



Global  
Long-Term  
Agricultural  
Experiment  
Network

*President: Professor Mike Gooding*

# Long Term Experiments: Meeting future challenges

Three-day Hybrid event hosted online and  
at *Rothamsted Research, West Common,*

*Harpenden, UK*

**20<sup>th</sup>-22<sup>nd</sup> June 2023**



## PROVISIONAL PROGRAMME



Special  
Issue



Long-term Experiments – redesign,  
reuse and repurpose for the future  
*European Journal of Agronomy*

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# Long Term Experiments: Meeting future challenges

Three-day Hybrid event hosted online and  
at *Rothamsted Research, West Common, Harpenden, UK*  
**20<sup>th</sup>-22<sup>nd</sup> June 2023**

(BASIS points will be applied for)

Long-term experiments (LTEs) are valuable resources to assess the sustainability and resilience of agricultural practices and systems.

This conference will focus on using LTEs to meet current and future challenges in agriculture. We will explore how LTEs are advancing agronomy, agroecology, soil science, crop science and statistics to underpin farming systems that support nutritious diets while safeguarding our environment.

A key focus will be collaboration between LTEs around the world, including how new metadata platforms (such as the Global Long Term Experiment Network) and new statistical approaches enable data to be combined to answer questions pertinent to the Sustainability Development Goals.

This event allows delegates to present on-site or online to maximise the global engagement. The meeting includes oral presentations, a poster session, workshops, a visit to the Rothamsted Long-Term Experiments, and an optional conference dinner.

The conference will celebrate the 180th anniversary of the Broadbalk Winter Wheat experiment. Broadbalk is the world's oldest field experiment, and was established in 1843 to investigate the relative importance of different plant nutrients. Today, it helps to answer questions about how farming practices, inputs, and weather patterns affect crop production.

## PROVISIONAL PROGRAMME

### Tuesday 20<sup>th</sup> June

09:00-09:50 **REGISTRATION**

10:00 **WELCOME and INTRODUCTION (Auditorium)**

10:10 **Keynote speaker**

**Conservation Agriculture Research in Southern Africa – the role of Long-term experiments**  
CHRISTIAN THIERFELDER (CIMMYT, Zimbabwe)

## *Auditorium*

### ***Session One: Sustaining Cropping Systems***

CHAIR: CAIRISTIONA F E TOPP (Scotland's Rural College (SRUC), Edinburgh, UK)

10:45 **The integration of cover crops and soil tillage to build resilience in farming systems in a long running UK field experiment**

NATHAN MORRIS (NIAB, Cambridge UK)

11:05 **Yield and yield stability within a rotational complexity gradient derived from a network of long-term cropping systems experiments**

ANN BYBEE-FINLEY (US Dept of Agriculture, Ithaca, USA)

11:25 **Sustaining maize yields and soil carbon following land clearing in the forest-savannah transition zone of West Africa: Results from a 20-year experiment**

RÉMI CARDINAEL (Cirad - La recherche agronomique pour le développement, France)

11:45 **Maintaining soil organic carbon is critical for sustaining maize yields in the tropics of Africa**

MORITZ LAUB (Swiss Federal Institute of Technology, Zürich, Switzerland)

12:05 ***LUNCH***

## *Fowden Hall*

### ***Session Two: Digital Agriculture in LTEs***

CHAIR: TBC (TBC)

10:45 **A contemporary long-term farming systems experiment for the digital age**

JOHN KIRKEGAARD (CSIRO Agriculture and Food, Australia)

11:05 **Improving climate resilience through adaptive rangeland management in the US Great Plains**

DAVID L HOOVER (USDA-ARS Rangeland Resource and Systems Research Unit, USA)

11:25 **Combining randomized field experiments with observational satellite data to assess the benefits of crop rotations on yields**

DAN KLUGER (Stanford University, USA)

11:45 **Spatial temporal variability in yield and nutrient use efficiency across a long-term farming systems experiment**

DAVID CLARKE (NIAB, Norfolk, UK)

12:05 ***LUNCH***

## *Auditorium*

13:00-14:30 **Workshop 1: Generating research questions for LTE networks**

## *Fowden Hall*

13:00-14:30 **Workshop 2: Data management for LTEs**

14:30 ***TEA***



## *Auditorium*

### ***Session Three: (Re)Designing LTEs for the Future***

CHAIR: CHLOE MACLAREN (Rothamsted Research, Harpenden, UK)

