

# Rothamsted Repository Download

## A - Papers appearing in refereed journals

Zhang, Y. and Collins, A. L. 2025. Global Warming Potential of farming systems across England: possible mitigation and co-benefits for water quality and biodiversity. *Agronomy for Sustainable Development - ASD*. 45, p. 22. <https://doi.org/10.1007/s13593-025-01015-4>

The publisher's version can be accessed at:

- <https://doi.org/10.1007/s13593-025-01015-4>

The output can be accessed at: <https://repository.rothamsted.ac.uk/item/9932v/global-warming-potential-of-farming-systems-across-england-possible-mitigation-and-co-benefits-for-water-quality-and-biodiversity>.

© 2 April 2025, Please contact [library@rothamsted.ac.uk](mailto:library@rothamsted.ac.uk) for copyright queries.

## **RRES Press Release 7th April 2025 Farming Reforms Could Cut Emissions by a Quarter and Boost Water Quality**

### ***Reductions in phosphorus and sediment loss estimated at around one third in key catchment areas suffering from water pollution***

A new study has revealed that targeted farming interventions could slash agricultural greenhouse gas (GHG) emissions in England by up to 30% while significantly improving water quality and biodiversity.

Researchers combined farm and environmental data to model the impact of mitigation measures across England's farming landscape. The study, using the Catchment Systems Model, compared current agricultural emissions with a scenario implementing the feasible mitigation options at maximum levels.

The findings show that under business-as-usual conditions, the median global warming potential over a 20-year period (GWP20) stands at 4,606 kg CO<sub>2</sub> equivalent per hectare, while over a 100-year period (GWP100), the figure is 2,334 kg CO<sub>2</sub> equivalent per hectare. However, by adopting maximum uptake of mitigation measures, emissions could be reduced by up to 30% for GWP20 and 27% for GWP100.

*This study underscores the importance of balancing climate action with economic viability*

Beyond emissions reductions, the study highlights the potential for significant co-benefits for water quality, with reductions in phosphorus and sediment loss estimated at around 34% in key catchment areas suffering from such water pollution. Co-benefits could also exist for biodiversity, as some mitigation measures also promote healthier ecosystems.

The research comes at a time of heightened focus on achieving net-zero agriculture while addressing broader environmental challenges and government priorities. With farming a key driver of emissions and water pollution, these findings provide crucial modelled evidence for policymakers designing England's agricultural policies.

"This modelling study underscores the importance of balancing climate action with economic viability," said lead author Yusheng Zhang. "We found that the ratio of business-as-usual GHG emissions to monetised farm production varied widely, suggesting that financial incentives may be needed to encourage widespread adoption of mitigation practices."

With the UK government committed to improving environmental sustainability in agriculture, these insights could help shape policies that not only cut emissions but also enhance the health of the country's waterbodies and natural habitats.

*The study was undertaken jointly as part of the UKRI-BBSRC funded institute strategic programme Resilient Farming Futures and the UKRI-EPSRC funded **Global Nitrogen Innovation Center for Clean Energy and Environment (NICCEE)***

#### **Publication**

Zhang, Y., Collins, A.L. Global warming potential of farming systems across England: possible mitigation and co-benefits for water quality and biodiversity. *Agron. Sustain. Dev.* 45, 22 (2025). <https://doi.org/10.1007/s13593-025-01015-4>

Contacts Dr Yushen Zhang and Prof Adie Collins