



WFSC Newsletter Issue 13

July 2020

Center News

COVID-19 Lockdown

By 16 March, ETH Zurich was in emergency operations; staff shifted to home office and classes moved online. During these challenging times, we wanted to stimulate a discussion on important and pressing issues of the global food system. We, therefore, shared stories about how the COVID-19 pandemic is affecting food systems and food and nutrition security worldwide using our multiple social media platforms. Michelle Grant also highlighted how COVID-19 is affecting food systems at a session of the ETH SDG Lecture Series in May. In July, WFSC alumni and researchers heard from two inspiring entrepreneurs supporting regional food networks during the pandemic in the Philippines.

The situation has greatly improved here in Switzerland, with social gatherings again allowed. Looking forward, we plan to move fall events online, taking this as an opportunity to reach a global audience and include more diverse voices from overseas. We also still intend to keep sharing stories of continued food insecurity and inequalities worldwide. Please feel free to comment, share, and contribute to these discussions.

Annual Report

All of our events, activities, and educational offerings aim to highlight, discuss, and disseminate current topics and results from research conducted in our 46 member groups. In our Annual Report 2019, published in April, we look back with joy and gratitude on the year that has past. **Download online**



New member

We welcome Ferdinand von Meyenn as a new member! Prof. von Meyenn leads the Laboratory of Nutrition and Metabolic Epigenetics in the ETH Zurich Department of Health Sciences and Technology. The group aims to gain insights into the complex relationship between nutrition, metabolism, and the epigeno-

me. They are interested in both fundamental biological discovery and potential therapies for human metabolic diseases. In particular, the impact of nutrition and food additives on (patho)physiology is an important aspect of their work. **Visit the group webpage**





Members of the Laboratory of Nutrition and Metabolic Epigenetics study the effects of nutrition on mammalian development.



Research

Future Food Initiative

ETH Zurich and EPFL launched the Future Food Initiative in 2018 together with Swiss food industry leaders Bühler, Givaudan, and Nestlé as the first partners on board. The goal of the initiative is to expand research and education in the area of food and nutrition sciences. The Future Food Fellowship is a postdoctoral program for exceptionally qualified young researchers who propose projects targeting future food issues, such as nutrition, production, packaging, and digital health.

In June, the Evaluation Board selected five new fellows to start in 2021. We are excited about the interesting projects and highly motivated candidates. The new fellows will work on topics such as production of meat analogues and protein-enriched beverages, personalized nutrition, and sustainable packaging materials. Learn more: https://futurefoodinitiative.ch/

The research of Future Food Fellows Niloufar Sharif and Marianna Fenzi were recently featured in EPFL news. Also, Joan Oñate Narciso wrote a Food Systems Stories blog about a Grow-It-Yourself (GIY) Feeding Program in Cebu, Phillipines.

WFSC Research Programs

Loads of updates about projects funded through the Center's Research Programs can be found at https://worldfoodsystem. ethz.ch/research/research-programs.html

Flagship Project: Enhancing Resilience in Food Systems

The RUNRES project (Rural-Urban Nexus: Establishing a nutrient loop to improve city-region food system Resilience) just completed its first full year. RUNRES seeks to build a circular food system predicated on the recycling of human and organic urban waste in Arba Minch, Ethiopia; Kigali, Rwanda; Bukavu, DRC; and Msunduzi, South Africa.



RUNRES Innovation Workshop in Bukavu, DRC in February 2020.

As a transdisciplinary project that emphasizes community participation and input, the RUNRES team spent the first year conducting context studies to become familiar with the local socioecological environment and existing stakeholder networks in each of the four project sites. In each country, project scientists



A proposed RUNRES innovation will compost collected organic material to produce a high-quality soil amendment (Collection in Arba Minch, Ethiopia).

and coordinators conducted literature searches, surveys, and site visits and held stakeholder workshops in order to better understand the local conditions and to build joint understanding with the stakeholders. The goal of this work has been to facilitate the selection of locally appropriate innovations that will enable the project to capture, process, and reuse organic and human waste. These innovations will make it possible to improve the sustainability and resilience of local food systems.

These efforts are now bearing fruit. At each project site, community stakeholders, working with the support of RUNRES scientists, have produced creative, well-designed innovation plans capable of transforming the rural-urban nexus. With locally appropriate plans almost finalized, the RUNRES team will now proceed to realize these plans over the next three years. RUN-RES is a multi-year research for development project funded by the Swiss Agency for Development and Cooperation.

