Increasing the water table in agricultural peatland could hold key to reducing UK's greenhouse gas emissions

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Increasing the water table could help to slow down global warming, boost crop yields, and preserve peat soils according to a new study.

The research, led by scientists from the University of Sheffield, found increasing the level below which the ground is saturated with water – known as the water table – in radish fields by 20 cms not only reduced soil CO2 emissions, but also improved the growth of crops.

Importantly, the study also showed a reduction in the rate of loss of peat soils converted into agricultural fields.

Around a third of greenhouse gases released by humans are caused by agriculture. Reducing this is critical in order to slow down climate change, however the world is facing a global shortage of food and agricultural land is a precious resource – adding to the challenge of food security.

A significant proportion of the UK's farming takes place on drained peatlands, which are some of the most productive soils for commercial agriculture. Draining naturally flooded peatlands, which are organically rich, triggers the carbon to oxidise and release CO2 into the atmosphere.

Dr Donatella Zona, senior author of the study from the University of Sheffield's Department of Animal and Plant Sciences, said: "It is

estimated that in 30 years' time the world's population will reach 10 billion so it is vital that any means of reducing greenhouse gas emissions do not impact negatively on global food security.

"We are losing our peat soils in the UK at a fast rate, and we need to find solutions to decrease this loss if we want to preserve our food security. In this study, we investigated the effects of water table levels, elevated CO2 and agricultural production on greenhouse gas fluctuations and the crop productivity of radishes which are one of the most economically important fenland crops."

The international team of researchers from the universities of Sheffield, Exeter, Leicester and San Diego, raised the water table from 30 cm to 50 cm in agricultural peat soil collected from the Norfolk Fens – one of the UK's largest lowland peatlands under intensive cultivation.

Dr Zona added: "Flooding peatland would be too extreme and damage crops, but increasing the water level by just 20 cms maintains current food production - or as shown in our study even increases it - while at the same time reducing carbon oxidation and emissions."

The findings, published in the journal *Science of the Total Environment*, showed elevating the water table increased the average uptake of CO2.

Professor Walter Oechel, of the University of Exeter, said: "This is very important in a time of global warming, when reducing greenhouse emissions is a global priority.

"The UK is the 111th country to ratify the Paris climate agreement, which aims to avoid the most devastating effects of climate change by reducing greenhouse gas emissions including CO2 and CH4.

"Reducing CO2 emissions from peatland soils, will not only help the UK

to reach the targets set for the Paris climate agreement, but will also help protect and extend the life of the UK's agricultural peatland soils.

"Without careful management, agricultural peatland soils can be 'mined' or consumed in the production of agricultural crops, leaving the UK with less productive lands in their place."

The study, led by University of Sheffield students Charlotte Atherton and Samuel Musarika, will now analyse other crops, including celery, and look into the impact of fertiliser use on greenhouse gas emissions and productivity.

More information: S. Musarika et al. Effect of water table management and elevated CO2 on radish productivity and on CH4 and CO2 fluxes from peatlands converted to agriculture, *Science of The Total Environment* (2017). DOI: 10.1016/j.scitotenv.2017.01.094

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