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IDP BRIDGES*News*

IDP BRIDGES - Bridging Plant Sciences and Policy

No 1, 2014

Upcoming training

**Symposium on Participatory
Research to foster Innovation in
Agriculture**

28 Aug 2014, 9-17

ETH Main Building, HG - D 7.1

**PSC Policy Workshop:
Stakeholder Engagement**

6 Oct & 3 Nov

University of Zurich

**Fluorescence Imaging Techniques
in Plant Physiology**

January 2015

1st Annual Meeting

27 - 29 Oct 2014 – Männedorf

The first annual meeting of IDP BRIDGES will host a PhD retreat where students present and discuss their research with peers, supervisors and associated partners, accompanied by thesis committee meetings for all fellows. In the Supervisory Board meeting the strategic objectives of the program are discussed.



Welcome Note



The new Marie-Curie IDP BRIDGES Fellowship program Bridging Plant Sciences and Policy evolved from a pioneering initiative: in 2009 the Swiss National Science Foundation funded the ProDoc Doctoral Program Plant Sciences and Policy, which grew into 14 PhD projects that addressed policy aspects of research. These projects were accompanied by a newly-developed, structured PhD program of the same name. Last year, the training program became 'Science & Policy', opening to include students from all of the Natural Sciences. Now, with 14 new fellowships, the research program is achieving an international dimension in addressing research questions with implications for policy and practice. Translational research, i.e. basic research in plant sciences implemented in an agricultural or environmental context, needs also to address and inform the associated political processes. This is necessary if plant sciences is to effectively contribute to solutions for our society.

I am especially motivated by this initiative because it combines basic research with training and secondments to inter-sectorial partners based in five EU Member States and eight non-member states (so-called Third Countries). This will ensure exposure of our young fellows to different working environments and cultures and help them understand the political and social context of their work.

Prof. Samuel C. Zeeman
Faculty Coordinator of IDP BRIDGES

Pictures taken during the IDP BRIDGES
Kick off Meeting on March 12, 2014.

Editorial



The first seven months of IDP BRIDGES have now passed and all our fellows have settled into a new research group and a new country. In fact, this process started much earlier: the first brainstorming for the proposal took place in October 2012. Thanks to the efforts of many, the proposal was accepted for funding with high marks. Finding the right person for each project was another challenge, making it all the more rewarding to finally meet our 14 fellows at our kick-off meeting in March. There, everyone was able to sit together and chat about their experiences and hopes for the near future.

As coordinator of the PhD program 'Science and Policy', I have also worked with the four Mercator fellows in their successful collaborations with policy and practice – i.e., governmental and non-governmental organisations. These projects have resulted in scientific excellence in addition to an impressive list of activities at the science-policy interface, such as the production of factsheets and the organisation of stakeholder workshops. While it is a challenging task to combine disciplinary excellence with transdisciplinary involvement in the limited timeframe of a PhD project, I can say that our 'Science-Policy Pioneers' are very satisfied with the additional experiences and skills they have acquired from their internships and their work with stakeholders.

Based on these experiences, we now embark on a new journey with the IDP Bridges fellows, whom we will support with a unique training program, a novel mentoring scheme and exciting secondments. The individual researchers can all tap into the vast experience pool of the Associate Partners, organisations ranging from governmental institutions to academic institutes, where they may get first-hand experience with day-to-day business within these organisations and take advantage of these networks during and beyond their secondments.

I have now had the chance to visit all the fellows at their labs or field stations. Having seen the fellows in their working environments, it is easy to be inspired by their projects! Read the first six portraits in this issue.

I am happy to be part of this exciting fellowship program, supporting it by conceptualising and moderating workshops, courses and summer schools for all of our project partners. With everyone's sincere engagement in research and knowledge exchange both within and beyond the IDP BRIDGES group - this program is destined for success.

I hope to see you all at the Annual Meeting in October at the Boldern, Männedorf!

