



## Comparing organic and conventional agricultural cropping systems - What can be learned from the DOK and other long-term trials?

### “DOK-Monte Verità”

Congressi Stefano Franscini, Monte Verità, Ascona, Switzerland  
6-10 October, 2019

DOK Excursion Friday 11. October 2019, Therwil, Switzerland

## Program

### Sunday, 6 October

From 15.00            Arrival, registration

16.00 – 17.00        Welcome drink

### Introductory session

Chair: Jochen Mayer

- 17.00                    Welcome addresses  
**Bernard Lehmann**, former DG Federal Office for Agriculture, Switzerland  
**Eva Reinhard**, Head Agroscope, Switzerland  
**Urs Niggli**, Director FiBL, Switzerland
- 17.30 – 18.15        **Keynote lecture**  
**Kate Scow**, University of California Davis, USA  
Longterm impacts of management on soil Carbon, soil life, and agricultural resilience in Mediterranean agroecosystems
- 18.15 – 19.00        **Keynote lecture**  
**Paul Mäder**, FiBL, Switzerland  
The DOK long-term experiment – lessons learned from 40 years of interdisciplinary research
- 19.15                    *Dinner*

## Monday, 7 October

8.45 Congressi Stefano Franscini and Fondazione Monte Verità  
Welcome address

### Yield and yield development

Chair: Erik Steen Jensen

- 9.00 – 9.30 **Keynote lecture**  
**Jochen Mayer**, Agroscope, Switzerland  
The performance of yields in organic and conventional cropping systems
- 9.30 – 9.45 **Andrew Macdonald**, Rothamsted Research, UK  
The Rothamsted Long-term Experiments
- 9.45 – 10.00 **Bettina Leschhorn**, Justus Liebig University Giessen, Germany  
Long-term effects of different farming and fertilization systems on biomass yields and nitrogen uptake of crops in the LTE “IOSDV” Rauschholzhausen
- 10.00 – 10.15 **Evelin Loit**, Estonian University of Life Sciences, Estonia  
Yield stability and nutrient use efficiency in wheat, barley, potato and field pea when comparing organic and conventional crop management from 2008-2017
- 10.15 – 10.30 **Jaroslaw Stalenga**, State Research Institute, Poland  
Environmental and yield performance of organic and conventional crop production systems in long-term experiment in Puławy (Poland)
- 10.30 – 11.00 *Coffee break*

### Nutrient flows and nutrient use efficiency

Chair: Else K. Bünemann

- 11.00 – 11.30 **Keynote lecture**  
**Erik Steen Jensen**, Swedish University of Agricultural Sciences, Sweden  
Determining nutrient flows and nutrient use efficiency in long-term cropping systems experiments – Advantages and challenges
- 11.30 – 11.45 **Bettina Eichler-Löbermann**, University of Rostock, Germany  
Yield development and soil fertility – results of different phosphorus fertilizer practices over 20 years
- 11.45 – 12.00 **Klaus Jarosch**, University of Bern, Switzerland  
Soil phosphorus (P) budgets, P availability and P use efficiencies in conventional and organic cropping systems of the DOK trial
- 12.00 – 12.15 **Astrid Oberson**, ETH Zurich, Switzerland  
Nitrogen budgets and soil nitrogen stocks of organic and conventional cropping systems: how reconcile efficiency and sustainability of nitrogen use?

12.15 – 12.30 **Xiaojin Zou**, Liaoning Academy of Agricultural Sciences, Shenyang, China  
Interspecific root interactions enhance nitrogen acquisition, symbiotic N<sub>2</sub> fixation, and N transfer in foxtail millet/peanut intercropping

12.30 *Lunch*

## **Soil quality**

Chair: Andreas Gattinger

14.00 – 14.30 **Keynote lecture**  
**Else K. Bünemann**, FiBL, Switzerland  
Soil quality: a critical review and a look into the future

14.30 – 14.45 **Andreas Fließbach**, FiBL, Switzerland  
Change of biological soil quality in organic and conventional farming systems of the DOK trial