For many project reports and to learn more about this Flagship project, visit www.resilientfoodsystems.ethz.ch.

Flagship Project: Novel Proteins for Food and Feed

This Flagship project aims to develop food innovations to provide new sources of sustainable and nutritious protein for a growing world population. Recent publications include the first study to **simulate midgut digestion for black soldier fly larvae (BSFL)** to estimate biowaste conversion performance as well as the development of **novel methods for BSFL research**. Another provides a **functionality assessment of** *Spirulina* **algae protein**. The findings help optimize the efficiency of raw material usage.

In February, Principal Investigator Prof. Alexander Mathys was named the 2020 recipient of the IFT W.K. Kellogg International Food Security Award and Lectureship, based on the submitted topic of black solider fly-based waste utilization for more sustainable feed production. Further, in May, Alexander Mathys was appointed as Governing Council Member of the International Centre of Insect Physiology and Ecology (ICIPE). He is also part of the newly convened Nature Sustainability and the Cornell Atkinson Center for Sustainability Expert Panel titled 'Innovations to build sustainable, equitable, inclusive food value chains.'

Visit the new project webpage to learn more!

WFSC member Dr. Jan Dirk Wegner, head of the EcoVision Lab at ETH Zurich, was recently selected to join the World Economic Forum's Young Scientists Community. He combines remote sensing imagery with machine learning to address issues such as biodiversity, deforestation, and sustainable supply chains.

Q: What were your first thoughts when you heard the news that you were selected to join World Economic Forum's Young Scientists community?

A: I think it's absolutely fantastic. I was quite thrilled and delighted to be selected into this group of 25 young scientists. It's refreshing for me because it gets me out of my technical, scientific niche.

Q: What has your experience with the community been thus far? Are there plans for you all to somehow work together in the future?

A: We originally planned to all meet in Shanghai. But, of course, all this, for obvious reasons, did not materialize. So we had virtual meetings, and I really enjoyed meeting with these people because you immediately find out that you have a lot of common thoughts.

Q: The EcoVision lab develops maps that show parameters such as biodiversity, agricultural use, or deforestation. You have made the maps and software available for download and use by public platforms. Why is this aspect of open access so central to your work?

A: I think the first thing is transparency. That people can really see what we did, and how we implemented it. And then repeatability, that people can repeat our results and see what we did. And third, they can take it as a basis and develop something much more exciting than what we did from there.

Q: EcoVision Lab is part of ETH for Development (ETH4D) as well as the World Food System Center. What is it about such collaborative initiatives with goals of sustainability that you find important?

A: The first thing why I'm involved in such centers is that I enjoy interdisciplinary research very much. Our team has mainly a computer science or engineering background, so we really want to collaborate with domain experts in environmental and agricultural sciences to learn about particular problems because we don't have the expertise. I also believe that it is absolutely essential that we share our expertise and knowledge with our colleagues in countries under development. I want to increase connections. I [also] want to motivate more colleagues from my field



to create something for human and social well-being and to work globally.

EcoVision lab members.

This is an excerpt of a recent interview with Jan Dirk Wegner. Read the entire interview on the WFSC news channel and a profile in ETH News. Prof. **Alexander Mathys** leads the Sustainable Food Processing group at ETH Zurich and is the Principal Investigator for the WFSC Flagship project on Novel Proteins for Food and Feed. In interview, he talks about sustainable food innovations and his thoughts about future food.



Q: Your research group has developed many technology innovations to make food production and processing more sustainable. What do you see as the main trends to reduce the environmental footprint of food?

A: Several animal-based protein rich foods and feeds are linked to significant sustainability issues.

Therefore, this is one of our main targets for innovations, with focus on novel proteins from microalgae as single cell systems and insects as alternative animal based source.

Q: The new webpage of the Flagship project highlights many innovations using insects to convert biowaste to feed. What do see as the next steps for this technology?

A: This is a huge new innovation field, where we are glad to contribute to with our awesome global team from academia, applied R&D centers, and industry. Current research avenues include safety concepts of insect-based food and feeds, waste streams as substrate for insects based on circular economy principles, microbiota of insects and substrates, emerging processing concepts for the new insect factories, and improved sustainability assessments.

