

# ARABLE

The Allerton Project research farm is looking at the environmental impact of compacted s

## Project aims to learn more about soil compaction

### ► Environmental issues highlighted in results

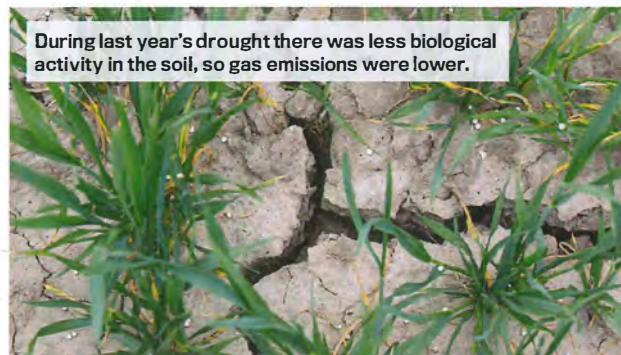
FAILING to correct compaction in farmland has long been known to have dire agronomic consequences in the form of reduced crop performance.

Now, early results from an experiment being conducted at the Game and Wildlife Conservation Trust's Allerton Project research farm in Leicestershire suggest compaction

also causes some significant environmental problems.

Results indicate the extra nitrous oxide emitted from compacted direct-drilled land could be as environmentally damaging as the carbon dioxide emitted by conventional cultivations, although the volume is much lower.

Prof Chris Stoate, of the Game and Wildlife Conservation Trust, who is leading the research, says researchers need a more complete



During last year's drought there was less biological activity in the soil, so gas emissions were lower.

set of data to understand the issue fully.

He says: "We were able to collect the first data from the project in April and May 2018, but the drought set in, which prevented us gathering relevant information until November.

### Activity

"During that drought period there was less biological activity in soil, so gas emissions were much lower."

Low gas emissions in summer are unusual. They normally reduce in winter due to the lower soil

temperatures, says researcher Dr Falah Darwesh, who is helping to run the project.

"There is still some activity in winter, but because it is so low it can be difficult to measure. There is still some carbon dioxide emitted in mid-winter because of interaction between microbes and plant roots."

Measurements resumed in autumn, says Prof Stoate.

"We have been collecting data since November and obtain a new set every few weeks to build up a year-round picture," he says.

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## d soils. Jonathan Wheeler reports.

"In spring and summer, when soil activity levels are naturally higher, we will collect information more regularly to see whether these confirm those from last spring.

"From the evidence we have already gained, we can see that compacted soils tended to be more anaerobic and produce more nitrous oxide, which is 296 times more potent in terms of global warming than carbon dioxide."

The Loddington work is part of the EU-funded SoilCare research project, which is being carried out on sites in 16 countries and in collaboration with other research organisations across the continent.

As well as gaseous emissions, the project will also measure various soil properties and water infiltration rates, which have implications for flood and soil erosion risks.

Prof Stoate points out that curbing compaction and raising water infiltration rates would have public benefits in terms of reduced run-off and flooding risk, as well as agronomic ones for the farmer.

"Reducing nitrous oxide emissions from compacted soils would be an additional bonus," he says.

"All of these are highly relevant to the Government's move towards payments to farmers for public goods and services."

### Issues

The subject matter of each country's project was decided by consulting with local farmers about which issues really trouble them and which subjects they feel they would like more information about.

Prof Stoate says: "The farmers we consulted identified direct drilling, which we are already doing a lot of work on, cover crops, compaction alleviation and grass leys as important issues.

"The main issue we are examining in our no-till system is the efficiency of different ways of alleviating compaction. We are comparing the traditional ploughing approach and low disturbance sub-soiling with untreated no-till.

"An additional treatment is inoculation of seed with mycorrhiza to see whether this increases the crop's ability to take up nutrients."

Three 40-metre by 9m plots of each cultivation regime were established in a randomised pattern, and gas emissions measured at intervals, as well as data on the soil, weed cover and crop yield at harvest.

The Gasmeter gas analyser the researchers are using is of the type developed for use by local authorities or health and safety companies to check emissions from factories and landfill sites.

In the first year, the plots were sown with winter barley and this year are under winter beans, says Prof Stoate.

"Local farmers told us that resolving compaction is one of their key issues, and they want more information about achieving this in non-plough-based systems because they recognise there are other drawbacks with that technique."

The plots have been deliberately compacted before drilling so the alleviation techniques get a thorough and realistic test.

Prof Stoate says: "In this second year we have again made things as bad as possible, physically, and will be aiming to gather a more com-

### Getting involved

THIS research is part of the EU's SoilCare Project, which involves understanding how farmers come to learn about soil management practices and which sources of information they trust. Researchers want to speak to UK arable farmers to understand this in more detail.

### MORE INFORMATION

To be interviewed for this research or to learn more email Niki Rust at [niki.rust@ncl.ac.uk](mailto:niki.rust@ncl.ac.uk)

plete set of data this spring in order to understand the processes better and make practical recommendations accordingly."



Dr Falah Darwesh testing gases emitted by soils.

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