14.45 – 15.00 **Noelia Garcia Franco**, Technische Universität München, Germany  
Beneficial effects of reduced tillage on soil aggregation and stabilization of organic carbon in an irrigated semiarid Mediterranean ecosystem

15.00 – 15.15 **Kyle Mason-Jones**, Netherlands Institute of Ecology, The Netherlands  
Vital Soils for Sustainable Intensification of Agriculture: A chronosequence approach to organic agricultural research

15.15 – 15.30 **Erin Silva**, University of Wisconsin-Madison, USA  
Influence of long-term organic and conventional cropping systems on soil microbial population size and structure

15.30 – 16.00 *Coffee break*

16.00 – 17.30 Workshops Themes 1-3

17.30 – 19.00 Poster session 1

19.00 *Dinner*  
*Supported by Biovision–Foundation for Ecological Development*

## Tuesday, 8 October

### Rhizosphere processes

Chair: Jochen Mayer

- 9.00 – 9.30            **Keynote lecture**  
**Doris Vetterlein**, Helmholtz Center for Environmental Research, Germany  
Relevance of rhizosphere processes at field scale – a road map based on imaging techniques
- 9.30 – 9.45            **Maria Finckh**, University of Kassel, Germany  
Long-term root adaptation to organic and conventional farming in heterogeneous wheat populations
- 9.45 – 10.00         **Andreas Hammelehle**, Agroscope, Switzerland  
New insights in below ground nitrogen of clover-grass mixtures
- 10.00 – 10.15        **Juliane Hirte**, Agroscope, Switzerland  
Fertilization intensity and the fate of root carbon in soil within two years after harvest
- 10.15 – 10.30        **Fritz Oehl**, Agroscope, Switzerland  
Diversity of arbuscular mycorrhizal fungi in agricultural systems
- 10.30 – 11.00        *Coffee break*

### Climate change adaptation and mitigation

Chair: Andreas Fliessbach

- 11.00 – 11.30        **Keynote lecture**  
**Ana Iglesias**, Universidad Politecnica de Madrid, Spain  
Effect of agricultural management practices on soil ecosystem services
- 11.30 – 11.45        **Philipp Koal**, University of Rostock, Germany  
The role of agronomic management practices on greenhouse gas emissions in a long-term field trial
- 11.45 – 12.00        **Nicolas Beaudoin**, INRA Laon, France  
Can organic cropping systems mitigate nitrogen losses and improve GHG balance? Results from a 19-yr experiment in Northern France
- 12.00 – 12.15        **Andreas Gattinger**, University of Giessen, Germany  
Soil-derived greenhouse gas emissions as influenced by farming management
- 12.15 – 12.30        **Emily Miranda Oliveira**, Agroscope, Switzerland  
Resilience of organic and conventional cropping systems to drought and climate change
- 12.30                    *Lunch*
- 14.00 – 22.30        Excursion to two innovative farms in the Magadino plain and conference dinner at the [Restaurant Castel Grande](#) in Bellinzona (UNESCO World Heritage)

## Wednesday, 9 October

### Nutritional quality

Chair: Astrid Oberson

- 9.00 – 9.30           **Keynote lecture**  
**Carlo Leifert**, Southern Cross University, Australia  
Effect of agronomic practices on food quality and human health – the need to understand complex interactions
- 9.30 – 9.45           **Emmanuel Frossard**, ETH Zurich, Switzerland  
Long-term organic matter application reduces cadmium but not zinc concentrations in wheat
- 9.45 – 10.00       **Juan Herrera**, Agroscope, Switzerland  
Genetic progress and genotype (G) × environment (E) interactions effects on winter wheat under organic, conventional low-inputs and conventional high-inputs production systems: insights from 20 years of studies
- 10.00 – 10.15      **Georg Langenkämper**, Max Rubner-Institut, Germany  
Profiling techniques and targeted analyses in the quest for differentiation of organic versus conventional DOK wheat
- 10.15 – 10.30      **Leonidas Rempelos**, University of Newcastle, UK  
Nafferton Factorial Systems Comparison trials: What we have learned from the first 18 years of experiments
- 10.30 – 11.00      *Coffee break*

