ETH zürich

World Food System Center Research Symposium 2019

Program and Posters

Thursday, 31 October 2019 | 17.15 - 21.00 | ETH Zurich, Audi Max (HG F 30)

This public symposium showcases research that the World Food System Center supports as well as other food system relevant research at ETH Zurich. This year's program will focus on contributions from current research to sustainable food systems and reaching the Sustainable Development Goals of the UN Agenda 2030.

The main program starts with a keynote address on the Future Food Initiative by Prof. Detlef Günther, ETH Zurich VP Research and Corporate Relations. The presentation sessions will feature presentations from five concluding research projects focused on (1) Nutritious, Safe and Sustainable Food for All and (2) Healthy Soils, Improved Livelihoods. A networking poster session focusing on ongoing research and Center activities offers you the chance to interact directly with researchers.

www.worldfoodsystem.ethz.ch

World Food System Center

The UN Sustainable Development Goals

The 17 Sustainable Development Goals (SDGs), with their 169 targets, form the core of the 2030 Agenda. They balance the economic, social, and ecological dimensions of sustainable development, and place the fight against poverty and sustainable development on the same agenda for the first time.

The SDGs are to be achieved around the world, and by all UN member states, by 2030. Created through a multi-stakeholder approach, all states, including Switzerland, are called upon to implement the Goals by working together with business, NGOs, governments, the United Nations, and other actors. Only if all equally play their part, can we find shared solutions to the world's urgent challenges.

ETH Zurich is committed to sustainability in its core areas of research, teaching, campus, and dialogue with society. It furnishes the technical and scientific know-how for the long-term conservation of our planet's resources, trains people to achieve these goals, integrates sustainability as a principle into its decisions and actions, and is committed to dialogue with society for sustainable development in Switzerland and worldwide. Our work at the World Food System Center contributes directly to many of the United Nations Sustainable Development Goals, including Zero Hunger, Sustainable Consumption and Production, and Good Health and Well-Being.

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Program

17:15	**Welcome and Introduction**	**Presented by:** **Prof. Michael Siegrist &** **Dr. Martijn Sonnevelt**
17:25	**Keynote on the Future Food Initiative**	**Prof. Detlef Günther** Vice President Research and Corporate Relations
17:35	**Session 1: Nutritious, Safe and Sustainable Food for All**	
	New sustainable food formulations based on algae proteins	**Leandro Buchmann** Sustainable Food Processing
	Application of *Lactobacillus reuteri* to naturally prevent *Campylobacter* colonization of chicken	**Dr. Anna Greppi** Laboratory of Food Biotechnology
	Towards nutritional security through organic management of soil fertility in orange-fleshed sweetpotato systems in Mozambique	**Rafaela Feola Conz** Sustainable Agroecosystems
18:20	**Session 2: Healthy Soils, Improved Livelihoods**	
	Microbial services for an environmentally and economically sustainable rooibos tea production	**Josep Ramoneda** Plant Nutrition
	Nitrified urine fertilizer: A transdisciplinary approach to solutions-oriented community development	**Ben Wilde** Sustainable Agroecosystems
18:50	**Concluding remarks**	
19:00	**Networking Poster Session and Reception**	
20:45	**Voting for Poster Session closes**	
21:00	**Symposium ends**	

Presentations

The Center's Research Programs support new cross-disciplinary and solution oriented research to address food system challenges, with 33 projects totaling nearly 9 million CHF funded to date.

All projects are subject to a rigorous evaluation and an assessment process that takes into account scientific excellence and relevance to the programs. To fund these programs, we established the World Food System Grants Platform, which allows for working with industry and foundation partners in a pre-competitive way that ensures academic independence and industry relevance.

Our two current research programs, the Mercator Research Program on Organic Production Systems for Global Food Security and the Coop Research Program on Sustainability in Food Value Chains, provide support for new projects.

The **Mercator Research Program** on Organic Production Systems, funded by the Mercator Foundation Switzerland, supports research, education, and outreach that explores the role and potential of organic production systems (certified or non-certified) to contribute to global food security.

The **Coop Research Program** on Sustainability in Food Value Chains, supported by the Coop Sustainability Fund, enables research that addresses challenges and opportunities for sustainability in food value chains.

The Center strives to work together with others in partnerships to achieve together what no partner could achieve on their own. We formally develop both strategic and collaborative partnerships, and, in addition, we indirectly foster new partnerships at the project level. This partnership approach, which we developed during our first phase of operations, has been critical to the Center's success.