Andrea Pfisterer
Program Officer IDP BRIDGES
Zurich-Basel Plant Science Center



Wuyan Wang
ETH Zurich, Institute of Plant Sciences
Supervisor: Prof. Samuel C. Zeeman

Secondment

Wuyan will spend two months at the lab of Dr Tadele at the **University of Bern**. There she will learn about tef cultivation and screening via TILLING technology. In addition, Wuyan will spend one month at the **Ethiopian Institute of Agricultural Research (EIAR)** to evaluate the agronomic performance of the new varieties in the field. During this time, she aims to transfer knowledge of plant biochemistry and molecular breeding techniques of crops to the students and researchers in Ethiopia. In doing so, she would like to contribute to improved research communication and the study of other crops in Ethiopia.

About the organization

EIAR comprise 55 research centers and sites located across various agro-ecological zones. In addition to research, EIAR provides coordination of agricultural research countrywide, and advises the government on agricultural research policy formulation.

www.eiar.gov.et/

Associate partners

Dr. Zerihun Tadele, University of Bern, Switzerland

Dr. Assefa Kebebew, EIAR, Ethiopia

Developing starch diversity in the orphan crop tef

This project will use state-of-the-art, high-throughput technologies to identify and breed improved tef varieties. In collaboration with the Ethiopian Institute of Agricultural Research, promising cultivars can be developed for the field and eventually made available to benefit local farmers.

WUYAN WANG

Tef is Ethiopia's main cereal crop, covering more than 2.6 million hectares and providing over two-thirds of the human nutrition in Ethiopia. It is more tolerant to extreme conditions than wheat or maize and is favored by Ethiopian farmers. Tef seeds are high in fiber, iron, and gluten-free protein. However, compared to other cereals, tef has low yields and lacks diversity in its grain properties.

To increase the productivity and diversity of tef, we will use a non-transgenic reverse genetics approach, called TILLING to select tef varieties with improved

starch properties. This work will be done in partnership with scientists from the University of Bern in Switzerland and the Ethiopian Institute of Agricultural Research. The improved varieties could be widely and swiftly adopted, since GMO technology will not be used, and a resulting increase in tef yield could contribute to food security in Africa.

Engineering durable resistance to viral diseases in cassava for sustainable industrial production in Southern Africa

This project seeks to use advanced RNA-based and genome engineering technologies to create farmer-preferred cassava cultivars that exhibit robust resistance to viral diseases.

DEVANG MEHTA

Cassava is a major staple food across the tropical world, forming part of the diet of around half a billion people worldwide. Though grown in marginal conditions, cassava produces more energy per unit area than most other crops, with limited human input. Additionally, it is unusually drought tolerant and has a flexible harvest time, since it can be stored below ground for long periods. Cassava is also important for the starch industry, as it produces high-purity starch at a competitive price. In the last

decade, cassava has also become an important bioenergy crop.

Despite its good agronomic performance, cassava production remains severely constrained by viral diseases. A key step in this project is to set up field trials with previously developed virus resistant cassava plants in southern Africa. Launching field trials of genetically modified crops involves directly interacting with policy makers and regulators to gain regulatory approval. Furthermore, we will be arranging conferences and workshops in southern Africa to engage stakeholders such as farmers, policy makers and industries.



Secondment

Devang will spend four months at the **University of the Witwatersrand (Wits)** setting up his field trials with genetically modified cassava. He will also attend a workshop on risk assessment and the sustainable use of genetically modified organisms organized by Biosafety SA, a leading biosafety R&D platform in South Africa. Metha is a member of AfricaBio, an independent, non-profit biotechnology stakeholder association. Its key role is to provide accurate information and create awareness, understanding and knowledge of biotechnology and biosafety in South Africa and other African regions.

About the organization

The University of Witwatersrand (Wits) in Johannesburg, South Africa, is one of Africa's largest universities. The School of Molecular and Cell Biology has three main focus areas: Biochemistry & Cell Biology, Genetics & Developmental Biology and Microbiology & Biotechnology.

www.wits.ac.za

Associate partner

Prof. Marie Emma Christine Rey, Wits, South Africa

"My interest in South Africa is to contribute to policy and the public understanding of GMO technology through promotion of genetic engineering of cassava; and to conduct confined field trials of transgenic cassava. I will also be interacting with AfricaBio – a non-profit biotechnology stakeholders' association – to help provide accurate information and create awareness, as well as knowledge on biotechnology and biosafety in South Africa and the African region."

