projects with its training and mentoring framework for research and knowledge sharing at the interface of plant science and policy.

Science
The selected research projects deal with socially relevant issues from the perspective of two academic disciplines and in collaboration with at least one relevant stakeholder. The fellows do benefit from exposure to different methods, perspectives and solutions. The desired outcome is a more inclusive approach to research, bridging plant science and society.

Training
The fellows are enrolled in the *PSC PhD Program Science and Policy*. They acquire competencies that will help them in dealing with policy and stakeholders, as well as advocating the dialogue with media and the public.

Additional training workshops organized by PSC:

2018: **Social valorisation workshop** with PD Dr. Christian Pohl, ETHZ TdLab, Prof. Brian Belcher Canada Research Chair - Sustainability Research Effectiveness, College of Interdisciplinary Studies | Royal Roads University.

2017: **Problem-framing workshop** with PD Dr. Christian Pohl, ETHZ TdLab.

Outreach
2018: Public Round Table: Urban Agriculture: Fad or Future – should tomorrow`s cities grow their own food?

Kevin Vega: Citizen Science Ausstellung zur partizipativen Forschung "Wo Samen fallen – Förderung und Vernetzung von Biodiversität in Städten" (July 2017 – ongoing).

Maria Vorkauf: Project presented in Das Urner Magazin Nr. 27, Dec. 2017. www.image-uri.ch/archiv.html#top

Maria Vorkauf: Project mentioned in an article about ALPFOR, in the andermatter. www.andermatt-swissalps.ch/files/Downloads/ALL/Andermatter/Andermatter_Sommer_2018_Web.pdf

Maria Vorkauf: Project presented in Walliser Bote. www.1815.ch

Sergei Schaub: Project presented in SGA Jahrbuch Agrarwirtschaft und Agrarsoziologie. www.sse-sga.ch/-/jahrbuch_agrarwirtschaft_und_agrarsoziologie/index.html

Sergei Schaub: Agrarpolitik Blog. “Ist Diversität im Grasland ökonomisch wertvoll?» https://agrarpolitik-blog.com/2017/12/11/ist-diversitaet-im-grasland-oekonomisch-wertvoll/

Kevin Vega: The project has been featured on Urban Nature Atlas. https://naturvation.eu/atlas

Kevin Vega: A podium discussion with the fellow and one supervision (Prof. Christoph Kueffer) in association with a film screening of the documentary on the urban botanical history of post-war Berlin *Natura Urbana* by Matthew Gandy has been arranged. This screening will be part of the LASER Talk http://www.laserzurich.com/talks.php .

Kevin Vega: The project was presented as part of the Zürcher Festspiele 2018. https://festspiele-zuerich.ch/de/spielplan/79-pop-up-stand-up-vorlesung-zum-thema-stadtnatur/

Kevin Vega: Personal Twitter account – shares updates/photos on his research and the citizen science project, connecting with urban researchers and planners from around the world. https://twitter.com/Kavega21/status/984696641029574657

Kevin Vega: Blog contribution in Atlas Obscura “The Many Reasons Biologists Eat Their Study Subjects”. www.atlasobscura.com/articles/biologists-eat-research-subjects

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

Table 6. PSC-Mercator Fellowships.

Title	Principal Investigator	PhD Student	Practice Partner/ Stakeholder
Changing snow loads and summer drought press alpine plants and force economy	Prof. Ansgar Kahmen, UBASEL Dr. Erika Hiltbrunner, UBASEL Prof. B. Abegg, University of Innsbruck and Dr. C. Marty, SLF Davos	Maria Vorkauf	Sport AG Andermatt Sedrun, Korporation Ursern (Andermatt), Interacademic Commission for Alpine Studies (ICAS)
Values of species diversity in grassland production – An ecological economic assessment	Prof. Nina Buchmann, ETHZ Prof. Robert Finger, ETHZ	Sergei Schaub	Agridea, Arbeitsgemeinschaft zur Förderung des Futterbaus (AGFF), Federal Office for Agriculture (FOAG)
Maintaining plant biodiversity in cities	Prof. Christoph Kueffer, ETHZ and HSR Rapperswil Prof. D. Siegrist, HSR Rapperswil	Kevin Vega	Grün Stadt Zürich
Papaya: History of its agricultural use and improvements to adapt to a changing climate	Prof. Ueli Grossniklaus, UZH Prof. Dr. J.-P. Vielle-Calzada, Langebio Cinvestav Prof. J. M. Santamaria, Centro de Investigación Científica de Yucatán, Mexico	Tjago Meier	Mexican network for papaya production, propapaya.org

PSC-Syngenta Fellowship Program

In March 2003, the ETH Zurich, the University of Zurich, the University Basel and Syngenta Crop Protection AG agreed to a long-term research collaboration that has been prolonged to 2021.

Science

The research projects are allocated through annual announcements. An Advisory Committee that consists of representatives of the three universities as well as Syngenta Crop Protection AG, was created for the selection of the projects. Applications for PhD and postdoc fellowships can be submitted by November 1. The funds are intended to promote innovative research in plant sciences. Research co-operation within PSC is an important criterion in the project selection. The calls are reserved for PSC professors and group leaders.

Additionally and outside of this fellowship program the Syngenta Crop Protection AG funded a $3^{1/2}$-year fellowship position from 2014–2018 in the area of "RNAi solutions in agriculture".

Publications

Xin Ma, Beat Keller, Bruce A. McDonald, Javier Palma-Guerrero, Thomas Wicker (2018). Comparative transcriptomics reveals how wheat responds to infection by *Zymoseptoria tritici*. *Mol Plant Microbe Interact*. 31(4):420–431.

Camilla Julie Kørner, Nicolas Pitzalis, Eduardo José Peña, Mathieu Erhardt, Franck Vazquez & Manfred Heinlein (2018). Crosstalk between PTGS and TGS pathways in natural antiviral immunity and disease recovery. *Nat Plants* 4:157–164.

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

Table 7. PSC-Syngenta Fellowships.

