# Microplastics in agricultural soils exceed ocean concentrations by 23 times, posing new threats to food safety and health



Microplastics have emerged as a significant environmental concern, particularly in agricultural soils, where a recent review by researchers from Murdoch University reveals that these microscopic plastic particles now exist in concentrations approximately 23 times greater than those found in oceans. This alarming statistic underscores the degrading health of agricultural ecosystems, posing threats to both soil vitality and human health.

The evaluation, led by PhD candidate Joseph Boctor, highlights a concerning reality: agricultural soils may contain microplastics infused with as many as 10,000 chemical additives, most of which remain unregulated. This lack of oversight is troubling, especially as these additives can infiltrate food crops such as lettuce, wheat, and carrots through various pathways, including the application of plastic mulching and fertilisers. Emerging data also suggest that microplastics can be introduced from the atmosphere, underscoring the pervasive nature of the pollution.

These tiny particles have not only infiltrated the world’s soil but have also made their way into the human body, being detected in organs such as the lungs, brain, and even the placenta. “And BPA-free does not equal risk-free,” Boctor warns, noting that substitute chemicals like BPF and BPS can exhibit similar or greater endocrine-disrupting effects. The urgency of this situation is amplified by the slow pace of regulatory measures, which have lagged behind scientific discoveries and industrial advancements.

Moreover, the review identifies a plethora of chemical additives linked to serious health risks. Phthalates, known for their association with reproductive issues, and PBDEs, neurotoxic flame retardants, are among the hazardous substances that have been found in growing concentrations within soil environments. These compounds can contribute to neurodegenerative diseases and have been linked to increased risks of stroke, heart attacks, and premature mortality. “These are not distant possibilities – they are unfolding within biological systems – silently and systematically,” Boctor emphasised, drawing attention to the urgent need for action.

Addressing this escalating crisis requires not only awareness but also innovation. Boctor and his colleagues at the Bioplastics Innovation Hub are actively exploring sustainable alternatives to conventional plastics. One such initiative, the SMART SPRAYS Project, aims to develop a non-toxic, bioplastic-based soil spray that enhances water retention while being easily applicable with current agricultural equipment. This approach represents a significant stride towards creating environmentally friendly plastics capable of decomposing without leaving harmful residues.

The broader implications of microplastic pollution reach beyond soil health and agricultural productivity; they threaten the integrity of the entire food supply chain. Studies indicate that microplastics can affect soil physicochemical properties, reduce fertility, and alter microbial communities, ultimately impacting food security and public health. As highlighted in related research, these contaminants can enter plants through their roots, suggesting that microplastics might accumulate within various food sources consumed by humans.

With their presence detected in a variety of fruits and vegetables, from carrots and lettuce to apples and pears, urgent steps are needed to mitigate the infiltration of microplastics into the food chain. Regulatory authorities, scientists, and industry stakeholders must collaborate effectively to address these mounting challenges. “This review highlights the urgent need for coordinated scientific and regulatory efforts,” Boctor stated, urging for collective action to close the existing loopholes before the consequences of plastic pollution further permeate global agriculture.

In conclusion, the peril posed by microplastics in agricultural ecosystems is profound. As the research indicates, the time to act is now, before plastic pollution further entrenches itself within our soil and food systems, with implications that could shape public health and environmental sustainability for generations to come.

### Reference Map

* Paragraph 1: [[1]](https://www.azocleantech.com/news.aspx?newsID=35737)
* Paragraph 2: [[1]](https://www.azocleantech.com/news.aspx?newsID=35737), [[2]](https://www.sciencedirect.com/science/article/pii/S0165993625000445), [[3]](https://www.frontiersin.org/articles/10.3389/fenvs.2022.855292/full), [[5]](https://www.ehn.org/plastic-in-farm-soil-and-food)
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* Paragraph 7: [[1]](https://www.azocleantech.com/news.aspx?newsID=35737), [[3]](https://www.frontiersin.org/articles/10.3389/fenvs.2022.855292/full), [[5]](https://www.ehn.org/plastic-in-farm-soil-and-food)
* Paragraph 8: [[1]](https://www.azocleantech.com/news.aspx?newsID=35737), [[2]](https://www.sciencedirect.com/science/article/pii/S0165993625000445), [[6]](https://enveurope.springeropen.com/articles/10.1186/s12302-023-00720-9)

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## Bibliography

1. <https://www.azocleantech.com/news.aspx?newsID=35737> - Please view link - unable to able to access data
2. <https://www.sciencedirect.com/science/article/pii/S0165993625000445> - This article discusses the global stock of microplastics in agricultural soils, estimating it to be one to two orders of magnitude higher than the estimated ocean surface microplastic stock. The study emphasizes the need for more diversified data to accurately assess these stocks and highlights the importance of coordinated scientific and regulatory efforts to address the issue.
3. <https://www.frontiersin.org/articles/10.3389/fenvs.2022.855292/full> - This review examines the effects of microplastics on agricultural soil ecosystems, noting that they can affect soil physicochemical properties, reduce soil fertility, and alter soil microbial communities. The article also discusses the release of various additives from plastics into soils and their potential adverse effects on soil health and nutrient cycling.
4. <https://www.mdpi.com/2673-8929/4/2/16> - This study investigates the presence of nanoplastics and microplastics in agricultural systems, focusing on their effects on plants and implications for human consumption. It highlights how microplastics can enter plants through their roots and discusses the potential risks associated with their accumulation in the food chain.
5. <https://www.ehn.org/plastic-in-farm-soil-and-food> - This article reports on studies that have found microplastics in various fruits and vegetables, including carrots, lettuce, broccoli, potatoes, apples, and pears. It discusses the pathways through which microplastics enter plants and the potential health risks associated with their presence in the human food chain.
6. <https://enveurope.springeropen.com/articles/10.1186/s12302-023-00720-9> - This review examines the sources and effects of plastic contamination in agricultural soils, noting that plastics enter soils primarily through the application of mulch and sewage sludge. The article discusses the detrimental effects of microplastics on soil health and the potential threats they pose to human health and food security.
7. <https://www.telegraph.co.uk/news/2020/06/26/carrots-contaminated-microplastics-scientists-find/> - This article reports on studies that have found microplastics in carrots, highlighting concerns about the potential health risks associated with ingesting these particles. The study emphasizes the need for further research to understand the implications of microplastic contamination in the food supply.