Devang Mehta
ETH Zurich, Institute of Plant Sciences
Research Group of Plant Biotechnology
Supervisor: Dr. Hervé Vanderschuren



Claudia Hahn
University of Basel, Department of Environmental Sciences
Supervisor: Prof. Ansgar Kahmen

Secondment

Claudia will spend six months at Agroscope, where she will carry out field experiments. **Agroscope and the Swiss Grassland Society (AGFF)**, a farmers' organization based at Agroscope, will be her main partners in organizing dialog with stakeholders and legal entities and in presenting recommendations for climate change-adapted strategies of forage production. Close collaboration offers the opportunity for insight into different legal tasks such as cultivar testing and development of the catalog of varieties that are allowed to be traded in Switzerland and Europe. Special emphasis will be placed on innovation transfer to the seed industry and farmers.

About this organizations

Agroscope is the Swiss center of excellence for agricultural research, affiliated with the Federal Office for Agriculture (FOAG).

www.agroscope.admin.ch
www.agff.ch

Associate partners

Prof. Andreas Lüscher, Head of research group Forage Production/ Grassland Systems, Agroscope
Dr. Willy Kessler, Managing director, AGFF, Swiss Grassland Society

Seasonal effects of drought on the productivity and fodder quality of temperate grassland species

CLAUDIA HAHN

In the past, changes in rainfall variability have increased the frequency of drought events in Europe; these are expected to increase further as a result of global climate change. More frequent drought-stress events are a current issue also for European grasslands, which are important for European agriculture. In Switzerland they represent more than two-thirds of the agricultural land.

In this project we will apply drought stress on Swiss grassland species at different times of the year and on different phenological stages. In doing so, we want to understand the interacting effects of seasonal drought events -spring, summer, autumn droughts - and

species phenological stages on fodder production and quality. This knowledge will contribute to our understanding of the processes underlying drought-induced biomass loss. It will help in developing adapted management strategies, such as irrigation farming and suitable species selections. I want to disseminate these strategies directly to stakeholders, i.e. farmers, agricultural schools, seed industry representatives and policymakers to support a sustainable and economic use of grasslands for agriculture.

Growth and bioactive properties of native potatoes under drought stress – development of an integrated approach from field to market

Increasing cultivation and use of native potatoes require not only a solid foundation of knowledge about physiological and agronomic traits, but also an integrated approach involving social and economic factors. This project will lead to recommendations for increasing potato crop biodiversity and native potato production, and give a broader set of solutions to farmers.

GUILLAUME LACAVÉ

Decreased water availability under climate change will have a significant impact on potato tuber yield, growth and quality. In contrast to commercial potatoes, native potatoes have very little representation in markets, despite their higher tolerance to stress and higher levels of bioactive compounds. Taking into account the ever-increasing importance of potatoes in the agrofood industry, the potato plant offers an excellent opportunity to link scientific research with practical applications of high social impact. This project aims to broaden the existing knowledge about the effects of drought stress on potato, thanks to new phenotyping methods. We will study native potatoes from Chile, with respect to their response to drought stress and their bioactive contents from normal or stressed conditions.

This will lead to economic feasibility assessments for increasing the cultivation of native potatoes in Chile, respecting the interests of the farmers, the industry and the consumers.

Secondment

Guillaume will spend six months at the CREAS, the Regional Centre for the study of Healthy foods in Chile. There he will carry out field experiments and a feasibility study of commercialization of native potatoes and processed products.

About the organization

CREAS is located in the Valparaíso Region and is the only research center in Chile focused on food and health issues. Among the R&D activities performed by the center are the development of technologies for obtaining bioactive compounds from different food matrices.

www.creas.cl/en/nosotros/creas/

Associate partner

Dr. María Elvira Zúñiga, Director of CREAS, Chile



Guillaume Lacavé
ETH Zurich, Institute of Agricultural Sciences
Research Group of Crop Science
Supervisors: Dr. Eduardo Pérez, Prof. Achim Walter

Sucrose metabolism during drought stress in *Arabidopsis thaliana*

This project investigates sucrose metabolism and its role during drought stress, an environmental constraint to plant productivity. The accumulation of sucrose represents one of the mechanisms for plants to withstand drought stress.