Title	Principal Investigator	Fellow	Dates	Scientific Field
Mycorrhiza-facilitated bio-irrigation in intercropping systems in dryland agriculture as a new tool to stabilize and increase yields of small holder farmers	Prof. Ansgar Kahmen, UBASEL Dr. Mathimaran Natarajan, UBASEL PD Dr. Astrid Oberson, ETHZ	Santiago Pérez-Bernal (PhD)	2019–2021	Plant Physiology
Unraveling regulatory mechanisms of the chlorophyll / chlorophyllase binary defense system of plants against insect herbivores and the insects' counter-adaptation strategies	Prof. Stefan Hörtensteiner, UZH Prof. Consuelo de Moraes, ETHZ	Spoorti Kalleda (Postdoc)	2018–2019	Molecular Biology and Biocommunication
How does the plant-AMF mutualism scale from pairwise interactions to complex networks? An analysis combining theory and experiments	Dr. Pascal Niklaus, UZH Prof. Jordi Bascompte, UZH Prof. Ansgar Kahmen, UBASEL	Sören Weber (PhD)	2018–2020	Modeling of Plant Microbial Networks
Shaping signaling landscapes during organ formation	Prof. Joop Vermeer, UZH PD Dr. Bruno Müller, UZH	Milica Nenadic (PhD)	2018–2020	Cell Biology and Plant Development
Impact of intra-specific TE variations on gene expression, local epigenetic states and spatial genome organization in Brachypodium distachyon	Prof. Anne Roulin, UZH PD Dr. Célia Baroux, UZH Prof. Beat Keller, UZH	Michele Wyler (PhD)	2017–2019	Epigenetics
Cell death executioners: impact of programmed cell death-associated enzymes on plant vascular development.	Prof. Antía Rodríguez-Villalón, ETHZ PD Dr. Bruno Müller, UZH	Claudia Stoff (PhD)	2016–2018	Cell Biology and Plant Development
Linking genotypic variation among plant-associated fluorescent pseudomonads with activation of plant defense against pathogens and insects	Prof. Consuelo De Moraes, ETHZ PD Dr. Monika Maurhofer, ETHZ Prof. Mark Mescher, ETHZ	Tobias Löser (PhD)	2016–2018	Plant-Pathogen Interaction
Using comparative transcriptomics to understand the genetic basis of biotrophy and necrotrophy in the wheat - Zymoseptoria tritici pathosystem	Dr. Palma Guerrero, ETHZ Dr. Thomas Wicker, UZH Prof. Beat Keller, UZH Prof. Bruce McDonald, ETHZ	Xin Ma (PhD)	2016–2018	Plant-Pathogen Interaction
RNAi solutions in agriculture	Prof. Beat Keller, UZH	Luisa Schäfer (PhD)	2015–2018	Plant Biotechnology

6 PSC Education

The PSC has core infrastructure and personal resources to carry out and manage training for +500 participants per year. Established training formats range from workshops, colloquia and lectures to summer schools, and face-to-face events to blended learning and e-learning formats that make our education highly scalable in number of participants. Didactic formats include case-study work, cognitive apprenticeship models, role play scenarios, simulations but also hands-on training in tools and methodology and experimentation that make our education highly successful in targeting learning objectives to the different target groups and demands of a multi-faceted academic education. The *PSC Summer Schools* foster critical thinking and take a systemic perspective in all areas of plant sciences and training competencies from the Education in Sustainability Development (ESD) curriculum. The PSC offers two internationally re-known structured doctoral programs.

PSC PhD Program in Plant Science

The *PSC PhD Program in Plant Science* (+135 participants registered in 2018) remains one of the largest PhD Program in its field, offering students access to (i) transferable skills and competencies to enhance employability and career perspectives, as agreed in the Lisbon strategy and following the Research Development Framework (**www.vitae.ac.uk**) competency matrix as well as (ii) research training from molecular biology to ecosystem research and at the forefront of plant science research methods and technologies.
PSC curriculum development resulted in the implementation of 20 courses in *Frontiers of Plant Sciences* taking up newest technical and methodological developments (since 2015). The PSC expanded its training curricula in **Responsible Research and Innovation (RRI)**: foster awareness, know-how, expertise and competence in RRI (Anticipation, reflexivity and inclusion, responsiveness of research to societal demands); **Science and Policy**: PhD students being able to improve their communication of scientific evidence towards policymakers, the public; to involve different stakeholder groups in a participative process and to co-produce knowledge; to understand the general process of policy development and endorsement in Europe and on global level; to establish contacts to policy-implementing organizations, industry, national and international NGOs, GOs and IGOs; and to develop a high standard of scientific responsibility and responsiveness towards the needs of the public; **Innovation Management**: PhD and postdoctoral fellows able to generate ideas, further develop their ideas into innovation and receive advice and access to funding opportunities to start their own innovation project, including idea labs and training in entrepreneurship and innovation management.
Approx. 40% of our curricula are devoted to taking a systemic perspective in all areas of plant sciences and training competencies from the **Education in Sustainability Development (ESD)**: society is in a major transformation with needs for a more sustainable development and including major technology and socio-economic changes, therefore our students need to understand how making technologies more environmental, social and economically sustainable. Main training activities in PSC curricula on ESD include: 1 Summer School per year of 2 ECTS and 1 seminar on “Sustainable Plant Systems” in fall term (1 ECTS).

PSC PhD Program Science & Policy

The *PSC PhD Program Science and Policy* (+38 participants registered in 2018) is a unique training program for researchers in the life sciences that can work and deal with the science-policy interface. It has trained a significant cohort of early-stage scientist familiar to carry out science-policy and science-society dialogue. In the associated fellowships in total 15 PhD students have successfully carried out internships between 1-8 months in a policy organization.
The PSC has developed 8 different *Science and Policy Training Workshops*, **raising capacities for knowledge and innovation transfer between science, policy and society** (see Table 8). Eight *Science and Policy Workbook*s in the series "Engaging in the Science-Policy Dialogue" are currently prepared as teaching and learning material (to be publicly available under open access license).
The PSC conducted a three-round **Delphi study** in 2017 to explore the views of partners, supervisors, lecturers, invited experts, fellows and alumni on the PSC fellowship program “Bridging Plant Science and Policy” (to be published soon). The objectives were (i) to analyze the success factors and the barriers for junior scientists that get involved at the science-policy interface; and (ii) to evaluate whether during

their internship students get an opportunity to translate scientific results into outcomes at the science-policy or science-innovation interface. Responses in the Delphi study suggested that the opportunity to carry out translation work to increase salience of results for society is appreciated, i.e., generating evidence that is relevant and timely for the needs of policymakers and society. Fellows, academic and policy supervisors ranked (i) the limited time frame for policy work of PhD students, (ii) the different incentive systems in science and policy, and (iii) difficulties to integrate policy work into their research plan as the most important limitations of the PSC internship program.

Table 8. *Science and Policy Training Workshops* developed by the PSC.