Presentation Abstracts

Session 1: Nutritious, Safe and Sustainable Food for All

Title: New sustainable food formulations based on algae proteins (NewAlgae)

Authors: Leandro Buchmann, Lukas Böcker, Martin Caporgno, Iris Haberkorn, Alexander Mathys
Sustainable Food Processing, ETH Zurich

Abstract: Currently, challenges derived from a growing world population and simultaneously decreasing arable land in combination with global warming require a change in supply chains. Microalgae could enable food production concepts considerably more sustainable than the existing value chains, as they could grow on infertile land with a high biomass productivity by using combustion gas as a CO_2 source to generate a wide range of food, material and energetic products. The principle objective of NewAlgae was the interdisciplinary development of innovative up- and downstream algae processing based on electroporation stress induction during cultivation, gentle extraction, advanced characterisation of techno-functional protein properties and further translation into the development of new product applications. Based on in-depth process characterization, the increase in cell proliferation by up to 15% of the prokaryotic microalgae *Arthrospira platensis* after nanosecond pulsed electric field treatment (nsPEF) could be demonstrated, while simultaneously increasing the economically highly relevant protein-pigment complex phycocyanin by up to 20% and maintaining the techno-functional properties of remaining *A. platensis* fractions. The project therefore supported the way towards global food security by technology driven innovations and specific product applications, with a direct impact on the achievement of at least five of the 17 Sustainable Development Goals.

This research is supported by the WFSC Coop Research Program. Further information is available at http://www.worldfoodsystem.ethz.ch/research/research-programs/CRP/NewAlgae.html.

Notes:

Session 1: Nutritious, Safe and Sustainable Food for All

Title: Application of *Lactobacillus reuteri* for naturally prevent *Campylobacter* colonization of chicken (Campy Chick)

Authors: Paul Tetteh Asare[a], Anna Greppi[a], Clarissa Schwab[a], Roger Stephan[b], Christophe Lacroix[a]

[a]Laboratory of Food Biotechnology, ETH Zurich; [b]Institute for Food Hygiene and Safety, University of Zurich

Abstract: Chicken meat is the main source for *Campylobacter* infection in humans. Campylobacteriosis is the most frequently reported food-borne illness in the European Union, linked to large economic losses. *Lactobacillus reuteri* is a commensal in chicken gastrointestinal tract (GIT) with the ability to produce reuterin from glycerol, a potent broad spectrum antimicrobial system.

The project investigates a novel microbial-based approach to naturally reduce *Campylobacter* contamination of chicken flocks using reuterin. We hypothesize that administration of reuterin-producing *L. reuteri* chicken isolates together with glycerol enables colonization in chicken GIT preventing *Campylobacter* colonization. We isolated 23 *L. reuteri* reuterin producers from chicken GIT, sequenced their whole genomes and assessed the absence of transmissible antibiotic resistant determinants. Strains produced high yield of reuterin, between 156 and 330 mM, from 600 mM of glycerol, and were sensitive to cefotaxime and penicillin. Reuterin was tested on a large panel of *C. jejuni* and *C. coli* isolates. Very low concentration of reuterin (1.5 and 3.0 µM, expressed in acrolein, the main active component of reuterin), completely inhibited the growth of all strains.

Our results show for the first time the high activity of reuterin for naturally preventing *Campylobacter* contamination in chicken flocks and enhancing meat safety.

This research is supported by the WFSC Coop Research Program. Further information is available at http://www.worldfoodsystem.ethz.ch/research/research-programs/CRP/CampyChick.html.

Notes:

Session 1: Nutritious, Safe and Sustainable Food for All

Title: Towards nutritional security through organic management of soil fertility in orange-fleshed sweetpotato systems in Mozambique (ORMASP)

Authors: Rafaela Feola Conz[a], Engil Pereira[b], Maria Andrade[c], Johan Six[a]

[a]Sustainable Agroecosystems, ETH Zurich; [b]University of Texas, Rio Grande Valley; [c]International Potato Center, Mozambique

Abstract: Consumption of orange-fleshed sweetpotato containing a high concentration of β-carotene, an important precursor of vitamin A, was successfully adopted as a food-based strategy to combat vitamin A deficiency and malnutrition in Mozambique. However, sweetpotato cultivation removes high amounts of soil nutrients. In limited-resource communities, the absence of soil nutrient replenishment degrades the soil, threatening future food production. This study was conducted to investigate the potential of organic management of soil fertility to provide sufficient potassium, a limiting soil nutrient, for optimal plant performance, while preventing soil nutrient depletion and preserving the nutritional quality of storage root. Sweetpotato was fertilized with locally-sourced organic amendments (i.e.; poultry manure and cowpea residue), inorganic fertilizer and no amendment. Weed biomass incorporation was combined with the fertilizer treatments and compared to weed biomass removal. After two seasons, soil organic amendments preserved total carbon and nitrogen in soil, while non-amended and inorganic fertilized treatments depleted soil nutrient storage. Co-application of organic amendments and inorganic fertilizer preserved storage root yield and β-carotene concentration. This research demonstrated the beneficial effects of locally-accessible organic amendments in preserving soil fertility for long-term food production, supporting nutritional security. Moreover, the use of locally-accessible resources contributes to the development of sustainable food production systems.

This research is supported by the WFSC Mercator Research Program. Further information is available at http://www.worldfoodsystem.ethz.ch/research/research-programs/MRP/ORMASP.html.