ARIANNA NIGRO

According to the FAO and UNESCO, 20% of the cultivated land worldwide is impaired by drought and salinity, and these areas are constantly growing due to global climate change. Moreover, water is an increasingly scarce resource given current and future human population and societal needs. Thus, understanding the mechanisms of plant adaptation to the changing environment is critical for the development of crop plants able to withstand salt and drought stress. Sucrose is the most common form of carbohydrate transported from source (leaf) to sink organs (mainly roots). In sink organs, sucrose is broken down to provide carbon and energy for growth and accumulation of storage reserves. Sucrose is also present in guard cells – pairs of specialized cells located in the leaf epidermis of plants which allow gas exchange, while limiting loss of water.

*“My investigations have the potential to identify key components mediating stress responses in the model plant *Arabidopsis thaliana*, enabling to initiate improvements in plants of economic importance.”*

Arianna Nigro
University of Zurich, Institute of Plant Biology
Supervisor: Dr. Diana Santelia

Sucrose in guard cells promotes stomatal pore opening during the afternoon, but it can also promote stomatal pore closure during stress conditions.

The objective of my research is to employ molecular and biochemical approaches to unravel the role and mechanism of sucrose accumulation in the guard cells of the model plant *Arabidopsis thaliana* during the diurnal cycle and in response to drought stress. The development of a method to measure the levels of sugars in guard cells of wild type plants and plants lacking sugar transporter/s is one of the challenges of my PhD project.

Secondment

Arianna will spend six months at the PSI (Photon Systems Instruments) in Czech Republic. She will take advantage of its state-of-the-art facilities for screening of sucrose mutants. Arianna will employ the automated system for large-scale phenotyping of plant drought stress tolerance, to identify new components of the guard cells carbon-related stress response pathway. This analysis will include chlorophyll fluorescence imaging, thermal imaging, Red-Green-Blue imaging, hyperspectral analysis and kinetic measurements under various abiotic conditions.

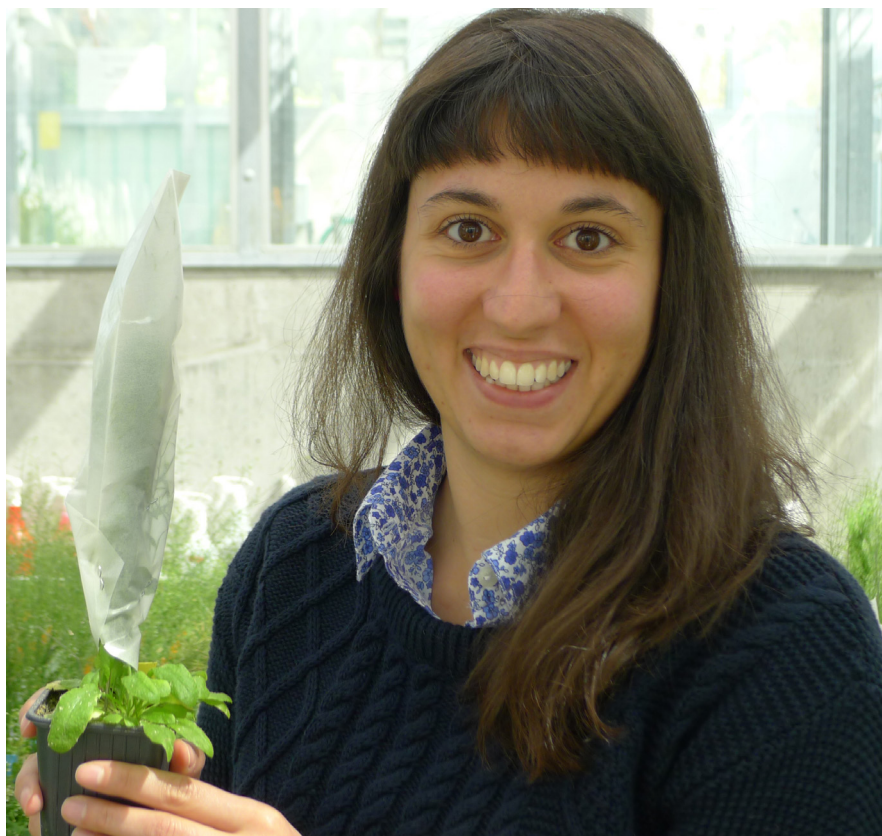
About the organization

PSI designs and manufactures sophisticated, high-end instrumentation for research in biological sciences.