Evidence-based policymaking: Evidence based policymaking involves a balance between professional judgment and expertise, on the one hand, and the use of valid, reliable and relevant research evidence, on the other hand. In this course, students will discuss the concepts of evidence-based policies and environmental governance, analyze real-life examples of regional or national policies, and explore how policy-relevant evidence is produced and incorporated in practice.
Stakeholder engagement: Implementing policy programs often involves providing advice to governmental institutions. In this course, students will learn how they can participate in stakeholder engagement processes. They will identify and analyze stakeholders in respect to their research projects and learn how to apply different levels of involvement; understanding their strengths and weaknesses.
Communicating science: Communicating with the media is increasingly seen as an important aspect of facilitating the dialog between scientists and policymakers. In this course, students will practice how to communicate science in an effective way to the media, policy-makers and to a wider public.
Building political support: In recent decades, different ways of bridging science and policy have been explored. In this course, students shall learn what kind of actions are necessary to implement policies in different sectors, incl. public agencies, the civil society or the private sector.
Analyzing and communicating risks and uncertainties: Applied concept of risk and uncertainty help to improve the effectiveness of science when informing policymakers. In this course, students will learn how to analyze and communicate risk and uncertainty.
Understanding policy evaluation: Based on the theoretical and methodological introduction on policy evaluation conducted by social scientists, participants reflect on how natural science can contribute to policy evaluation and on how research can become socially relevant.
Scenario building and modeling: In this course, students will address scientific concepts and visions of the future by practicing scenario building and modeling.
Introduction to political sciences: The course is an introduction to politics in a globalized world, with a focus on how political science tries to understand and explain cross-country and cross-time differences.

Frontiers in Plant Sciences

Between 2015 and 2018, the PSC received funding for a series of training workshops on frontier topics in plant sciences by the SUK "Interuniversity Program" through University of Zurich, ETH Zurich and University of Basel. Some of these courses have been developed in collaboration within the University Research Priority Program: Evolution in Action (UZH).

2018:

- Introduction to Genome-Wide Association Studies (GWAS, Dr. Matt Horton, Dr. Ümit Seren), 16 participants.
- RNA Sequencing – A pratical course for plant scientists (Dr. Lucy Poveda, Dr. Weihong Qi, Lennart Opitz), 8 participants.
- Advanced Data Management and Data Manipulation using R (Dr. Jan Wunder), 16 participants.
- NGS II – Advanced Course: Transcriptomes, Variant Calling and Biological Interpretation (Dr. Stefan Wyder, Dr. Heidi Lischer, Prof. Kentaro Shimizu), 7 participants.
- NGS I – Introductory Course: Assembly, Mapping and Variant Calling (Prof. Kentaro Shimizu, Prof. Jun Sese, Dr. Rie Inatsugi, Dr. Masaomi Hatakeyama, Dr. Hiromi Matsumae), 8 participants.
- Advanced Course on 3D Microscopy Imaging of Plant Tissues and Image Processing (PD Dr. Célia Baroux, Prof. Joop Vermeer, Prof. Alexis Maizel), 9 participants.

PSC Summer Schools

As a vibrant part of PSC education, the *PSC Summer Schools* stimulate critical thinking among the participants. The students work one week with cases studies. Results presented as policy briefs or fact sheets together with contributions of Summer School speakers are published as proceedings.

Alpine Plant Ecology Summer School, 15–21 July 2018, Furka ALPFOR Alpine Research

This Summer School was offered by the University of Basel and the PSC for advanced biology students with basic plant science training. Course topics included microclimatology, ecophysiology, biodiversity, reproductive biology, vegetation and ecosystem ecology. 24 participants took part in lectures, field excursions and project work. **Organizers:** Dr. Erika Hiltbrunner, Prof. Christian Körner, PD. Dr. Jürg Stöcklin (UBASEL), Prof. Jonathan Levine (ETHZ).

Responsible Research and Innovation in Plant Sciences, 10-14 September 2018, Einsiedeln

Social transformation through innovation and research are key elements in the discussion on how the global community could overcome its complex problems related to environmental and economic constraints in a resource-limited world. Innovation conflicts arise when transformation is mainly technological driven and not integrating ethical, legal and social issues. In response, scientists are asked to take a role in science-in-society dialogue. In this summer school, the 14 participants implemented the Responsible Research and Innovation (RRI) framework of the European Union in exemplary research fields of plant sciences, inlcuding plant breeding, smart farming, digitalization in agriculture or genome editing (CRISPR/Cas-method). The students were guided through the science-in-society research processes that includes the following dimensions: **Anticipating** a wide range of possible futures with the public and stakeholders. **Become reflective** about involved values and interests. **Opening the research process** to all actors, providing them with meaningful information, including different perspectives and expertise across a diversity of communities. And, be **responding and adapting research** to societal needs and views. Invited speakers gave insight into their research field, conduct interactive workshops and mentored the case studies group work, which will be available as proceedings. **Invited speakers**: PD Dr. Christian Pohl, D-USYS TdLab, ETHZ; Dr. Daan Schuurbiers, De Proeffabriek, NL; Dr. Grégory Grin, Fri Up, CH; Bernadette Oehlen, Research Institute of Organic Agriculture FiBL, CH; Foteini Zampati, Global Open Data for Agriculture and Nutrition, GODAN, DE; Dr. Eduardo Perez, World Food System Center, ETHZ; Prof. Jochen Markard, Sustainability and Technology within the Dept. of Management, Technology, and Economics, ETHZ; Dr. Melanie Paschke (PSC).

www.plantsciences.uzh.ch/teaching/summerschool.html

The Summer School was supported by swissuniversities and PlantHUB, a European Industrial Doctoral Programme (EID) funded by the H2020 PROGRAMME Marie Curie Actions – People, Initial Training Networks (GA 722338).

Colloquium Challenges in Plant Sciences

The colloquium "Challenges in Plant Sciences" is a core event of the PSC's PhD program and the MSc module. The colloquium introduces participants to the broad spectrum of disciplines in plant sciences. The topics offer integrated knowledge about plant sciences, they range from the molecular level to the ecosystem level, and from basic to applied

science while making use of the synergies between the different research groups of the PSC.
2018: 27 participants. Input talks from Prof. Jordi Bascompte, UZH; Prof. Elena Conti, UZH; Dr. Mana Gharun, ETHZ; Dr. Stefan Grob, UZH; Prof. Beat Keller, UZH; Dr. Javier Sánchez Martín, UZH; Dr. Frank Liebisch, ETHZ; Dr. Timothy McLaren, ETHZ; Dr. Federica Tamburini, ETHZ; Dr. Daniella Schweizer, ETHZ; Dr. Andrea Sánchez Vallet, ETHZ; Prof. Thomas Boller, UBASEL. Organizer: Sylvia Martinez, PSC.

www.plantsciences.uzh.ch/en/teaching/masters/colloquium.html

E-learning Initiatives

PSC offers e-learning courses that are used by various universities also outside the PSC. All learning material is published under a Creative Commons License of "Attribution - Non-Commercial - Share Alike".

