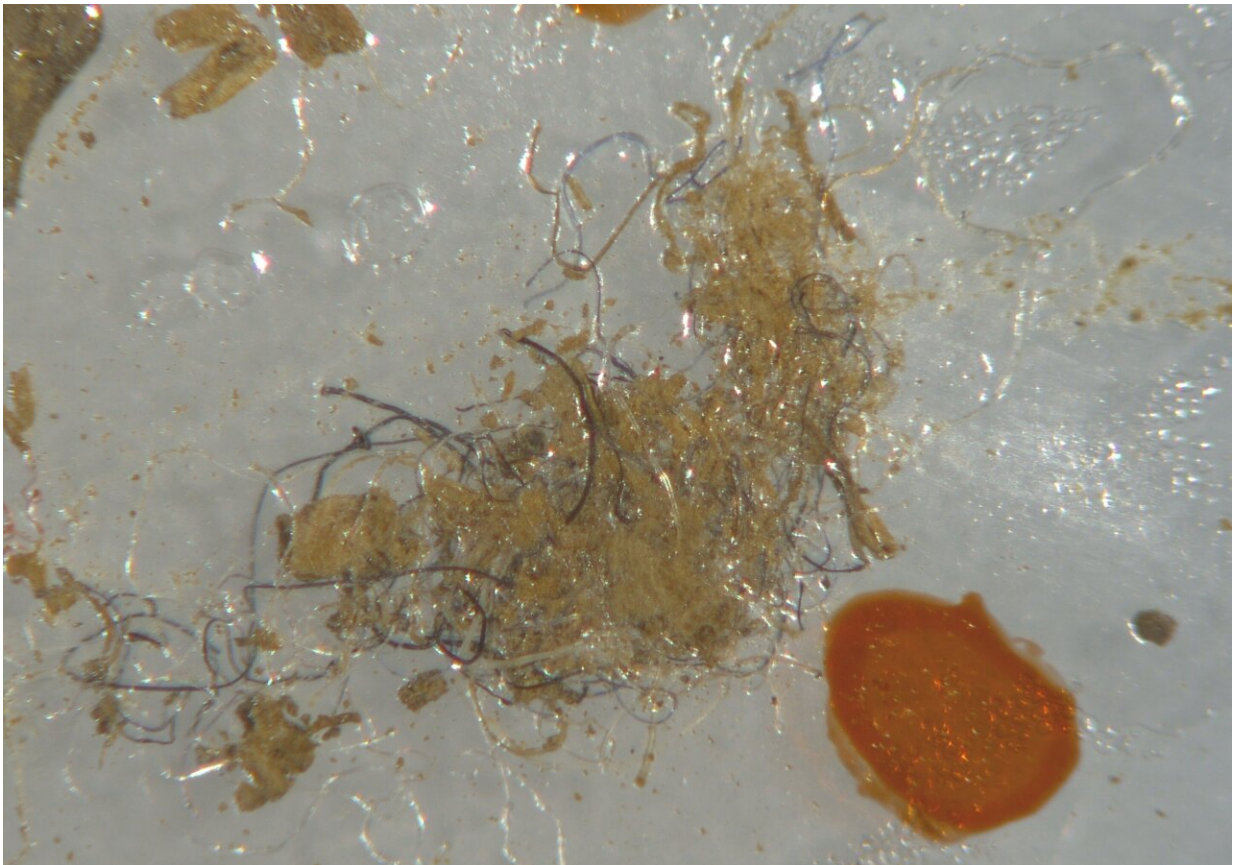


Investigation into plastic pollution moves inland

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A bundle of anthropogenic fibers found in UK soil. Credit: Ellie Harrison

New research highlights the increasing threat of microplastics to global farming and food production.

Scientists at Staffordshire University are driving research to understand the scale of plastic pollution in [agricultural soils](#) and its impact around the world.

Claire Gwinnett, Professor of Forensic and Environmental Science, explained that "we know a lot about microplastics in oceans and freshwater and we are starting to learn more about microplastics in the air, but we still know very little about microplastics in terrestrial environments."

"With [climate change](#), the pressure of increasing populations on food production and risks to food security, it has become apparent that it is incredibly important that we look into this."

In recent years, the use of plastics in agriculture has increased significantly. However, microplastics in soil are estimated to take up to 300 years to completely degrade. It is believed that their presence alters soil characteristics such as its structure, water holding capacity, and microbial communities, and that microplastics are, in part, responsible for crop-reducing effects.

The Staffordshire Forensic Fibres and Microplastic Research Group has been undertaking [various studies](#), including an international review into the pressures of plastic pollution in rural regions, which highlights the need for wider analysis of terrestrial microplastics to help reduce environmental and public health threats.

Professor Gwinnett says that "we know that microplastics in agricultural soils are abundant, varied, and are influenced by land use and farming activities. We know from a small number of studies that it can affect organisms living in the soil such as worms and springtails."

"Studies on the effect of microplastics on plants are even rarer but we

also know that it impacts crops grown in these environments as well as livestock living there. What we need to know now is how much plastic there is and to better understand what effect this is having."

Ellie Harrison, a Ph.D. researcher in the Staffordshire Forensic Fibres and Microplastic Research Group, is currently conducting a series of studies on the effects of microplastics on common UK [agricultural crops](#). She says that "research into the impacts of microplastics in the agricultural soils conducted at Staffordshire University has shown that this pollutant can cause a decrease in germination rate and changes to seed production which could have negative consequences for food production."

A recent study, conducted in partnership with Çukurova University, has investigated the amount of plastics derived from disposable greenhouse plastic films and irrigation pipes in agricultural soils in Turkey.

Professor Gwinnett says that "greenhouse films and irrigation piping are products commonly used in farming and we have the same plastic uses in the UK and across Europe. Instead of being removed, these plastic products are often left in fields where they experience wear and tear and degradation from the sun which breaks these plastics down into secondary microplastics."

"Our results show that from years and years of using these plastics, microplastics are accumulating in the soil and cannot be removed."

Soil samples were taken from 10 different locations in the Adana/Karataş region in Turkey. The number of micro-, meso-, macro- and megaplastics that was identified in soil where greenhouse film and irrigation piping was used, was about 47, 78, 17, and 1.2-times higher than in farmlands that did not use plastic, respectively. Findings indicated that residual plastics decreased in the soil where used plastics

were removed after usage. The results aim to guide farmers in better management of plastics.

A further study with Çukurova University is investigating farmer practices and perceptions in Turkey to understand what the barriers are to taking up preventative measures or more sustainable approaches.

Staffordshire University has been conducting similar research in the UK in partnership with the National Farmers' Union (NFU); this study looks into the amount and types of [microplastic](#) in UK agricultural soils. This is the first of its kind in the UK and it aims to get a better understanding of the extent of microplastic pollution in farmland.

Professor Gwinnett added that "[plastic](#) usage in the agricultural sector may have worthy benefits in the short term, but the long-term effects cannot be ignored. We hope that our growing body of research can be used to inform [decision makers](#) and kickstart real change to safeguard [soil](#) health and the future of the farming."

The research was published in *Environmental Science and Pollution Research*.

More information: Rezan Gündoğdu et al, Plastics derived from disposable greenhouse plastic films and irrigation pipes in agricultural soils: a case study from Turkey, *Environmental Science and Pollution Research* (2022). [DOI: 10.1007/s11356-022-21911-6](https://doi.org/10.1007/s11356-022-21911-6)

Provided by Staffordshire University

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