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Session 2: Healthy Soils, Improved Livelihoods

Title: Microbial services for an environmentally and economically sustainable rooibos tea production (EcoInt)

Authors: Josep Ramoneda[a], Jaco Le Roux[b], Beat Frey[c], Hannes Gamper[d], Emmanuel Frossard[a]

[a]Plant Nutrition, ETH Zurich; [b]Biological Science, Macquarie University Syndney; [c]Rhizosphere Rocesses, WSL Birmensdorf; [d]Institute of Life Sciences, Scuola Superiore Sant Anna, Pisa

Abstract: The optimization of plant microbiomes in concert with soil fertility management can contribute to food security while minimizing environmental impacts of food production. Recent studies highlight that microbial diversity promotes the stability of microbiome functionality against stress, while the presence of particularly beneficial microbes contributes to particular functions being maximised. In South Africa, small-scale rooibos farmers are at risk due to increasing soil unproductivity, land ownership and ongoing desertification. Given the multiple associations of rooibos with both nitrogen-fixing rhizobia and mycorrhizal fungi, both in cultivated and wild rooibos populations, rooibos farmers have the opportunity to make use of a vast diversity of symbioses that could be optimized. We show that local fertilizer can be applied in rooibos nurseries to simultaneously promote larger rooibos plants and more diverse rhizobial communities. We found that particular rhizobium strains correlate significantly to plant functions, in particular to crop yield, root nodulation and nitrogen nutrition. Importantly, one of them dominated the roots of rooibos plants grown on mixtures of soils from cultivated and wild rooibos, a soil management measure that can also be implemented by rooibos farmers. In sum, we show that local, simple and low-cost soil management measures can improve benefits from rhizobial symbioses in rooibos, which could contribute to improving rural livelihoods and environmental sustainability in the long run.

This research is supported by the WFSC Mercator Research Program. Further information is available at https://worldfoodsystem.ethz.ch/research/research-programs/MRP/ecoint.html.

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Session 2: Healthy Soils, Improved Livelihoods

Title: Nitrified urine fertilizer: A transdisciplinary approach to solutions-oriented community development (NUFSOC)

Authors: Ben Wilde[a], Eva Lieberherr[b], Astrid Oberson[c], Engil Pereira[d], Alfred Odindo[e], Johan Six[a]

[a]Sustainable Agroecosystems, ETH Zurich; [b]Natural Resource Policy, ETH Zurich; [c]Plant Nutrition, ETH Zurich; [d]University of Texas, Rio Grande Valley; [e]University of KwaZulu-Natal

Abstract: The elimination of hunger and the increased provision of basic sanitation are the focus of two of the 17 Sustainable Development Goals (SDGs) of the UN Agenda 2030. Although traditionally viewed as distinct matters to be solved with disparate solutions, there is growing awareness that emerging ecological sanitation technologies have the potential to not only improve public health, but also to enhance sustainable agricultural production. In particular, a system designed and tested at the Swiss Federal Institute of Aquatic Science and Technology (Eawag), shows great promise as an ecologically sustainable, hygienically safe, and socially equitable alternative to traditional sanitation management that can, through the separation and biological processing of nitrogen- and phosphorus-rich urine, provide a sustainably sourced urine based fertilizer (NUF) to close the agricultural nutrient cycle. NUFSOC, through the design and implementation of a transdisciplinary research approach, sought to assess the biophysical and social implications of this novel fertilizer to support smallholder agricultural production in Kwazulu-Natal, South Africa. To do so, the following work packages were conducted: 1) a biophysical field experiment to quantify the agronomic and ecological implications of this amendment, 2) a participatory field trial to elucidate farmer perceptions of this fertilizer, and 3) an acceptance survey to understand consumer attitudes of food grown with NUF.

This research is supported by the WFSC Mercator Research Program. Further information is available at https://worldfoodsystem.ethz.ch/research/research-programs/MRP/NUFSOC.html.

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Posters

Poster Prizes

For our Networking Poster Session, the audience is kindly requested to cast their vote for which poster they would like to receive each prize. Ballot slips are available for all participants. Please place in the corresponding ballot box by 20:45.

We asked poster contributors to make their content visually accessible to a general public. Please judge the posters on the (1) excellence of content, (2) visual accessibility of content, (3) researcher interaction, and (4) relevance of the research to sustainable food systems and achieving the SDGs.

Best Overall Poster Prize: 1000 CHF award to be used for any food system related research, education, or outreach activity.

The Mercator Poster Prize: 1000 CHF to be used for any organic food or agriculture related research, education, or outreach activity. To be considered for this award, a poster should touch on the role of organic production systems in addressing food security.