Responsible Conduct in Research: In this course, we want to increase the knowledge of our Master's and PhD students about the specific rules, regulations and guidelines of responsible conduct in their research fields. This course also offers guidance for the process of developing a well-reasoned response to a moral problem in scientific conduct (Bebeau 1995).

Access using Uni, ETH, FH, or PH Login:
moodle-app2.let.ethz.ch/course/view.php?id=470

Bebeau M.J. (1995). Developing a well-reasoned response to a moral problem in scientific research. In M.J. Bebeau, K.D. Pimple, K.M.T. Muskavitch, S.L. Borden & D.H. Smith (Eds.), Moral reasoning in scientific research: cases for teaching and assessment. Bloomington, Indiana, pp.13-20.

Scientific Writing: In Bachelor's and Master's education the PSC is engaged in offering online training platforms for scientific writing that can be used for self-studies or are embedded in several courses of the Bachelor's and Master's curricula of our partner universities.
151-0091-10L Ingenieur Tools IV: Wissenschaftliches Schreiben, Paschke, Brändle (+130 participants since 2015).

Access using Uni, ETH, FH, or PH Login:
WiSch (bachelor's level):
moodle-app2.let.ethz.ch/course/view.php?id=132
SkriPS (master's level):
moodle-app2.let.ethz.ch/course/view.php?id=134

Sustainable Plant Systems: This e-learning course is organized with two workshops (half days) and an intensive, well-structured self-study/ group work phase in between the workshops. Participants discuss and understand sustainability in the context of plant science research. A special focus is given on research on agro-ecological systems and farming system research.

Access to the learning platform:
https://lms.uzh.ch/auth/1%3A1%3A0%3A0%3A0/

PSC Certification

Both the *PSC PhD Program Plant Sciences* and the *PSC PhD Program Science and Policy* are finished with a **PhD Program certification**. The certification is part of the diploma supplement of the doctoral certificate that is awarded by the University of Zurich, ETH Zurich or University of Basel. The certification includes a transcript of record of accomplished course work carried out by the PhD student.

Recruitment of Fellows, Supervision and Quality Control

The PSC offers **PhD admission channels**. Recruitment is organized together with Life Science Zurich Graduate School, LSZGS. Deadlines June 1 and December 1.

www.lifescience-graduateschool.uzh.ch/en.html

The *PSC PhD Programs* have implemented **monitoring of supervision processes**: thesis committees are established for all PhD students. Thesis committee composition follows the guidelines of the member institutions.

Since Autumn 2014, both *PSC PhD Programs* use the new platform "Dissgo", developed by the Life Science Zurich Graduate School. The database is continuously updated responding to the requirements of the three PSC partner universities. This database allows PhD students to self-manage all documents necessary for their doctoral degree, e.g., ECTS certifications, certifications of teaching commitments, as well as organizing and documenting thesis committee meetings. The program coordinator can monitor the processes and offer support where appropriate.

7 Activity Report — *PSC PhD Programs*

Table 9. Students registered in the *PhD Program Plant Sciences*, as of Dec 31, 2018.

Year	TOTAL	UZH	ETHZ	UBASEL	Female	Male	National	International
2018	131	58	59	12	66	65	40	91

Table 10. Students registered in the *PhD Program Science & Policy*, as of Dec 31, 2018.

Year	TOTAL	UZH	ETHZ	UBASEL	Other	Female	Male	National	International
2018	41	18	18	4	1	21	20	12	29

Table 11. Number of courses carried out in *PSC PhD Programs* and number of course participations, as of Oct 22, 2018.

Year	TOTAL	UZH	ETHZ	UBASEL	Other	Course Participations
2018	30	68	81	4	2	153

Course evaluations. Between 2015–2017, 100 of the total 113 (from which evaluation records were available) were rated as 3 to 4 (=fully agree) and 3 (=2%) rated as 3 to 1 (=fully disagree) in “I learned & benefited from this course” and several other aspects.

Table 12. Courses offered in the *PhD Program in Plant Sciences*.

Year	Course	Lecturer
2018	Scientific Writing Practice II	Dr. Jacopo Marino, PSi
2018	Responsible Conduct in Research	Prof. Nina Buchmann, ETHZ; Dr. Melanie Paschke, PSC
2018	Concepts in Evolutionary Biology	Prof. König, UZH; Prof. Beat Keller, UZH; Prof. Krützen, UZH; Prof. Clara Sánchez Rodríguez, ETHZ; Prof. Kentaro Shimizu, UZH; Prof. Anne Roulin, UZH
2018	Scientific Presentation Practice	Dr. Barbara Hellermann, ETHZ
2018	Data Analysis using R	Dr. Stefanie von Felten, Oikoslat GmbH
2018	BIO 609 – Introduction to UNIX/Linux and Bash Scripting	Dr. Stefan Wyder, UZH; Dr. Heidi Lischer, UZH
2018	BIO 610 – Next-Generation Sequencing for Model and Non-Model Species	Prof. Kentaro Shimizu, UZH; Roman Vladimir Briskine, ETHZ; Jun Sese, UTokyo; Dr. Rie Shimizu-Inatsugi, UZH; Masaomi Hatakeyama, UZH; Tony Kuo, UZH; Heidi Tschanz-Lischer, UZH
2018	Dealing with the Publication Process	Dr. Philipp Mayer, Science-Textflow; Prof. Christian Fuhrer, UZH; Dr. Melanie Paschke, PSC
2018	Advanced Data Management and Manipulation using R	Dr. Jan Wunder, WSL
2018	Basic Plant Disease Diagnostics	PD Dr. Ueli Merz,ETHZ; PD Dr. Monica Maurhofer Bringolf, ETHZ
2018	Models and Scenarios of Biodiversity and Ecosystem Services (ECO 396)	Paul Leadley, UParis-Sud
2018	Genetic Diversity Analysis	Dr. Stefan Zoller, Dr. Jean-Claude Walser, Dr. Niklaus Zemp, ETHZ-GDC
2018	Transdisciplinary Research: Challenges of Interdisciplinarity and Stakeholder Engagement	PD Dr. Christian Pohl, ETHZ; Prof. Michael Stauffacher, ETHZ
2018	Sustainable Plant Systems (part of "Integrative Plant Sciences")	Dr. Melanie Paschke, PSC; Dr. Navreet Bhullar, ETHZ; Dr. Frank Liebisch, ETHZ; Prof. Marcel van der Heijden, UZH
2018	Scientific Writing Practice 1	Dr. Patrick Turko
2018	Genetic Diversity: Techniques	Dr. Aria Minder, ETHZ-GDC
2018	Writing a Post-Doctoral Grant	Dr. Andrea Degen, Eurelations AG; Dr. Melanie Paschke, PSC
2018	Introduction to R	Dr. Jan Wunder, WSL
2018	Current Challenges in Plant Breeding	Prof. Bruno Studer, ETHZ; PD Dr. Andreas Hund, ETHZ

Table 13. Courses offered in the *PhD Program in Science & Policy*.