### Sustainability assessment

Chair: Jan Bengtsson

- 11.00 – 11.30      **Keynote lecture**  
**Thomas Nemecek**, Agroscope, Switzerland  
Environmental impacts of cropping systems: lessons learnt from LCA studies
- 11.30 – 11.45      **Mariam Soma**, Institut de l'Environnement et de Recherches Agricoles, Burkina Faso  
History, lessons and challenges of the long term field trial of Saria
- 11.45 – 12.00      **Martin Entz**, University of Manitoba, Canada  
The Glenlea long-term study illuminates the ecosystem health – crop productivity nexus in Canadian Prairie organic production
- 12.00 – 12.15      **Long Li**, China Agricultural University, China  
Crop diversity enhances agroecosystem sustainability via improving soil fertility
- 12.15 – 12.30      **Andrew Mead**, Rothamsted Research, UK  
A meta-analysis approach for assessing the sustainability of cropping systems using data from multiple global LTEs
- 12.30                *Lunch*

## **Biodiversity in agroecosystems**

Chair: Klaus Birkhofer

- 14.00 – 14.30      **Keynote lecture**  
**Henrik G. Smith**, Lund University, Sweden  
Landscape-scale studies capture effects of organic farming across scales on mobile organisms and their services
- 14.30 – 14.45      **Klaus Birkhofer**, Brandenburg University of Technology, Germany  
Effects of farming system and simulated drought on biodiversity, food webs and ecosystem functions in the DOK trial
- 14.45 – 15.00      **Martina Lori**, FiBL, Switzerland  
Nitrogen transformations and its underlying microbial communities in differently managed soils under future projected rainfall variability
- 15.00 – 15.15      **Francisco Xavier Sans Serra**, Universitat de Barcelona, Spain  
Effects of farming system on weed seed bank and on invasibility in arable fields: evidences from the long-term DOK trial
- 15.15 – 15.30      **Marjetka Suhadolc**, University of Ljubljana, Slovenia  
Transition of long term Conservation Tillage experiment from Conventional to Organic system – effects on soil quality and weed infestation
- 15.30 – 16.00      *Coffee break*
- 16.00 – 17.30      Workshops Themes 4-6
- 17.30 – 19.00      Poster session 2
- 19.00                *Dinner*  
*Supported by Bio Suisse*

## Thursday, 10 October

### Sustainable production within planetary boundaries

Chair: Paul Mäder

- 9.00 – 9.30      **Keynote lecture**  
**Hermann Lotze-Campen**, Potsdam Institute for Climate Impact Research (PIK), Germany  
Agricultural production in line with the Sustainable Development Goals and within Planetary Boundaries
- 9.30 – 9.45      **Gurbir Bhullar**, FiBL, Switzerland  
Can organic agriculture contribute to sustainable development in the tropics?
- 9.45 – 10.00     **Pietro Barbieri**, Bordeaux Sciences Agro, France  
Simulating the effects of nitrogen availability on organic production at the global scale
- 10.00 – 10.15    **Jan Bengtsson**, SLU, Sweden  
Long-term field trials are fine but insufficient for understanding landscape impacts of farming systems on ecosystem services and biodiversity
- 10.15 – 10.30    **Michael Mielewczik**, Rothamsted Research, UK  
TSARA (Targets for sustainable and resilient agriculture) – efficiency
- 10.30 – 11.00     *Coffee break*