15:00 ***Keynote speaker***

**TBC**

CHRISTINE WATSON (SRUC Aberdeen, UK)

15:30 **Never change a running system? Balancing systems approach and comparability when adapting LTEs**

EVA GOLDMANN (Research Institute of Organic Agriculture (FiBL), Switzerland)

15:50 **Re-designing Long-Term Rotations**

CAIRISTIONA TOPP (Scotland's Rural College (SRUC), Edinburgh, UK)

16:10 **Designing farms of the future using LTEs**

MARIE WESSELINK (Wageningen University & Research, The Netherlands)

16:30 **Reflections on the design and management of a new Long Term Experiment**

JONATHAN STORKEY (Rothamsted Research, Harpenden, UK)

## *Fowden Hall*

16:50-17:00 ***Put up Posters***

17:00-20:00 ***Poster Session, Drinks Reception and Hot Buffet***

## **Wednesday 21<sup>th</sup> June**

08:00-09:00 **REGISTRATION**

## *Auditorium*

### ***Session Four: Soil Carbon***

CHAIR: CHRISTIAN THIERFELDER (CIMMYT, Zimbabwe)

09:00 **Soil organic carbon stocks and greenhouse gas emissions in two long-term conservation agriculture experiments in sub-humid Zimbabwe**

ARMWELL SHUMBA (University of Zimbabwe, South Africa)

09:20 **Leveraging long-term experiments to assess the carbon sequestration potential of diverse agroecosystems on Mollisols of the North Central US**

GREGG SANFORD (University of Wisconsin-Madison, USA)

09:40 **Rotation with forage crop and fertilization slowed down soil carbon loss from Swedish long-term field experiments**

RONG LANG (Swedish University of Agricultural Sciences, Sweden)

10:00 **Soil organic carbon and nitrogen dynamics under long-term conservation agriculture systems in Cambodia**

VIRA LENG (Cambodian Conservation Agriculture Research for Development Center, Cambodia)

10:20 **Soil organic matter stocks decrease despite increasing plant productivity - Insights from 14C analyses of an 80-years-old field experiment**

SABINA BRAUN (Swedish University of Agricultural Sciences, Sweden)

10:40-11:10 **COFFEE**

### *Brenchley Suite*

#### *Session Five: Innovative Methods*

CHAIR: RICHARD OSTLER (Rothamsted Research, Harpenden, UK)

09:00 **Challenges and approaches in data management of LTE trials in tropical field sites: Experiences from two trials in India and Bolivia**

CHIGUSA KELLER (Research Institute of Organic Agriculture FiBL, Switzerland)

09:20 **Application of Bayesian Regression to data from long-term field experiments**

JOHN ADDY (Rothamsted Research, Harpenden, UK)

09:40 **From Long Term Experiment gross results to soil nutrient critical concentration: Which adjustment method can be used with best robustness and precision? Case study of P**

LIONEL JORDAN-MEILLE (Bordeaux Sciences Agro et INRAE, France)

10:00 **A comparison of 16 soil-crop models using four term experiments in sub-Saharan Africa to guide improvement**

ANTOINE COUËDEL (AIDA, University Montpellier, CIRAD, Montpellier, France)

10:20 **The importance to consider analytical method changes for soil organic carbon in long-term experiments**

KATHRIN GRAHMANN (Leibniz Centre for Agricultural Landscape Research (ZALF), Germany)

10:40-11:10 **COFFEE**

### *Auditorium*

11:10-12:40 **Workshop 3: Statistical approaches for LTEs - Andrew Mead**

### *Brenchley Suite*

11:10-12:40 **Workshop 4: Adapting LTEs to new challenges**

12:40-13:40 **LUNCH**



## *Auditorium*

### ***Session Six: Soil Health***

CHAIR: ANDY GREGORY (Rothamsted Research, Harpenden, UK)

13:40 ***Keynote speaker***

**TBC**

ANDY NEAL (Rothamsted Research, Harpenden, UK)

14:10 **A bayesian belief network with which to infer soil quality and health**

KIRSTY L HASSALL (Rothamsted Research, Harpenden, UK)

14:30 **Bioprospecting for plant growth promoting microbes: Rich seams in long-term agricultural field experiments?**

OWEN THORNTON (Rothamsted Research, Harpenden, UK)