Year	Course	Lecturer
2018	Understanding Policy Evaluation	Dr. Sibylle Studer, INTERFACE GmbH
2018	Contributing to Policy Action	Dr. Cornelius Senf, Humboldt UBerlin; Dr. Melanie Paschke, PSC; Dr. Christoph Beuttler, Stiftung Risiko Dialog; Dr. Elisabeth Ehrensperger, TA-Swiss; Prof. Anthony Patt, ETHZ
2018	Introduction to Political Sciences	Dr. Sarah Bütikofer, UZH
2018	Communicating Sciences	Jacopo Pasotti, journalist
2018	Building Political Support	Dr. Sarah Bütikofer, UZH; Dr. Sebastian Köhler, UKonstanz

8 PSC Mentoring

The PSC offers various mentoring formats, including individual mentoring in carrying out science-policy dialogue, science communication, public engagement, and Responsible Research and Innovation (RRI). The PSC organizes industry visits including research markets and dialogue with HR representative, as well as career events. Every autumn term the PSC organizes introductory events for new students including sessions and workshops on carrying out teaching as PhD student.

feminno Mentoring Program

Since 2017 the PSC is coordinating the *fem*inno Mentoring Program for female PhD students and postdoctoral researchers. This program addresses gender topics at the science-innovation interface, and in parallel offers career development. Career advisers, coaches, innovation experts, and executives from successful life science enterprises share their experiences, and work with the participants towards individual innovation ecosystems, which will allow them to eventually bring their own ideas to the market. The program consists of an initial career retreat, two soft skill trainings, four innovation seminars, three lunch talks, and company visits (e.g., PWC, Actelion, Biopark Basel, LimmaTech Biologics AG). The program is designed for a group of 10–20 participants per call.
Output will be a guideline on successful innovation processes for female academics. This document will be based on a **Delphi-study**, which analyses reasons that discourage or support female scientists in life sciences during their career in the academia culture.

Number of participants:
2018: 11 (6 PhD, 5 postdoc; 1. call); 21 participants (12 PhD, 9 postdoc; 2. call)

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

The Delphi study on barriers and success factors for female scientists at the academia-innovation interface is open until April 1, 2019.

https://goo.gl/forms/CGoSDnpp93PE5lB32

Project partners

Life Science Zurich – University of Zurich and ETH Zurich

Office for Gender Equality – University of Zurich and University Basel

Career Services – University of Zurich

*fem*inno is supported by the Swiss Federal Office for Gender Equality for the period 2017–2019.

Special Lecture

6 Dec 2018, High-impact science communication in the 21st century – a Cell Press perspective, ETH Zurich

A challenge for early career academics is to identify all long-term career options, such as working as scientific editor. Susanne Brink, the editor of *Trends in Plant Sciences* and *Cell Press* shared her insights as an editor on (i) how to get published in top tier journals; and (ii) what it takes to become a scientific editor.

Table 14. PSC Mentoring activities.

Year	Activity	Mentor	Nr. Part.
2018	Reflection: Career Retreat	Dr. Daniela Gunz, UZH Career Services	11
2018	Training: Developing leadership	Dr. Olga Pardo, HR Department ETHZ	10
2018	Lunch talk: What I need to know to apply to a job in the industry	Dr. Roger Gfrörer, UZH Career Services	50
2018	Innovation seminar: Where does Innovation come from?	Dr. Janine Antonov/Unitectra	11
2018	Company Visits	PWC & Actelion	11
2018	Innovation seminar: Gender-based perspectives in the innovation process	Nicole Schaffer, Consultant	11
2018	Innovation seminar: Business Canvas and other tools	Isabelle Sigrist, Sandborn	11
2018	Lunch talk: Work-Life Balance	Dr. Christiane Löwe, Head of Gender Equality, UZH	50
2018	Innovation seminar: Financing your project	Dr. Andrea Degen, EUrelations AG	11
2018	Lunch talk: Why diverse teams perform better	Klaus Gehmann, Syngenta	50
2018	Training: Negotiation skills for conflict situations, business deals	Dr. Ella Roininen, Lecturer and Researcher at Ella Roininen Ltd.	11
2018	*fem*inno final event: All participants present their innovative idea or development plan	*fem*inno participants	20
2018	Welcome event: Introduction to new PhD students including information on “Tailoring your teaching” and “Communication with the public”	Dr. Melanie Paschke, Dr. Luisa Last, Dr. Juanita Schläpfer, PSC	18

9 PSC Outreach

The PSC offers a diversity of platforms for public outreach where cutting-edge plant science research comes to life. The PSC organizes symposia, round tables, citizen fora, teacher and school class workshops, science holiday camps, family expeditions and art & science exhibitions. The PSC also contributes to large science fairs such as Scientifica, Treffpunkt Science City and the International Fascination of Plant Days. The PSC newsletter is published twice per year, online and in 400 prints. PSC publishes press releases, publications in the lay press, books, peer-reviewed scientific publications and proceedings. The PSC maintains a webpage with ~30'000 annual visitors (2018), blogs and other social media channels.

PSC Symposium

5 Dec 2018: Breakthroughs in plant sciences – from the lab to the world, ETH Zurich, +220 participants

The symposium marked the 20th anniversary of the PSC. We were honored to receive a group of highly influential scientists, whose work is recognized worldwide. All of them have left their mark in different aspects of plant sciences, be it plant signaling, development, ecology, evolution, plant improvement or science communication.
In addition, +50 participants from research groups from Switzerland and abroad, showed their research in posters. Poster Award 1st prize was awarded to David Stähli (*et al*), for his poster: Feasibility and adaptation of genome editing in *Malus domestica*. (Prof. Bruno Studer group, ETHZ); 2nd prize to: Marta Bjornson (*et al*) for her poster: The transcriptional landscape of pattern-triggered immunity (Prof. Cyril Zipfel group, UZH); 3rd prize to: Elizabeth Kastanaki (*et al*) for her poster: Receptor-Like Protein Kinase 2 (RPK2) acts as a negative regulator of phloem identity in *Arabidopsis thaliana* (Prof. Antia Rodriguez-Villalon group, ETHZ).
Impressions of the symposium were shared in social media under the hashtag #PSC2018. Participants could join a scientific haiku competition by tweeting a small haiku about their own research. The award to the most retweeted or liked haiku went to Dr. Timothy Sykes, ETHZ.
Invited speakers: Prof. Beat Keller, UZH; Prof. Cyril Zipfel, UZH; Prof. Daphne Goring, UToronto, Canada; Prof. Mark Estelle, UCalifornia, San Diego, USA; Prof. Detlef Weigel, MPI Tübingen, DE; Prof. Ansgar Kahmen, UBASEL; Prof. Elena Conti, UZH; Prof. Mark Aarts, UWageningen, NL; Prof. Luca Comai, UCalifornia Davis, USA; Dr. Caixia Gao, CAS, China; Dr. Susanne Brink Editor of *Trends in Plant Sciences*, UK; Prof. Samuel C. Zeeman, ETHZ. **Organizers:** PSC PhD students: Claudio Cropano, ETHZ; Sabrina Fluetsch, UZH; Maximilian Vogt, ETHZ; Tiago Miguel Dias Cruz, ETHZ; Alessio Maccagni, UBASEL; Miguel Loera Sánchez, ETHZ; PSC staff: Dr. Manuela Dahinden, Romy Kohlmann, Dr. Luisa Last as well as the PSC Steering Committee.