Q: You were recently appointed as Governing Council Member of the International Centre of Insect Physiology and Ecology (ICI-PE). What do you feel is the importance of your participation both for the Flagship project and for you?

A: I am very glad about this appointment, as I would love to share our most recent know-how regarding insect production and processing for food and feed applications. Contributing to the excellent icipe network could increase the impact of our research.

Q: Besides working with insects, your research group has designed and analyzed innovations to make microalgae production sustainable for food applications. What do you see as the current hurdles to large-scale production and consumption of microalgae?

A: Many microalgae based products are not competitive on a large scale yet, mainly due to the limited technology readiness level and lack of economy of scale. Once these hurdles are overcome by production and process innovations, incorporating microalgae as food ingredients will not only provide interesting

potential health benefits but could also contribute to improving issues related to sustainability and food security.



Sustainable Food Processing group.

This is an excerpt of a recent interview with Alexander Mathys. Read the entire interview on the WFSC news channel.

Outreach and Education

Delivering Food Security on Limited Land

The international consortium Delivering Food Security on Limited Land strived to examine feedbacks and interactions between land use change and food security dynamics. The project, with its many collaborators, concluded that food and nutrition security cannot be achieved under current soil management regimes when global population increases as projected. However, a combination of three elements, i.e. sustainable intensification, lower consumption of livestock products, and waste reduction by 50% of current levels, is indeed able to provide food and nutrition security on limited land area and poor soil quality.

The project was supported by national funding bodies, coordinated through the Belmont Forum and the FACCE-JPI Initiative. The Center, with Prof. Nina Buchmann as Principal Investigator, led the stakeholder engagement and knowledge exchange activities for the consortium. Education and outreach outputs included developing and coordinating summer schools, publishing articles about teaching methods for complex systems, and collaborating to produce public outreach materials.

Find out more at http://deliveringfoodsecurity.org.



FAO Course on Food Security

Since 2014, the WFSC has collaborated with the Food and Agriculture Organization of the United Nations (FAO) and the Sustainable Agroecosystems Group to offer a three-day course for ETH Zurich Master's students at the FAO headquarters in Rome. This year, the course moved online, with a program of webinars allowing the students to directly interact with experts from FAO and IFAD. Students have the opportunity to further discuss their suggestions in an event organized by the Swiss Representation to FAO/IFAD and WFP this autumn. This event, set-up as a critical debate, aims to stimulate discussions at a multinational level in preparation of next year's UN Food Systems Summit. **Read more**



FAO Course on Food Security moved online in June.

Investing in Food Systems Transformation

During the World Economic Forum in Davos, Switzerland, over 80 decision makers from sectors of the food system came together for a High Level Dialogue "Investing in Food Systems Transformation." The event on 22 January, co-organized by the Swiss Federal Office for Agriculture and the Food Systems Dialogues, started with a keynote by Swiss Federal Councilor Guy Parmelin and led into a panel discussion with several food system experts. WFSC Michelle Grant moderated the panel, which included the President of the World Farmers' Organization and the FAO Director General. The panel discussion was followed by a session of Food Systems Dialogues.



WFSC Alumni Network Workshop in Assam (Image: WFSC).

WFSC Alumni Network

The World Food System Center Alumni Network (WFSCAN), founded in 2018 by alumni of the World Food System Summer School, aims to cultivate an active network that collaborates and drives change towards sustainable food systems. In January 2020, the alumni network organized a workshop at Pabhoi Greens, the organic farm of alumnus Neelam Dutta, in Assam, India. The interdisciplinary alumni group joined forces to brainstorm on three challenges that Neelam faces on his farm: how to efficiently scale the different parts of seed production, to generate effective seed marketing, and to improve the training of two women farming groups in the remote areas of Nagaland and Arunachal Pradesh. The workshop proved an excellent new format to strengthen the community, interchange and acquire knowledge, as well as support individual WFSCAN members. **Read more in WFSC News**

"Having the chance to bounce around ideas, on-site, with colleagues from different backgrounds was enriching," remarked a participant, "each adds to the bigger picture."

Milena Wiget shared her experiences from Assam in the Food System Stories blog: **The culture in agriculture is essential**.

WFSCAN Personal Development Courses

The WFSCAN requested professional skill courses to help them in their journey to make change in the food system, and, in reply, the WFSC will organize a set of personal development courses over the next three months. The sessions will focus on finding a meaningful job in the food system space, mindfulness for food system professionals, and time management.