### Research need and new perspectives of long-term experiments

Chair: Emmanuel Frossard

- 11.00 – 11.30     **Keynote lecture**  
**Paolo Barberi**, Sant'Anna School of Advanced Studies, Italy  
Applying the Efficiency-Substitution-Redesign transitional framework to ensure the sustainability of long-term experiments
- 11.30 – 11.45     **Maike Krauss**, FiBL, Switzerland  
Organic conservation tillage – evidence from more than 15 years of research
- 11.45 – 12.00     **Janjo de Haan**, Wageningen University and Research, The Netherlands  
(What is) The best methodology to compare organic and conventional agricultural cropping systems
- 12.00 – 12.15     **Sara König**, Helmholtz-Zentrum für Umweltforschung GmbH, Germany  
The importance of long-term field experiments for modelling soil functions in agricultural systems
- 12.15 – 12.30     **Christine Watson**, SRUC Aberdeen, UK  
A comparison of four contrasting experimental rotations: reflections on an organically managed rotational LTE started in 1991
- 12.30 – 12.45     CSF Award ceremony and closing remarks
- 12.45                *Lunch and departure*

## Poster session 1

Monday, 17.30 – 19.00

**1. Amelie Carriere**, Arvalis, France

Fertility losses in organic agriculture systems

**2. Leo Condron**, Lincoln University, New Zealand

Impacts of long-term input cessation and biomass management on soil nutrient dynamics in a New Zealand grassland

**3. Anne-Laure de Cordoue**, ARVALIS Institute, France

Multi-performances of an organic cropping system led without external fertilizer, in the northern part of France, in arable crops: comparison with a conventional cropping system

**4. Keyvan Esmaeilzadeh Salestani**, Estonian University of Life Sciences, Estonia

Impact of long-term conventional and organic farming systems on barley

**5. Noelia Garcia Franco**, Technische Universität München, Germany

Seasonal climate conditions, pedogenic-topographic factors and management practices as main drivers of long-term carbon dynamics (1989-2016) in grassland soils of Bavaria

**6. Veronika Hansen**, Copenhagen University, Denmark

Green manure crops for low fertility soils

**7. Valentin Klaus**, ETH Zurich, Switzerland

The ServiceGrass project: Effects of organic farming on ecosystem services and grassland multifunctionality

**8. Bärbel Kroschewski**, Humboldt-Universität zu Berlin, Germany

Analysis of a long-term nitrogen fertilization experiment on fen grassland and presentation of the results

**9. Tatiana Rittl**, Norwegian Centre for Organic Agriculture, Norway

Perennial leys for dairy cows: soil and plant attributes, yield and botanical composition with long-term low and high N input

**10. Francisco Xavier Sans Serra**, Universitat de Barcelona, Spain

The Gallecs trial, a mid-term experiment on reduced tillage, fertilisation and green manure in Mediterranean dryland arable cropping systems

**11. Franz Schulz**, University of Giessen, Germany

(presented by **Andreas Gattinger**, University of Giessen, Germany)

Organic arable farming experiment Gladbacherhof - productivity and soil parameters of different farm types and various soil tillage systems



**12. Markus Steffens**, FiBL, Switzerland

(presented by **Hans Martin Krause**, FiBL, Switzerland)

Carbon sequestration and stabilization in a 40-year agronomic long-term experiment

**13. Liina Talgre**, Estonian University of Life Sciences, Estonia

Organic cropping systems with winter cover crops in combination with composted manure significantly improve soil properties

**14. Huyen Thai**, Leibniz Centre for Agricultural Landscape Research (ZALF) e.V., Germany

Effect of long-term fertilizer management on spring and winter cereals on sandy soil in Northeast Germany

**15. Yavar Vaziritabar**, Justus Liebig University Giessen, Germany

Long-term effects of different previous crops and NPK fertilization on soil parameters and biomass yields of subsequent crops in the LTE "BSG" Giessen

**16. Martin Wiesmeier**, Bavarian State Research Center for Agriculture, Germany

Soil carbon dynamics in croplands under conventional and organic management in Bavaria

## Poster session 2

### Wednesday, 17.30 – 19.00

**17. Daniele Antichi**, University of Pisa, Italy

(presented by **Erik Steen Jensen**, Swedish University of Agricultural Sciences, Sweden)