-O denotes a poster is eligible for only the **Best Overall Poster Prize**

-OM denotes a poster is eligible for **both prizes**

Full poster abstracts are available at **www.bit.ly/wfsc-symposium2019**

Posters Overview

01-OM **Buckwheat for more diverse crop fields and diets**

Authors: M.M. Nay, E. Pérez, S.L. Byrne, A. Walter, B. Studer

Contribution to Sustainable Food Systems: Buckwheat is an excellent food crop for pollinators, livestock and human consumers alike. By determining the suitability of different buckwheat accessions for their cultivation in Switzerland, we provide farmers with a valuable alternative to the major crops currently grown.

02-OM **Effect of the total replacement of soybean by feeds from Black Soldier Fly larvae in egg production**

Authors: M. Heuel, C. Sandrock, A. Mathys, M. Gold, C. Zurbrügg, M. Kreuzer, M. Terranova

Contribution to Sustainable Food Systems: Caused by the high import rate for soybean in organic egg production it is important to investigate alternative and local protein sources. One of these could be insects. Therefore, it is important to examine their impact on the poultry performance.

03-OM **Measurement and optimization of iron bioavailability in sustainably produced insect based foods and estimation of the nutritional potential as an alternative dietary iron source in human subjects**

Authors: N. Hilaj, V. Galetti, P. Herren, D. Ambuhl, J. Grunder, M. Zimmermann, D. Moretti

Contribution to Sustainable Food Systems: The projects links innovative nutritional questions (high iron bioavailability from insect foods) with the identification of insect species, which have a potentially extremely low environmental footprint, in particular organisms reared on plant by-products such as compost and wood.

04-OM **Developing crop diversification measures to optimize bean production in North Macedonia**

Authors: A. Singh, P. Krütli, P. Iannetta, C. Schöb

Contribution to Sustainable Food Systems: Our research promotes sustainable agriculture and food security SDG goals by developing cropping systems that would be resilient to extreme climate events, produce more food per unit area, improve ecosystem services such as soil fertility and be economically profitable.

05-OM Stabilizing multiphase food systems with microalgae proteins

Authors: L. Böcker, L. Buchmann, P. Bertsch, D. Wenner, S. Teixeira, U. Krähenmann, J. Bergfreund, P. Fischer, A. Mathys

Contribution to Sustainable Food Systems: Microalgae proteins as a sustainable alternative resource offer solutions for 9 of the 17 SDGs. Especially, the investigated potential to stabilize food matrices such as emulsions and foams enables the replacement of animal protein, directly acting on SDGs 12 and 13.

06-OM Optimization of microalgae-based biorefinery concepts by pulsed electric field treatments

Authors: I. Haberkorn, L. Buchmann, A. Mathys

Contribution to Sustainable Food Systems: The project contributes to sustainable food systems and reaching the SDGs by fostering the economic viability of microalgae cultivation using PEF as novel technology. Microalgae-livestock promotes sustainable agriculture with direct impact on achieving at least five of the 17 SDGs.

07-OM Genetic improvement of climbing beans using genomics and machine learning

Authors: B. Keller, H.F. Buendia, A.E. Portilla Benavides, D. Ariza, E. Macea, B. Raatz, B. Studer

Contribution to Sustainable Food Systems: The rapid and efficient development of new bean varieties with higher seed iron content and improved yield stability contributes to a sustainable food production system that reduces poverty and malnutrition.

08-OM Host genotype x soil interaction in the composition of pathogenic and beneficial fungi of pea lines screened for root-rot resistance

Authors: L. Wille, M. Kurmann, M. M. Messmer, B. Studer, P. Hohmann

Contribution to Sustainable Food Systems: Pea is a highly valuable protein source for human nutrition and animal feed (SDG 2). Additionally, pea is an important crop for N fixation in low-input farming systems (SDG 12). The project investigates resistance of pea against root rot pathogens considering plant-microbe interactions and promotes breeding programmes of resistant pea varieties (SDG 3).

09-OM Farming systems affect hydraulic traits of crops

Authors: Q. Sun, A.K. Gilgen, V.H. Klaus, C. Signarbieux, N. Buchmann

Contribution to Sustainable Food Systems: Due to climate change, agricultural production systems will be progressively subjected to more frequent and severe weather events, such as prolonged summer drought. Adaptations of farming practices require assessing and improving the resilience of agricultural systems to ensure food security.

10-OM Impact of Swiss cropping systems on soil hydraulic properties

Authors: E. M. Oliveira, R. Wittwer, Y. Liu, Q. Sun, A. K. Gilgen, V. Klaus, T. Keller, M. Van der Heijden, N. Buchmann

Contribution to Sustainable Food Systems: Increased frequency of drought events will threaten food production. Soil properties influence the severity of such events. Thus, in order to propose better adapted cropping systems, it is important to understand how their inherent physical properties respond to this disturbance.

11-OM Tracking growth phenology and physiology of a cropland in response to experimental drought and different cropping systems

Authors: Y. Liu, C. Bachofen, V. Klaus, G.S. Duarte, Q.Sun, A.K. Gilgen, E. Oliveira Hagen, R. Wittwer, M. Van der Heijden, N. Buchmann

Contribution to Sustainable Food Systems: Our research assessed changes in crop yields using phenocam images to characterize the impact from severe drought on food production in different cropping systems. Results will help adopting management practices to sustain food production under climate change.