<http://psi.cz/>

Associate partner

Dr. Klara, Simkova, PSI, Czech Republic



Using epigenetics to help improve plant breeding in organic farming

Genetically modified organisms (GMOs) are the source of controversy that has divided Swiss and European communities. With the prohibition of green biotechnology in the organic sector, new and innovative strategies for plant breeding are urgently required.

MICHAEL THIEME

The latest advances in green biotechnology, which allow the development of plants with completely new properties that are transferred from other species, offers undreamed-of possibilities. However, green biotechnology may also have disadvantages.

In this project, we will make use of naturally occurring alterations in the genome structure and gene expression of plants under suboptimal conditions (e.g. heat stress). These so called epigenetic changes of selected traits are useful if they are also transferred to the next generation. First, experiments will be conducted under controlled conditions with the model plant *Arabidopsis thaliana*. After the proof of concept in the laboratory, our revolutionary breeding approach that does not make use of

genetic engineering, will be adapted to soybean.

Discussion of this innovative method with politicians, stakeholders from the organic farming sector and the public will be an important component of my project. Against the backdrop of the heated debate on GMOs, it will be important to emphasize the differences between our approach and breeding strategies that are based on conventional green biotechnology.

Secondment

Michael will spend three months at the **Research Institute of Organic Agriculture (FiBL)** in Switzerland. Here the connection between experiments with the model organism *A. thaliana* and the crop soybean will be established. Michael will also use FiBL's network and contacts for the policy-related aspects of his project.

About the organization

FiBL is an independent, non-profit research institute with the aim of advancing cutting-edge science in the field of organic agriculture. It is one of the world's leading information and documentation centers for organic agriculture.

www.fibl.org/

Associate partner

Dr. Monika Messmer, FiBL, Switzerland



Michael Thieme
University of Basel, Botanical Institute
Supervisors: Dr. Etienne Bucher and Prof. Thomas Boller

Join the 1st Annual Meeting 27 -29 Oct 2014

At this event, all fellows, PIs and associated partners will meet and discuss research progress and strategic reflections

Monday, October 27, 2014

Morning	Individual Thesis Committee meetings, time and location to be organized individually
Afternoon	Individual arrival at the Boldern
19.00	Joint dinner
20.00	Targeted mentoring with the IDP BRIDGES Angels: Dr. Gunther Festel, Regina Ammann, Dr. Gerlind Wallon and Dr. Michele Garfinkel

Tuesday, October 28, 2014

8.00	Breakfast
9.00–13.00	PhD Retreat Part I
13.00	Lunch
14.00–18.00	PhD Retreat Part II
18.15	Dinner
19.15- 21.15	Social Event

Wednesday, October 29, 2014

8.00	Breakfast
9.00-13.00	Workshop on impact analysis moderated by Beno Baumberger, Mercator Foundation Switzerland. For all Fellows. <i>In parallel:</i> Supervisory Board Meeting (all PIs, associated partners, invited experts and mentors)
13.00	Lunch
Afternoon	Departure or time for Individual Thesis Committee meetings, time and location to be organized individually

Program and registration:

<https://www.registration.ethz.ch/spsw/>

Admission is free of charge, but registration is required.

Location:

The Conference Center Boldern in Männedorf (approx. 20 km from Zurich) is the first hotel in Switzerland to be awarded the European Ecolabel Tourism. It offers great views over Lake Zurich and the Central Swiss Alps.

www.boldern.ch

PhD Retreat

At the PhD retreat, students will present and discuss their research with peers, supervisors and associated partners.

