

# Scientists warn of insect pest outbreaks and reduced wheat yields

October 23 2018

---



Credit: CC0 Public Domain

Climate-warming affects farmlands by increasing pests but not their natural predators, resulting in reduced crop yields, new research has revealed.

The study, published today in the journal, *Molecular Ecology*, provides

the first experimental evidence of how the interactions between agricultural plants, greenflies and tiny parasitoid wasps are affected in a world where temperatures are increased by 1.4°C.

Scientists at Newcastle University and the University of Hull have also shown that a rise in temperature drives changes in the crop, altering the growing patterns of the wheat that produced fewer, lighter seeds.

## **New approach**

Dr. Darren Evans, Reader in Ecology and Conservation at Newcastle University, and the leader of the study, said the research findings provide a further understanding into the impact of climate-change.

He said: "There have been a number of recent high-profile studies that have modelled the long-term effects of climate-change on crops using computers, but there are surprisingly few studies that have tested this using field experiments on farms.

"Most models examine the impacts on [crop yields](#), but often fail to take into account that crops are embedded in a wider network of interactions with organisms that can also directly and indirectly impact upon the crop as a result of climate-change.

"We used a network approach to better understand the impact on the farmland food-web."

By simulating a warmer, wetter environment, the team suspended infrared heaters above a wheat crop in Yorkshire, whilst also managing rainwater and found significant changes to the food-web.

In order to study the network of species interactions, the team developed a DNA-based tool to rapidly identify greenflies collected in the field,

enabling them to see whether they had been parasitised as well as the identity of the natural predator based on the DNA of their eggs injected into the insects.

Dr. Evans said: "In the first year of the experiment, we found that climate-warming affected the structure and complexity of the species-interaction networks.

"Some species were more affected than others but we observed four times as many greenflies in the warmed plots compared to the controls.

"Although it must be stressed that our experimental plots were not managed in a way similar to conventional wheat [crops](#), and the study was based on a single growing season, our results support growing evidence that climate-change will increase pests and pathogens and reduce crop yields in some temperate agro-ecosystems."

## Further research

The scientists found no effect of adding extra rainwater, despite the year of study being unseasonable dry, suggesting that increased irrigation by farmers might not mitigate the effects climate-warming.

They are now examining subsequent year's data to understand variation across growing seasons and plan to include a wider range of above and below-ground organisms in the networks.

Dr. Evans added: "New approaches in [network](#) ecology, combined with DNA-based tools, could help us to better understand and mitigate adverse effects of climate-warming through targeted management of non-crop plants, farm habitats and [natural predators](#).

"Further work must include other important factors, such as increases in

carbon dioxide, if we are going to make experiments and models more predictive. Ideally projects such as these should be replicated beyond a single experimental farm to incorporate wider geographical areas and a diversity of agro-ecosystems."

**More information:** Stephane A.P. Derocles et al. Climate-warming alters the structure of farmland tri-trophic ecological networks and reduces crop yield, *Molecular Ecology* (2018). [DOI: 10.1111/mec.14903](https://doi.org/10.1111/mec.14903)

Provided by Newcastle University

Citation: Scientists warn of insect pest outbreaks and reduced wheat yields (2018, October 23) retrieved 25 April 2024 from <https://phys.org/news/2018-10-scientists-insect-pest-outbreaks-wheat.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.