www.psc2018.ethz.ch
Supported by Swiss Industry Science Fund.

PSC Public round table

24 Oct 2018: Urban Agriculture: Fad or Future – should tomorrow`s cities grow their own food?, ETH Zurich, +150 participants

Urban agriculture has the potential to contribute to food security and social well-being in cities, while simultaneously increasing overall sustainability of food production. However, many uncertainties remain with respect to potential risks, limitations, and overall feasibility. **Invited speakers:** Prof. Giorgio Gianquinto, Bologna, IT; Dr. Heidrun Moschitz, Research Institute of Organic Agriculture (FiBL), Frick, CH; Dr. Joëlle Salomon Cavin, ULausanne, CH; Mark Zahan, Architect, CH
Organizers: PSC PhD students: Tiago Meier, UZH; Sergei Schaub, ETHZ; Kevin Vega, ETHZ; Eva Maria Vorkauf, UBASEL; PSC staff: Dr. Luisa Last and Dr. Manuela Dahinden.

www.plantsciences.uzh.ch/en/outreach/roundtable.html
Supported by Mercator Stiftung Schweiz.

Latsis Symposium

6–7 and 9 June 2018, Scaling-up forest restoration, ETH Zurich, +150 participants

The Latsis Symposium 2018 brought together some of the world's leading forest restoration scientists to address the ecological, economic, and societal challenges for scaling up forest restoration. The key purpose of this 2-day symposium was to work towards a conceptual understanding and

scientifically grounded guidelines for scaling up forest restoration efforts, as well as to evaluate how barriers to the scaling up of global forest restoration efforts might be overcome. Presentations were given by experts from academia, non-governmental organisations, and the business sector, with time set aside for discussions.
The PSC supported the organization of public events. Children could explore issues in conservation management through fun role-playing games. Alongside the symposium there was a photographic exhibit in collaboration with Arnaud De Grave, to explore public perceptions of forest and landscape degradation and restoration.
Organizers: Prof. Jaboury Ghazoul, Dr. Nicole Kalas, ETHZ; Public events: Dr. Carole Rapo, PSC; Dr. Anett Hofmann, ETHZ.

http://latsis2018.ethz.ch

The symposium was supported by the Latsis Foundation.

Reopening of the Institute of Botany

30 May 2018, University of Basel, +400 participants

After more than one year of construction the Institute of Botany at the University of Basel re-opened in spring 2018. On May 30th the official reopening of the institute was celebrated with a stimulating event. More than 400 guests were welcomed in the universities main auditorium by the university president Prof. Andrea Schenker-Wicki and other university authorities. Prof. Bernhard Schmid, who started his career in Basel, gave a keynote lecture in which he stressed the pertinent role of plant sciences in contributing to solutions for current challenges such as sustainable food security and to providing profound understanding of ecosystem functioning. After the official part of the celebration, visitors enjoyed an apero in the Botanical Garden and an exhibition about the Herbaria Basel.

Plant Science @ School

PSC Discovery Workshops

In collaboration with educators of the ETH MINT Lernzentrum, the PSC develops and offers workshops for school classes at the secondary school level. Participants engage in the latest innovations in plant science research. This includes advanced 3D microscopy, novel breeding methods, omics-technologies and predictive evolutionary and climate change models. These classroom activities address the Lehrplan 21 syllabus and teachers can implement this inquiry-based science education in their classroom. The following PSC scientists contributed: **3D Mikroskopie** with PD Dr. Célia Baroux (UZH), **Symbiose** with Dr. Lukas Schütz (UBASEL), **Klimawandel** with Prof. Nina Buchman and Dr. Sabina Keller (ETHZ), **Moderne Pflanzenzucht** with Prof. Bruno Studer (ETHZ) and Martina Birrer (Agroscope), **Stärkemetabolismus** with Prof. Samuel C. Zeeman and Dr. Gavin M. George, Dr. Michaela Fischer-Stettler (ETHZ), **Adaptive Evolution** with Prof. Kentaro Shimizu, Dr. Rie Inatsugi-Shimizu and Dr. Lucas Mohn (UZH) and **Biokommunikation** with Prof. Consuelo De Moraes, Tobias Löser, Corinne Hertäg, Dr. Nina Stanczyk (ETHZ). Between 2016–2018, the PSC organized +40 workshops with +740 participants. For each workshop didactical materials were designed containing background knowledge, experiments and assessments. World café discussions at the end of each workshop addressed the contribution of plant sciences to global challenges such as climate change, food security, better resource-use, conservation of biodiversity and ecosystem management.
2018: On behalf of the Bundesamt für Umwelt, BAFU, the PSC has developed an additional school class workshop on **Genome Editing** with Dr. Simon Bull (ETHZ).

www.plantsciences.uzh.ch/de/outreach/discovery.html

The *PSC Discovery Program for Youth* was supported by the Schweizerischen Nationalfonds Agora 2015–2018.

http://p3.snf.ch/project-158542

PSC Teacher Workshops

Since 2011, the PSC offers workshops for secondary school teachers in topics at the forefront of current plant science research. The workshops provide robust teaching material that can be transferred easily to classroom teaching. Participation in these workshops is fully accredited as continuing education in the teacher's portfolio. Activities are carried out at Life Science Learning Center in Zurich. The hands-on training has been acknowledged for its "new ideas to work with our students", "experiments that can be integrated in my teaching" and "that can be used directly in the classroom", "high quality documentations and links". Sofar, the PSC organized +20 workshops with +240 participants.
25 Jan 2018: Plant Ecophysiology, organized by Prof. Achim Walter (ETHZ); Dr. Carole Rapo, PSC. 16 participants.

www.plantsciences.uzh.ch/de/outreach/lehrpersonenangebot.html

Holiday Science Camps

In cooperation with Science et Cité, the Swiss national competence center for science communication, the PSC develops plant science based activities for holiday camps in form of workshops and expeditions. The camps are organized together with ProJuventute Ferienplausch, Kovive, Stiftung Zürcher Schulferien. Our aim is to create new envi-

ronments for informal science education (Wissenschaftsferien Schweiz) including children with socio-economic disadvantaged backgrounds.
2018: 1 camp, 25 participants.

www.plantsciences.uzh.ch/de/outreach/ferienlager.html

Supported by the Gerbert Rüf Foundation, 2015–2019.