12-OM Large-scale crop classification from satellite images

Authors: M.O. Turkoglu, J.D. Wegner

Contribution to Sustainable Food Systems: Our research aims to develop an intelligent system to automatically predict cultivated crop types and detect over-fertilization in farmlands from satellite images. Thus, our research leads to more economic and environmental sustainability in food systems by making these time-consuming and labor-intensive tasks fully-automatic.

13-OM Use of nitrified urine fertilizer (NUF) in a hydroponic Bato bucket system

Authors: C. Staeheli, A. Hofmann, B. Wilde

Contribution to Sustainable Food Systems: Human urine could be reused as fertilizer and lead to less usage of mineral fertilizer, which is expensive and energy consuming to produce. NUF may help developing countries obtaining a cheaper source of fertilizer and reuse urine waste from cities.

14-OM Biological Control: Fighting below ground insect pests with entomopathogenic *Pseudomonas* bacteria, nematodes and fungi

Authors: A. Spescha, M. Brunner, F. Scheibler, P. Flury, A. Guyer, G. Grabenweger, M. Maurhofer

Contribution to Sustainable Food Systems: Below ground insect pests cause major losses, especially since most insecticides have been banned and resistance against bacterial *Bacillus thuringiensis* toxins has already developed. Therefore, a new bacterial biological control method is very important for organic agriculture and integrated pest management.

15-OM Diversity-functioning relationships in agroecosystems: From crops over weeds to soil microbes

Authors: L. Stefan, C. Schöb

Contribution to Sustainable Food Systems: Intercropping contributes to increasing the sustainability of food systems, for it optimizes crop resource uses and increases diversity, which in turn provides ecosystem services such as increased nutrient cycling or reduced weed invasion, thus reducing chemical input needs.

16-OM The context dependence of resource partitioning in crop mixtures

Authors: N. Engbersen, C. Schöb

Contribution to Sustainable Food Systems: By investigating the potential of biodiversity for agroecosystems and getting a mechanistic understanding of these benefits in diverse cropping systems, we aim to achieve a more sustainable yet productive agriculture.

17-OM Exploring trajectories of shifting-cultivation landscapes through games: the case of Assam (India)

Authors: S. Bos, T. Cornioley, A. Dray, P. Waeber, C. Garcia

Contribution to Sustainable Food Systems: Understanding what motivates indigenous farmers to depart from traditional subsistence practices and move to market oriented cash crop production as the result of local and global change is essential to better address sustainable economic development, biodiversity conservation and livelihood security.

18-OM Racing to recover: What determines smallholder responses to extreme weather events?

Authors: W. Thompson, S. Bonilla-Duarte, P. Kruetli, B. Kopainsky, A. Aguiar, J. Joerin, E. Chavez, J. Six

Contribution to Sustainable Food Systems: Extreme weather events, such as hurricanes, have severe impacts on our food system, particularly for vulnerable smallholder farmers. The ability of smallholder farmers to recover from such shocks is important not only for their own livelihoods but also for the functioning of the food system as a whole.

19-OM Forest enrichment with Brazil Nut - An economic perspective

Authors: L. Bronzini, A. Müller, F. Chiriboga Arroyo

Contribution to Sustainable Food Systems: Making reforestation and enrichment in Brazil Nut concessions of Peru more financially competitive can ensure the maintenance of traditional nature-close forest management in vast areas of the region. This contributes directly to the SDGs 1, 2, 12, 13 and 15.

20-OM Effects of organic farming on ecosystem services and grassland multifunctionality: The ServiceGrass Project

Authors: V. Klaus, N. El Benni, A. Lüscher

Contribution to Sustainable Food Systems: Our project studies how different types of grassland management affect yields and public ecosystem functions, such as recreational value, habitat function, and carbon fixation, in order to deduce recommendations on management practices that increase grassland multifunctionality for farmers and society.

21-0M Why are there regional differences in the uptake of organic farming?

Authors: M. Chautems, R. Finger, R. Huber

Contribution to Sustainable Food Systems: Understanding why the adoption of organic farming is higher in certain regions is crucial to design efficient support mechanisms. This will speed up the development of organic farming and help us to move toward a resource-efficient and sustainable food system.

22-0M Towards a more energy-efficient and upscalable electrohydrodynamic drying of food

Authors: K. Iranshahi, A. Martynenko, T. Defraeye

Contribution to Sustainable Food Systems: By targeting goal 2 of SDGs, this promising technology, provides faster drying with more nutritional content in dried material and less energy consumption compared to conventional dryers. Since it is non-thermal drying, damage to heat-sensitive compounds (e.g. vitamins, antioxidants) reduces.