14:50 **Higher plant species diversity increases the estimated abundance of key genes involved in soil phosphorus turnover**

AARON FOX (Environment Research Centre, Teagasc, Ireland)

15:10 **From LTE data to the sustainable control of soil fertility**

THIBAUT PUTELAT (Rothamsted Research, Harpenden, UK)

15:30-16:00 ***TEA***

### ***Fowden Hall***

16:00-18:00 ***Poster Session, Information Discussions, Visit Broadbalk Experiment, Tour of Rothamsted Museum***

18:00-18:15 ***Posters Removal***

18:30 ***Conference Dinner***

## **Thursday 22<sup>nd</sup> June**

08:00-09:00 **REGISTRATION**

## *Auditorium*

### ***Session Seven: Responses to Weather and Climate Change***

CHAIR: MICHEL CAVIGELLI (USDA-ARS, Beltsville Agricultural Research Center, USA)

09:00 ***Keynote speaker***

**TBC**

JORGEN EIVIND OLESEN (Aarhus University, Denmark)

09:30 **Prediction of maize yields under conservation agriculture using crop and machine learning models in Eastern Southern Africa**

SIYABUSA MKUHLANI (International Institute for Tropical Agriculture (IITA), Kenya)

- 09:50 **The signature of the North Atlantic Oscillation on long-term aboveground primary production dynamics through 160 years of the Park Grass long-term experiment**  
GONZALO IRISARRI (Rothamsted Research, North Wyke, UK)
- 10:10 **Climatic effect of no-tillage and mulch due to albedo change differs with soil type: A field study in Zimbabwe**  
SOULEYMANE DIOP (Université Paris-Saclay, INRAE, AgroParisTech, UMR EcoSys, France)
- 10:30 **Mud, mud, glorious mud - impacts of modern farming and extreme weather on soil loss revealed by the North Wyke Farm Platform**  
ADIE COLLINS (Rothamsted Research, Harpenden, UK)

10:50-11:20 **COFFEE**



*Auditorium*

**Session Eight: LTE Networks and Platforms**

CHAIR: JONATHAN STORKEY (Rothamsted Research, Harpenden, UK)

- 11:20 **Keynote speaker**  
**The First Decade of the USDA Long Term Agroecosystem Research (LTAR) Network: Successes and Strategy Moving Forward**  
LINDSEY WITTHAUS (Water Quality and Ecology Research Unit, Oxford, Mississippi, USA)
- 11:50 **USDA long term agricultural research: Carrying out multi-site research in the cropland common experiment**  
LORI J ABENDROTH (USDA-ARS, University of Missouri, USA)
- 12:10 **Bringing metadata of European Long-Term Field Experiments through an open-access geospatial platform**  
CENK DÖNMEZ (Leibniz Center for Agricultural Landscape Research (ZALF), Germany)
- 12:30 **Current and future adaptation strategies to heat stress for global livestock production systems in the context of climate change**  
M JORDANA RIVERO (Rothamsted Research, North Wyke, UK)
- 12:50 **Global Long-Term Agricultural Experiment Network (GLTEN)**  
RICHARD OSTLER (Rothamsted Research, Harpenden, UK)

13:10-14:10 **LUNCH**

*Auditorium*

**Session Nine: The Wider Impact of LTEs**

CHAIR: JORGEN EIVIND OLESEN (Aarhus University, Denmark)

- 14:10 **Crop response to soil potassium under diverse pedoclimatic conditions in multiple environments – implications for fertilization recommendations**  
JULIANE HIRTE (Agroscope, Agroecology, Water Protection and Substance Flows,
- 14:30 **Long-term conservation agriculture effects of wheat production on the economy and environment**  
JOHANN STRAUSS (Directorate Plant Sciences, South Africa)



14:50 **Long-term experiments to investigate contemporary global challenges: genetics × environment × management effects on soil organic carbon sequestration**

ANDREW S GREGORY (Rothamsted Research, Harpenden, UK)

15:10 **Using Long-term experiments (LTEs) as platforms for knowledge exchange and capacity development**

JOHANNA RÜEGG (Research institute of organic agriculture FiBL, Switzerland )

15:30 **Conservation effects assessment project watershed assessment studies: A long-term national research network to assess environmental impacts of agricultural conservation management practices**

MARTIN A LOCKE (USDA ARS National Sedimentation Laboratory, USA)

15:50 ***Concluding Remarks and Meeting End***

