**RRES Press Release 04 September 2023 New long-term experiments at Rothamsted**

**New long-term experiments at Rothamsted will shed light potential impacts of regenerative agriculture**

*Early results show interactions are complex with many possible outcomes*

Initial results from a new set of long-term experiments at Rothamsted suggest that more regenerative approaches to agriculture, such as no-till and diversified cropping, are not a short-term fix for more sustainable food production systems but will require a long-term commitment.

An experimental setup of 24 cropping systems that combine a variety of regenerative agriculture practices was established at sites in Hertfordshire and Suffolk in 2017/18. It has so far shown that, in the short-term, reduced tillage has resulted in lower wheat yields but the effect varied with crop rotation, previous-crop and site.

Plots with added organic matter significantly increased spring barley yield by 8% on average, though the effect again varied with site. The ploughed crop plots tended to produce higher caloric yield overall than systems under reduced tillage.

“The initial results suggest that it takes time for regenerative approaches to restore the health of soils and the ecosystem. In addition, there may be a decrease in yields as the system transitions to a more sustainable state,” said study team leader Professor Jon Storkey. “With so many variables in play, only a long-term, integrated approach will be able to tell us “what really works” in regenerative farming.”

The original long-term Broadbalk experiment at Rothamsted was set up in 1843 and was focussed on how varying inputs of fertilizer might affect crop yield. This was hugely influential and helped establish many modern farming practices that have consistently delivered bountiful harvests and widespread food security.

Today, as agriculture faces multiple pressures to reduce its environmental impacts, the new long-term experiments will look at how varying approaches to crop rotation, tillage, nutrition and crop protection can reduce inputs of pesticides and fertilizers, emissions of greenhouse gases and support biodiversity. The aim is to collect extensive data on multiple indicators from each of the experiments.

Rather than just focussing on crop yield, these new Large Scale Rotation Experiments (LSREs) are being monitored to study the synergies and trade-offs of each approach. The experiment has been established as a long-term resource for inter-disciplinary research.

“We have explained the experimental setup in detail in this new paper so that other similar experiments can be set up worldwide. Only by taking such a broad perspective can we hope to successfully inform the transition to more sustainable cropping systems across the planet,” said Storkey. “Inevitably trade-offs will need to be made between maximising crop yield and protecting the environment, but these experiments will help us better understand the system behaviour, and ultimately identify the optimal balance for multiple systems and approaches.”

As the experiment matures, the LSRE will use novel computing and statistical analysis to evaluate the importance of long-term data. This will provide the evidence base for alternative pathways to sustainable agriculture. It will also serve as demonstration site for encouraging the transition to more sustainable farming systems.

“We need to better understand cropping as a complex system. That way we can create models for predicting the system response to the multiple factors that will affect farming as our climate and food demands change. This will be of use to farmers and policymakers in guiding decisions on how to modify existing systems to reconcile multiple objectives,” said Storkey.

Publication

Li, X., Storkey, J., Mead, A. *et al.* A new Rothamsted long-term field experiment for the twenty-first century: principles and practice. *Agron. Sustain. Dev.* **43**, 60 (2023). https://doi.org/10.1007/s13593-023-00914-8