23-0 Effects of Spirulina intake on growth and metabolism of pregnant sows

Authors: R. Lugarà, M. Kreuzer, K. Giller

Contribution to Sustainable Food Systems: Spirulina is a novel food, which can be produced sustainably. It provides proteins, fatty acids, bioactive components and other nutrients, and is applied as a supplement to prevent malnutrition and also suggested to ameliorate metabolic problems.

24-0 Is replacing soybean meal and feeding a grass-silage based diet to growing bulls an option for increasing the sustainability of Swiss intensive beef production?

Authors: M. Kurrig, M. Kreuzer, B. Reidy, A. Scheurer, K. Giller

Contribution to Sustainable Food Systems: The sustainability of Swiss intensive beef production systems may be improved by increasing the shares of grassland-derived feeds, which are not competing with human food supply, and by replacing imported soybean meal (SBM) with alternative and preferably local protein sources.

25-0 Combining oral vaccination and niche competition to fight antimicrobial resistance gene-reservoirs

Authors: V. Lentsch, C. Moresi, W. Hardt, D. Kümmerlen, M. Diard, T. Keys, E. Wetter-Slack

Contribution to Sustainable Food Systems: Our research should not only lead to the reduction of antimicrobial resistant bacteria on meat as well as plants and crops but by preventing disease in food producing animals it should also lead to further reduction of antibiotic usage in livestock.

26-0 Nose to Tail – Safety assessment of slaughtering byproducts

Authors: D. Etter, M. Morach, N. Käppeli, M. Hochreutener, S. Johler, J. Julmi, R. Stephan

Contribution to Sustainable Food Systems: The microbial safety assessment of slaughtering byproducts is crucial in order to release these products for human consumption. Our study adds value to a nutritionally rich product by demonstrating that it poses no health risk if handled with good manufacturer's practice. This ultimately reduces food waste and promotes nose to tail eating.

27-0 Symbiosis opportunities between food and energy system: The application of manure based biogas as heat source for greenhouses

Authors: V. Burg, F. Golzar, G. Bowman, S. Hellweg, R. Roshandel

Contribution to Sustainable Food Systems: The use of manure-based biogas as heat source for greenhouses is presented as a promising concept within the food-energy nexus. The system presents many advantages associated with sustainable agriculture, such as reducing energy demand, mitigating GHG emissions, and economical land-use.

28-0 Prospects of digital agricultural policy

Authors: M. Ehlers, R. Huber, R. Finger

Contribution to Sustainable Food Systems: Agricultural policy is the key public policy field for ensuring sustainable food systems. The use of digital technology in agricultural policy promises to more effectively address social, economic and environmental sustainability goals, but could also challenge some.

29-0 Freezing of vegetables for maximal cell survival

Authors: S. Schudel, K. Prawiranto, T. Defraeye

Contribution to Sustainable Food Systems: Freezing is crucial to extend the shelf life of perishable products and to reduce food waste. The investigation of the freeze process enables the improvement of current freezing protocols and helps the development of sustainable solutions.

30-0 Digital twins: The next hot topic in fresh produce cold chains!

Authors: C. Shrivastava, T. Defraeye

Contribution to Sustainable Food Systems: Reducing food loss and making the refrigerated supply chain greener is critical towards reaching the global Sustainable Development Goals (SDGs), especially SDG 2 (Ending Hunger), SDG 3 (Ensuring good health and well-being), SDG 9 (Fostering sustainable industrialization and innovation) and SDG 12 (Ensuring sustainable consumption and production patterns).

31-0 Digit Soil

Authors: S. Meller, K. Normak, H. Iven, V. Růžička, E. Frossard

Contribution to Sustainable Food Systems: We are creating solutions for better soil management, responding to the needs of a more responsible production (SDG 12), in protecting the soil biotope (SDG 15) and advising farmers for building more resilient farming systems (SDG 2 and SDG 13).

32-0 Variable rate technologies – Costs and benefits of increasing information accuracy

Authors: K. Späti, R. Huber, R. Finger

Contribution to Sustainable Food Systems: Considering heterogeneous production conditions within fields is expected to increase the efficiency of nitrogen fertilization and reduce nitrogen losses from agriculture. We calculate the profitability of precision agriculture techniques to identify management options for increasing sustainability in small-scaled farming systems.

33-0 The optimal drought index for designing weather index insurance

Authors: J. Bucheli, T. Dalhaus, R. Finger

Contribution to Sustainable Food Systems: Weather index insurance can mitigate financial climate risks (SDG 13). This removal of financial downside risks helps to overcome poverty traps (SDG 1), improves farmers' well-being (SDG 3) and facilitates economic growth in the agricultural sector (SDG 8).

34-0 Country-wide high-resolution vegetation height mapping with Sentinel-2

Authors: N. Lang, K. Schindler, J.D. Wegner

Contribution to Sustainable Food Systems: Our aim is to stop commodity driven deforestation in the tropics to mitigate climate change. Monitoring forests at large scale allows to make informed sourcing decisions, which is the first step towards sustainable and deforestation free supply chains.

35-0 Irrigation modernization: Towards a more sustainable use of freshwater resources in citrus production?