PSC Creative Camps

In collaboration with art educators from the Zurich University of the Arts (ZHdK), scientists develop creative and inquiry based workshop activities for young people aged 8–14. The workshop activities are designed to foster children`s own interests and explorations and to encourage a range of inquiry skills in particular observing and exploring, asking questions, reasoning and making connections. Social aspects of learning focus on children`s role as citizens and highlighting science and environmental awareness as part of their life. The PSC collaborates with afterschool programs to facilitate the use of the workshop materials. The following PSC scientists contributed: Prof. Consuelo De Moraes, ETHZ; Prof. Joop Vermeer, UZH; PD Dr. Diana Santelia, ETHZ; PD Dr. Célia Baroux, UZH; Prof. Loic Pellissier, ETHZ; Prof. Kentaro Shimizu, UZH.
2018: 2 camps and 4 one-day workshops, 102 participants. Participation at *Frühlingsfest* at the Botanical Garden, UZH and *100 ways of thinking*, art & science exhibition of UZH.

The *PSC Creative Camps for Youth* are supported by the Schweizerischen Nationalfonds Agora, 2017–2019.

http://p3.snf.ch/project-171682

Citizen Science

The citizen science project *Where seeds fall* was launched together with Prof. Dr. Christoph Küffer and Kevin Vega (HSR Rapperswil), in 2017 and examine the survival chances of urban plant populations and their genetic diversity. The goal is to document which plants are growing spontaneously in the city of Zurich and how they are influenced by the surrounding biodiversity. We are distributing plant trays to participants which they fill with soil and set out on their balcony or garden. Around eighty people are already participating and have sent in photos of the first seeds landing and germinating.
2018: Stand-up presentation at Festspiele Zürich (June, 20) and a plant identification session in the CHN building of the ETH Zurich on Sep, 8.

www.plantsciences.uzh.ch/de/outreach/citizenscience.html

ETH @ OLMA

11–21 Oct 2018, St. Gallen, +20.000 visitors

The PSC coordinated the exhibition activities together with several ETH research groups from D-USYS, D-HEST and the World Food System Center. With the goal of bringing research closer to the farming community, an exhibit with activities mainly for adults, teens and young children was created. The heart of the exhibit was an open lab, with a program of short workshops and demonstrations. Prof. Samuel C. Zeeman's group developed a starch-in-grains demo to show how the quality and type of starch in for example, Tef is being improved to increase nutritional value. Prof. Laura Nystrom's group showed properties of soluble fibers in grains. These plant fibres are important to regulate blood sugar and reduce cholesterol. Prof. Nina Buchmann's group produced a Virtual Reality film to show the CO2 exchange over agricultural land. Prof. Bruno Studer's group with a stomata experiment which helps in understanding how leaf growth responds to the environment and is a tool to improve crop productivity.

Media coverage:

www.lid.ch/medien/agronews/detail/news/bundesrat-schneider-ammann-eroeffnet-olma/

www.ufarevue.ch/deu/bundesrat-schneider-ammann-eroeffnet-olma_3467099.shtml

www.schweizerbauer.ch/politik--wirtschaft/agrarwirtschaft/landwirtschaft-muss-sich-oeffnen-45126.html

www.nau.ch/news/schweiz/johann-schneider-ammann-eroffnet-olma-65442300

CreativeLabZ

In autumn 2018, the PSC launched the *CreativeLabZ*, a new innovative science education program, that aims to promote self-confidence, creativity, critical thinking, problem solving and leadership in youth. The core of the project is a series of six consecutive workshops on Wednesday afternoons and intensive week-long projects during the school holidays. The youth can engage in themes such as investigations of plant intelligence, building robots for plant care, biocommunication and soft robotics.
There will be opportunities for students from the ETH Zurich and University of Zurich to volunteer and coach youth with their individual projects, thereby develop their own creativity.

www.creativelabz.ch

Supported by the Drosos Foundation, 2018–2022.

25 Jan
Teacher workshop
Plant ecophysiology – feel the pulse of the plants

31 Jan–2 Feb
SwissPLANT Symposium

15 Feb & 15 Mar
PSC Science & Policy Workshop
Understanding policy evaluation

12 Mar
Creative Workshop: Bionik bugs

21 Mar
PSC General Assembly

22 Apr
Frühlingsfest Botanical Garden @ UZH

24 May
Discover school class workshop
Biokommunikation

5 & 12 & 19 May
Creative Camp: Feel the vibes

28–30 May
PSC Science & Policy Workshop
Communication of risks and uncertainties

30 May
Reopening of the Institute of Botany @ UBasel

6–9 Jun
Latis Symposium: Scaling-up forest restoration

15–21 Jul
Holiday Camp: Forscherreise auf der MS Yellow

6–11 Aug
Creative Camp: Science adventure

10–14 Sep
PSC Summer School
Applying Responsible Research and Innovation

17 & 19 Sep
PSC Science & Policy Lecture
Introduction to political science

11–21 Oct
ETH @ Olma: Agricultural fair in St. Gallen

8–13 Oct
Creative Camp: Cyberkids

22 Oct & 19 Nov
PSC Science & Policy Workshop
Communicating Science

24 Oct
Public Round Table: Urban agriculture

19–23 Nov
PlantHUB **Midterm Review**
2nd Annual Meeting

1 Dec
CreativeLabZ: Kick off

7 Nov & 12 Dec
PSC Science & Policy Workshop
Building political support

5 Dez
PSC Symposium
Breakthroughs in plant sciences

PSC Meetings & Events

Science Education Offers

Science & Policy Education

Further education activities:

- Mentoring: *fem*inno program
- 30+ scientific and transferable skills courses

10 PSC Financial Report

The PSC has shown repeated success in securing funding for research, education and outreach, making the PSC one of the most robust competence centers in Switzerland. The PSC has secured third-party funding of MCHF 20,3 since 2009, mainly through highly competitive large-scale programs from European Union FP7 and Horizon 2020, in collaboration with industry and in collaboration with international re-known foundations as for example Mercator Foundation Switzerland. In total, the PSC accredited funding for 126 PhD and postdoctoral fellowships so far. For the period 2015–2018, PSC has yielded an excellent tenfold return of invest for the three partner universities: with an investment of kCHF 1'290 (sum of their internal institutional and individual member contributions for coordination and institutional funding for core PSC PhD education activities) the PSC acquired kCHF 11'870 income through competitive third-party funds for research, education and public outreach.