Member Highlights

The Früebüel research station completed renovation and extension for research on cattle, sheep, and deer. The station is part of AgroVet–Strickhof, a research collaboration supported by ETH Zurich, University of Zurich, and Strickhof. **Michael Kreuzer** is part of the directorate. **More in ETH News**

Rachael Garrett appointed to both the Science Steering Committee of the Global Land Programme, which contributes to the implementation of research to advance sustainability transformations worldwide, and the UN Science Panel for the Amazon.

Achim Walter invited to become member of scientific advisory board of the Cluster of Excellence "PhenoRob – Robotics and Phenotying for Sustainable Crop Production" at the University of Bonn in Germany.

Bruno Studer part of team of authors from the Swiss Academy of Science Forum for Genetic Research publishing a new fact sheet on Plant breeding - from classic crossing to genome editing. The accompanying video explains four important breeding methods. Watch on YouTube



Alexander Mathys named the 2020 recipient of the IFT W.K. Kellogg International Food Security Award and Lectureship.

Melissa Terranova, former postdoctoral researcher in the group of Michael Kreuzer, appointed Head of Research of Agro-Vet–Strickhof in April.

The topic of this year's International Swiss Talent Forum was the world food system. **Nina Buchmann** served as Topic Leader and gave the Inspirational Keynote to the 70 invited international young prize winners.

Research from Agricultural Economics and Policy group of **Robert Finger** featured in ETH News in February: **Biodiversity** yields financial returns.

Study from Biocommunication group of **Consuelo De Moraes** featured in ETH News in June: **Bumblebees speed up flowering**.

Emma Wetter Slack and **Shana Sturla** among researchers highlighted in ETH news in April: Research into drugs and vaccines to combat COVID-19.

Enhancing biodiversity to support sustainable crop production

At the session "Enhancing Biodiversity to Support Sustainable Crop Production" at the World Biodiversity Forum held on 28 February 2020 in Davos, policy makers, scientists, and practitioners shared the current state-of-the-art and challenges of intercropping. **Christian Schöb** and **Johan Six** from ETH Zurich and Rob W. Brooker from The James Hutton Institute convened the session.

Overall, the session demonstrated that diverse cropping such as intercropping and agroforestry are valuable and promising methods to achieve a sustainable production of food. **Read more in WFSC News**

Sharing research insights by storytelling

The **Sustainable Agroecosystems group** has received funding for the new science communication project "Edible research goes storytelling: Participative design of an interactive art-science exhibition on food value chains." The Swiss National Science Foundation Agora project will start in February 2021.

The goal of new project will be to jointly design and implement an interactive exhibition on food system stories by Swiss secondary school students and scientists. The exhibition will be an installation that consists of large displays with photographs representing the main components of the food value chain, i.e. agricultural production, processing, retailing, and consumption – from field to fork. The stories behind these photographs will be brought to life through augmented reality features such as videos, audio, and illustrations.

Food System Stories

This creative blog space of the WFSC alumni community offers a platform to share stories. Recent stories include those from Lukas Wille on plant-microbe interactions and Sophie Lamond on racial injustice in the food sytem, as well as a series of posts from students of the 'Tropical cropping systems, soils and livelihoods' course.

Follow the blog at www.foodsystemstories.org/



Becoming friends (Image: Federico Ferrari).

Below is a selection of recent publications from WFSC members that highlight their work on food system topics.

Canxi Chen, C.; Chaudhary, A.; Mathys, A. Nutritional and environmental losses embedded in global food waste. *Resour. Conserv. Recy.* **2020.** https://doi.org/10.1016/j.resconrec.2020.104912

Castellano M.J.; Archontoulis, S.V.; Helmers, M.J.; et al. Sustainable intensification of agricultural drainage. *Nature Sust.* **2019**. https://doi.org/10.1038/s41893-019-0393-0

Dalhaus, T.; Schlenker, W.; Blanke, M.; et al. The effects of extreme weather on apple quality. *Sci. Rep.* **2020**. https://doi.org/10.1038/s41598-020-64806-7

Fuchs, K.; Merbold, L.; Buchmann, N.; et al. Multi-model evaluation of nitrous oxide emissions from an intensively managed grassland. *Biogeosciences* **2020**. https://doi.org/10.1029/2019JG005261