Authors: S. Pool, F. Frances, A. Garcia-Prats, C. Puertes, M. Pulido-Velazquez, C. Sanchis-Ibor, M. Schirmer, H. Yang, J. Jimenez-Martinez

Contribution to Sustainable Food Systems: Understanding the effects of irrigation modernization (under changing land use and climate conditions) on the availability of regional water resources is fundamental to support decision makers in achieving a more sustainable future in irrigated agriculture.

36-0 Elucidating farm system economics as influenced by agroforestry in West Switzerland

Authors: U. Le Goff, D. Barjolle, J. Six

Contribution to Sustainable Food Systems: In a context of climate change, biodiversity downfall and declining soil fertility, agroforestry may provide part of the answer to instill sustainable agriculture. This project aims to unravel the economic uncertainties influencing the development of agroforestry systems in Switzerland.

37-0 Critical resilience – Poverty traps and power relations in face of climate change – The case of tomato value chain in Ghana

Authors: K. Benabderrazik, L. Jeangros, J. Six

Contribution to Sustainable Food Systems: This research focuses on enhancing tomato farmer's resilience in face of climate change, aiming to identify the dynamics that drives poverty and food insecurity traps in the Upper East region of Ghana. This work thus directly tackles SDGs 1&2.

38-0 PubliFarm Research Days: Chewing cows, apple trees and earth worms – An on-farm science experience for the public

Authors: S. Keller, N. Buchmann

Contribution to Sustainable Food Systems: PubliFarm is a dialog project between young researchers, farmers and consumers in the context of biodiversity and climate change in agriculture. It promotes a reflection on consumer behavior and production, in line with SDG 12 Responsible Consumption and Production.

39-0 The relationship between food disgust sensitivity and sustainability

Authors: J. Ammann, M. Siegrist, C. Hartmann

Contribution to Sustainable Food Systems: One third of the food produced is wasted. To tackle this issue, it is of crucial importance to understand its drivers. In the present study, we found a relationship between an individual's food disgust sensitivity and their edibility assessment for various foods.

40-0 Consumer's knowledge gain through a cross-categorical environmental food label

Authors: M. Dihr, M. Siegrist, B. Sütterlin

Contribution to Sustainable Food Systems: Informing consumers about the environmental impact of different food choices could lead to consumption pattern change and ultimately to a reduced global agricultural demand.

41-0 Can consumers contribute to the resilience of the food systems?

Authors: E. Monastyrnaya, J. Six

Contribution to Sustainable Food Systems: In the world of changing climate building resilience of farmers is essential. In this study, we have conducted an online survey among 1200 Swiss consumers to investigate whether farmers could count on consumers support in case of a climatic shock.

42-0 Rheology of Swiss Cheese Fondue

Authors: P. Bertsch, L. Savorani, P. Fischer

Contribution to Sustainable Food Systems: This work strives to raise public awareness for the complexity of food products and related research at ETH Zurich using a traditional Swiss food: fondue. The results demonstrate the interactions in dairy multiphase systems and provide an adequate tool for their assessment.

43-0 Iron requirements in women and children

Authors: C. Speich, M. Zimmermann

Contribution to Sustainable Food Systems: Reliable data on iron requirements are crucial for reaching the goal of a 50% reduction in anemia prevalence among women of reproductive age implemented in target 2.2: end all forms of malnutrition of the UN Sustainable Development Goals for 2030.

44-0 Iodine absorption and thyroidal uptake: A novel ^{129}I tracer method for their assessment in humans

Authors: V. Galetti, O. Van der Reijden, A. Mannhart, L. Stierli, A. Krzystek, C. Zeder, M. Andersson, I. Herter-Aeberli, N. Casacuberta, C. Vockenhuber, M. Zimmermann

Contribution to Sustainable Food Systems: Optimal maternal iodine stores are critical to cognitive development of their fetuses, but iodine requirements of women of reproductive age have never been directly quantified. This safe tracer-based method contributes to SDGs no poverty and good health and well-being.

World Food System Center Posters

Sustainable food systems World Food System Center

We act as a platform to bring together our members' multidisciplinary expertise with strategically relevant external partners and to provide the leadership and foresight needed to create innovative solutions.

Future Food Initiative - Promoting talents and new ideas for food systems of the future World Food System Center

Future Food provides opportunities to educate and train new talent around the food value chain by leveraging the complementary strengths of the Swiss academic and industrial research communities.

World Food System Center Mercator Program World Food System Center

The Mercator Program, in partnership with the Mercator Foundation Switzerland, supports activities in research, education, and outreach to explore the role and potential of organic production systems to contribute to global food security.