Table 15. Overview on Return of Invest – PSC fundraising activities for fellowships per partner universities and partner universities contribution to PSC core management activities.

	Fellowships through competitive third-party funding (2015–2018)	Funding of core PSC management through Universities (2015–2018)*	
Contr. to ETHZ Overhead	125'045	407'500	ETHZ
Contr. to ETHZ Research	4'439'865	228'500	UZH
UZH Overhead	209'670	320'000	UBASEL
UZH Research	2'451'219		
UBASEL Overhead	61'838		
UBASEL Research	1'841'803		
PSC Management and Training	2'212'997		
TOTAL	10'342'338	956'000	

* Includes funding from universities central funds, departments and faculties and own contributions of PSC professors.

Table 16. Overview on Return of Invest - PSC fundraising activities for training and outreach and partner universities contribution to PSC PhD training activities.

	Third-party funding to PSC training and outreach (2015–2018)	Funding of PSC core training through universities (2015–2018)
for Training	539'916	334'1501*
for Outreach	986'771	
TOTAL	1'526'687	334'150

* Through Life Science Zurich Graduate School and through Graduate Campus, UZH.

11 PSC Publications

Proceedings

Tagungsband zur Fachtagung Dialog Grün. Neue Technologien in der Pflanzenforschung – eine Alternative zu Pflanzenschutzmitteln?, 2018, Manuela Dahinden, Jörg Romeis, Liselotte Selter, Gerd Folkers (Hrgs.). Zurich: Zurich-Basel Plant Science Center. ISBN: 978-3-906327-61-7. doi.org/10.3929/ethz-b-000258288

Didactical school class material

PSC Discovery Workshop#1: Klimawandel, 2018, Nina Buchmann, Sabina Keller, Juanita Schläpfer, Carole Rapo, Patrick Faller, Melanie Paschke, Manuela Dahinden. Zurich: Zurich-Basel Plant Science Center. ISBN 978-3-906327-46-4.

PSC Discovery Workshop#2: 3D-Mikroskopie, 2018, Célia Baroux, Carole Rapo, Juanita Schläpfer, Patrick Faller, Melanie Paschke, Manuela Dahinden. Zurich: Zurich-Basel Plant Science Center. ISBN 978-3-906327-17-4.

PSC Discovery Workshop#3: Moderne Pflanzenzucht, 2018, Bruno Studer, Martina Birrer, Carole Rapo, Patrick Faller, Melanie Paschke, Manuela Dahinden. Zurich: Zurich-Basel Plant Science Center. ISBN 978-3-906327-50-0.

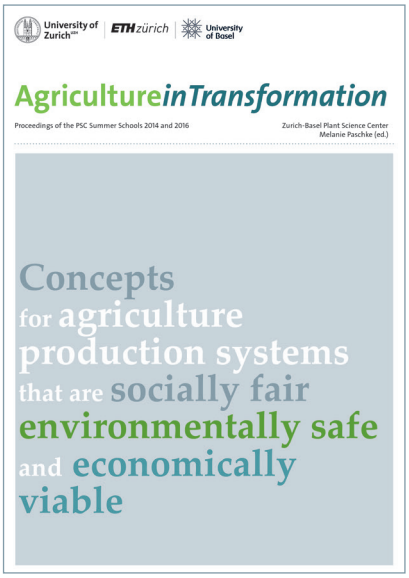
PSC Discovery Workshop#4: Metabolismus, 2018, Samuel C. Zeeman, Gavin Georg, Michaela Stettler, Carole Rapo, Patrick Faller, Melanie Paschke, Manuela Dahinden. Zurich: Zurich-Basel Plant Science Center. ISBN 978-3-906327-86-1.

PSC Discovery Workshop#5: Biokommunikation, 2018, Carole Rapo, Tobias Löser, Nina Stanczyk, Corinne Hertäg, Patrick Faller, Manuela Dahinden. Zurich: Zurich-Basel Plant Science Center. ISBN 978-3-906916-24-8.

PSC Discovery Workshop#6: Adaptive Evolution, 2018, Kentaro Shimizu, Rie Shimizu, Carole Rapo, Patrick Faller, Melanie Paschke, Manuela Dahinden. Zurich: Zurich-Basel Plant Science Center. ISBN 978-3-906327-85-3.

PSC Discovery Workshop#7: Symbiose, 2018, Lukas Schütz, Juanita Schläpfer, Patrick Faller, Carole Rapo, Melanie Paschke, Manuela Dahinden. Zurich: Zurich-Basel Plant Science Center. ISBN 978-3-906327-44-0.

PSC Discovery Workshop#8: Genome Editing, 2019, Alexandra Rosakis, Simon Bull, Iren Schürmann, Manuela Dahinden. Zurich: Zurich-Basel Plant Science Center. ISBN 978-3-906916-53-8.



Agriculture in transformation – Concepts for agriculture production systems that are socially fair, environmentally safe and economically viable, 2017, Melanie Paschke (ed.), IDEA Verlag GmbH. ISBN 978-3-88793-257-2. doi.org/10.3929/ethz-b-000218321

Klimagarten 2085: Handbuch für ein öffentliches Experiment, 2017, Juanita Schläpfer-Miller und Manuela Dahinden (Hrsg.), Park Books, ISBN 978-3-03860-059-6.

Climate Garden 2085: Handbook for a public experiment, 2017, Juanita Schläpfer-Miller and Manuela Dahinden (eds.), Park Books, ISBN 978-3-03860-060-2.

Publisher
Zurich-Basel Plant Science Center
Management Office
Tannenstrasse 1, ETH Zurich, TAN D5.2
8092 Zurich, Switzerland
Phone +41 (0)44 632 23 33

info-plantscience@ethz.ch
www.plantsciences.ch

Editors
Manuela Dahinden, Melanie Paschke

Layout
Annina Ziltner, INTERES GmbH

Pictures
Courtesy of PSC staff or indicated

Twitter
@ PlantSciCenter
@ PlantHUB_EU

Facebook
@ plantsciencecenter
@ creativelabzurich

LinkedIn
Plant Fellows
PlantHUB
feminno

Blogs
www.klimagarten.ch
www.creativelabz.ch
blogs.ethz.ch/Science_and_Policy