Building a network of long-term experiments on agroecology and organic farming

**18. Gilles Gagné**, CETAB, Canada

Establishing a long-term experiment to study the effect of organic cropping systems on GHG emissions, carbon and nitrogen cycles and environmental efficiency

**19. Meike Grosse**, Leibniz-Zentrum für Agrarlandschaftsforschung (ZALF) e.V., Germany

The BonaRes Repository: overview of long-term field experiments and provision of research data

**20. Dominika Kundel**, FiBL, Switzerland

Profiling soil microbial communities influenced by reduced summer precipitation and farming system history

**21. Frank Liebisch**, Agroscope, Switzerland

Phenotyping – a link between field experiments and agricultural practice?

**22. Chloe MacLaren**, Rothamsted Research, UK

Combining long-term experiments to quantify the contribution of crop diversity to sustainability

**23. Jakob Magid**, Copenhagen University, Denmark

What are the limits for recycling from society to organic agriculture?

**24. Indrek Melts**, Estonian University of Life Sciences, Estonia

Estonian semi-natural grasslands in historical perspective

**25. Richard Ostler**, Rothamsted Research, UK

The Global Long-term Experiments Network Metadata Portal

**26. Vladimir Romanenkov**, Lomonosov Moscow State University, Russia

Long-term timescale for implementation 4per1000 initiative: comparison organic and mineral fertilization

**27. Colin Skinner**, FiBL/University of Basel, Switzerland

Determination of greenhouse gas sources and sinks in Swiss arable soils under organic and non-organic management

**28. Laura Summerauer**, ETH Zurich, Switzerland

(presented by Astrid Oberson, ETH Zurich, Switzerland)

Influence of long-term fertilization and crop rotation on the  $^{13}\text{C}$  and  $^{15}\text{N}$  natural abundance of soils from the Saria soil fertility experiment

**29. Odette Weedon**, Universität Kassel, Germany

(presented by **Maria Finckh**, Universität Kassel, Germany)

Exploring agronomic performance of heterogeneous winter wheat populations under organic and conventional agricultural cropping systems in a long-term trial

## **Thematic workshop topics**

### **Monday, 16.00 – 17.30**

**WS 1** Productivity, stability and resource use efficiency

**WS 2** Nitrogen and phosphorus sources and use efficiency in the North and the South?

**WS 3** Climate change and climate smart agriculture

### **Wednesday, 16.00 – 17.30**

**WS 4** Economics and life cycle assessment

**WS 5** Biodiversity

**WS 6** Future research needs and new designs of long-term experiments

## DOK Excursion Friday 11. October 2019

**Address of the DOK trial: Birmatthof in Therwil (7 km south of Basel)**

In the morning of Friday Oct. 11, Paul Mäder and Jochen Mayer, the two responsible scientists and other staff members will guide you through the DOK field experiment, where bio-dynamic, bio-organic and conventional cropping systems are compared in a replicated field experiment since 1978. It is located in the Leymen valley, a region characterized by loamy soil developed on deep deposits of alluvial loess. An overview on associated ongoing or recently closed projects will be given (e.g., on drought stress, soil quality indicators, N<sub>2</sub>O emissions, N and C rhizodeposition, root carbon turnover, Deuterium studies, P-cycling). Principle investigators and PhDs will present new projects on soil organic matter quality and soil metagenomics. We will also discuss future research questions and potential collaboration with visitors.

A bus is waiting for you at Basel SBB main station to bring you to the DOK site in Therwil and return to the station afterwards. The bus will leave on Oct. 11, 2019 at 8.30 am and return after the excursion before 12 pm. Departure and arrival are at Meret Oppenheim Strasse at the southern side (Gundeldingen) of Basel SBB station. You reach the Meret Oppenheim Strasse by entering the main hall of the SBB train station (northern side, city) and crossing the rail tracks on the walkway direction Gundeldingen (Media Markt). Before reaching the southern end of the walkway, turn left to a stairway that brings you down to Meret Oppenheim Strasse.

In case of any problems contact Paul Mäder +41 79 346 18 86 (mobile).