The World Food System Center Alumni Network (WFSCAN)- organized by alumni for alumni N. Bartolomé, V. Loaiza, M. Wiget, on behalf of WFSC alumni

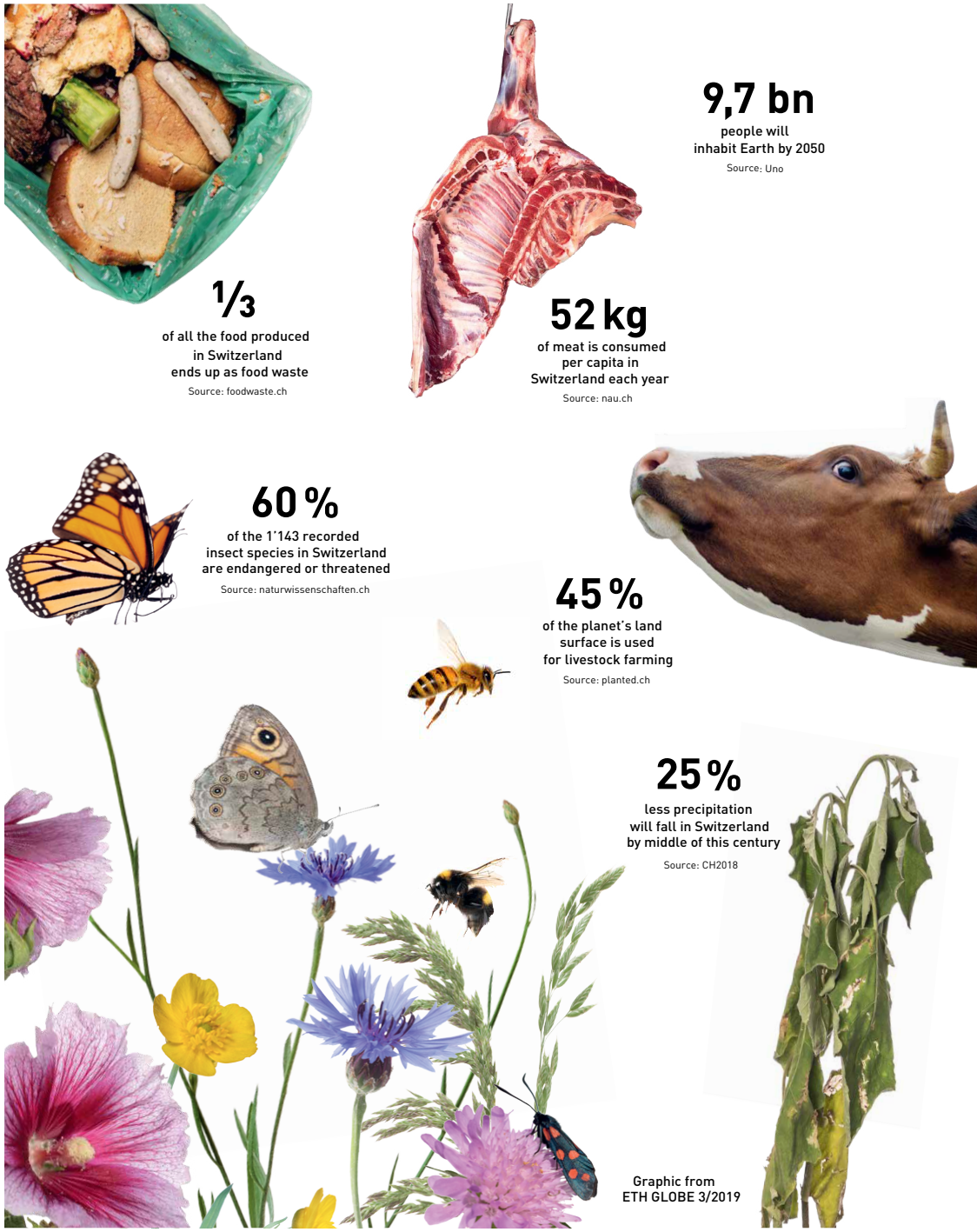
WFSC Alumni Network (WFSCAN) allows alumni to share knowledge, learn, discuss and create solutions on food system challenges. A new digital platform allows alumni from around the world to engage, organize events, look for support/ expertise in cohort, and share job opportunities. We believe that this unique international community of food system experts can potentially lead to innovative co-creation of knowledge processes.

Creating sustainable change in food systems: The WFSC Summer School 2019 M. Grant, M. Piessens

The World Food System Summer School is an innovative approach to education that teaches participants to navigate complexity and build sustainable food systems. The course has taken place 8 times in 4 different countries, training 188 participants from 54 different nationalities. Built around 12 key design criteria, it is rigorous, meaningful and impactful for participants.

ArtScience: Creativity, curiosity, and courage World Food System Center

Is it Art? Is it Science? Knowledge transfer between artists and scientists does not have to be all about knowledge itself, but about sharing the process- the scientific process and the creative process. Visit the ArtScience exhibit in the Clock Hall!



Layout & Content: Nadine Stähli and
Jeanne Tomaszewski

Contact

ETH Zürich
World Food System Center
Stampfenbachstrasse 52
8092 Zurich

www.worldfoodsystem.ethz.ch