Mentoring

Some of our mentors will be available for individual or group meetings:

Dr. Gunter Festel: on putting innovation into practice, learning about start-ups and how to fund them

Regina Ammann, Syngenta: on broadening professional networks, how industry fits into the Science - Policy- Agriculture framework

Dr. Michele Garfinkel and **Dr. Gerlind Wallon,** EMBO: Career development, activities for promoting young researcher careers

Consortium: ETH Zurich, University of Zurich, University of Basel
Coordinator: Prof. Samuel C. Zeeman, ETH Zurich
Project Management: Dr. Melanie Paschke, Zurich-Basel Plant Science Center
Project Officer: Dr. Andrea Pfisterer, Zurich-Basel Plant Science Center
Financial Administration: Romy Kohlmann, Zurich-Basel Plant Science Center

Principal Investigators

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University of Basel: Dr. Etienne Bucher, PD Dr. Mikhail Pooggin, Prof. Thomas Boller, Prof. Ansgar Kahmen, Prof. Jürg Stöcklin

University of Zurich: PD Dr. Diana Santelia, Prof. Bernhard Schmid, Prof. Pascal Niklaus, Prof. Ueli Grossniklaus

Fellows

ETH Zurich: Guillaume Lacavé, Devang Mehta, Wuyan Wang, Timothy Sykes, Lisa King, Charlotte Pavageau

University of Basel: Silvia Turco, Claudia Hahn, Michael Thieme, Constantin Pöll, Lukas Schütz

University of Zurich: Arianna Nigro, Yuanyuan Huang, Margarida Sofia Nobre

Associated Partners

Dr. María Elvira Zúñiga - Centro Regional de Estudios en Alimentos Saludables, CREAS, Chile

Prof. Maria Emma Christine Rey - University of Witwatersrand, South Africa

Dr. Monika Messmer, Dr. Lucius Tamm and Dr. Paul Mäder - Research Institute of Organic Agriculture, FiBL, Switzerland

Dr. Willy Kessler and Dr. Andreas Lüscher - Agroscope Reckenholz, Switzerland

Dr. Klara Simkova - PSI, Czech Republic

Dr. Kebebew Assefa - Ethiopian Inst of Agricultural Research, Ethiopia

Dr. Zerihun Tadele - University of Bern, Switzerland

Dr. Torben Asp - Aarhus University, Denmark

Prof. David S. Wilcove - Princeton University, USA

Dr. Anja Gassner, Dr. Philippe Vaast and Dr. Robert Nasi - CGIAR

Dr. Uma Shaanker - ATREE, India

Prof. Ma Keping - Chinese Academy of Sciences, China

Dr. Daniela Pauli and Prof. Markus Fischer - Swiss Biodiversity Forum, Switzerland

Dr. Samuel Vogel - Federal Office for Agriculture, Switzerland

Dr. Richard Jefferson - CAMBIA, Australia

Mentors

Dr. Gerlind Wallon - EMBO Deputy Director, Manager for Women in Science Activities, EMBO Young Investigator Program

Dr. Michele Garfinkel - EMBO Science Policy Program

Regina Ammann - Head of Public Policy, Syngenta International AG

Dr. Gunter Festel - FESTEL CAPITAL

Work Package MANAGEMENT

Lead: Dr. Melanie Paschke

Work Package RESEARCH

Lead: Prof. Samuel C. Zeeman

Work Package TRAINING

Lead: Dr. Melanie Paschke

Work Package EXPLOITATION

Lead: Dr. Manuela Dahinden

Work Package OUTREACH

Lead: Dr. Manuela Dahinden

IDP BRIDGES is an Innovative Doctoral Program supporting 14 PhD students work in the most challenging areas of the plant sciences and policy. This project has received funding from the European Union's Seventh Framework Programme for research, technological development and demonstration under grant agreement no PITN-GA-2013-608422 – IDP BRIDGES. It is coordinated by the Zurich-Basel Plant Science Center as a competence center linking and serving the plant science research community of the University of Zurich, ETH Zurich and University of Basel.

Our twice-yearly newsletter is distributed to all IDP BRIDGES participants and other interested people in our network. It will provide information about scheduled training and outreach events as well as highlights of significant research results and policy outcomes.

Contributions are always welcome! If you are interested in contributing to the next issue, please contact andreapf@ethz.ch

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PSC team, except:
Page 2: Eragrostis tef, http://en.wikipedia.org/wiki/Eragrostis_tef
Front page: Samuel Beckett bridge, Dublin
<http://www.cityvision.org.au/2012/01/myths-about-the-perth-foreshore-plan/>