Hgaza, V.K.; Oberson, A.; Kiba, D.I.; et al. The nitrogen nutrition of yam (*Dioscorea spp*). J. Plant Nutr. **2020**. https://doi.org/10.1080/0 1904167.2019.1659315

Jacobi, J. Llanque, A.; Bieri, S.; et al. Utilization of research knowledge in sustainable development pathways: Insights from a transdisciplinary research-for-development programme. *Environ. Sci. Policy* **2020**. https://doi.org/10.1016/j.envsci.2019.10.003

Klaus, V.H.; Whittingham, M.J.; Báldi, A.; et al. Do biodiversity-ecosystem functioning experiments inform stakeholders how to simultaneously conserve biodiversity and increase ecosystem service provisioning in grasslands? *Biol. Conserv.* **2020.** https://doi. org/10.1016/j.biocon.2020.108552

Lee J.; Necpálová, M.; Six, J. Biophysical potential of organic cropping practices as a sustainable alternative in Switzerland. *Agr. Syst.* **2020.** https://doi.org/10.1016/j.agsy.2020.102822

Loera-Sánchez, M; Studer, B.; Kölliker, R. DNA-Based assessment of genetic diversity in grassland plant species. *Agron.* **2019**. https:// doi.org/10.3390/agronomy9120881

Loera-Sánchez, M.; Studer, B.; Kölliker, R. DNA barcode TrnH-PsbA is a promising candidate for efficient identification of forage legumes and grasses. *BMC Res. Notes* **2020**. https://doi.org/10.1186/ s13104-020-4897-5

To subscribe or read online: http://www.worldfoodsystem.ethz.ch/news

> Follow us on Twitter www.twitter.com/ethzWFSC

Follow us on LinkedIn

World Food System Center - ETH Zurich

McLaren, T.I.; Smernik, R.J.; McLaughlin, M.J.; et al. The chemical nature of soil organic phosphorus – A critical review and global compilation of quantitative data. *Adv. Agr.* **2020**. https://doi. org/10.1016/bs.agron.2019.10.001

Möhring, N.; Bozzola, M.; Hirsch, S.; et al. Are pesticides risk decreasing? The relevance of pesticide indicator choice in empirical analysis. *Agr. Econ.* **2020**. https://doi.org/10.1111/agec.12563

Möhring, N.; Wüpper, D.; Musa, T.; et al. Why farmers deviate from recommended pesticide timing: The role of uncertainty and information. *Pest Manag. Sci.* **2020**. https://doi.org/10.1002/ps.5826

Reineke, K.; Mathys, A. Endospore inactivation by emerging technologies: A review of target structures and inactivation mechanisms. *Annu. Rev. Food Sci. Technol.* **2020**. https://doi.org/10.1146/annurev-food-032519-051632

Schaub, S.; Finger, R.; Leiber, F.; et al. Plant diversity effects on forage quality, yield and revenues of semi-natural grasslands. *Nature Comm.* **2020**. https://doi.org/10.1038/s41467-020-14541-4

Schaub, S.; Lüscher, A.; Buchmann, N.; et al. Economic benefits from plant species diversity in intensively managed grasslands. *Ecol. Econ.* **2020**. https://doi.org/10.1016/j.ecolecon.2019.106488

Siegrist, M.; Hartmann, C. Consumer acceptance of novel food technologies. *Nature Food* **2020**. https://doi.org/10.1038/s43016-020-0094-x

Van De Broek, M.; Bugge Henriksen, C.; Bahadur Bhim, G.; et al. Assessing the climate regulation potential of agricultural soils using a decision support tool adapted to stakeholders' needs and possibilities. *Front. Environ. Sci.* **2019**.

https://doi.org/10.3389/fenvs.2019.00131

Wuepper, D.; Wimmer, S.; Sauer, J. Is small family farming more environmentally sustainable? Evidence from a spatial regression discontinuity design in Germany. *Land Use Policy* **2020**. https://doi. org/10.1016/j.landusepol.2019.104360

Zu Ermgassen, E.K.H.J.; Ayre, B.; Godar, J.; et al. Using supply chain data to monitor zero deforestation commitments: an assessment of progress in the Brazilian soy sector. *Environ. Res. Lett.* **2020.** https://doi.org/10.1088/1748-9326/ab6497

Contact:

ETH Zurich World Food System Center Stampfenbachstrasse 52 STE K 15 8092 Zurich Switzerland

www.worldfoodsystem.ethz.ch