

Researchers discover eco-friendly fungicide alternative

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Credit: Wikipedia

A material that could replace current fungicides (i.e., anti-fungal

pesticides), increase food security, and help protect wildlife has been discovered.

A recent investigation undertaken by Pesticide Action Network (PAN) revealed that the UK is still using 36 harmful pesticides that have been banned in other European countries, with 13 described as "highly hazardous" that have links to [water contamination](#), cancer, infertility, and other illnesses.

Published in [Green Chemistry](#), researchers at the University of Nottingham have completed a successful field trial of a material they have developed to help to protect crops from fungi.

Simon Avery, professor of eukaryotic microbiology in the Faculty of Medicine and Health Sciences, said, "The test material is not toxic but works by passively resisting attachment of fungal spores to protect surfaces from [fungal infection](#), including crop surfaces. Results from this first field trial with wheat are particularly encouraging as there is a lot of scope to optimize further the [material properties](#) for crop protection."

"We identified two lead polymer candidates by bio-performance testing using in vitro microplates and leaf-based assays. These were then taken forward into a program to optimize and scale up their synthesis and compound them into a spray formulation that could be used on crops. Our findings showed that the material not only significantly reduced fungal infection by the fungus *Septoria tritici* by up to 26% but also that the crop grew just as well as the [control group](#)—providing an alternative that appears safer for the environment, wildlife, and people, and is effective, too."

Sprayed directly onto wheat at timings conventional for fungicides, the trial has provided the first real-world scale exemplification of how the

material interacts with crops. The small plot trial compared the two polymer candidates to a multisite fungicide and two commercial fungicide programs.

Valentina Cuzzucoli Crucitti, research fellow in the Faculty of Engineering, said, "Wheat is one of the most economically and nutritionally important cereal crops, but there's a real-world challenge waiting to be solved as 5–10% of yields are lost to fungal infections even with the use of resistant crop varieties and fungicides."

For the field trial, the university partnered with ADAS, an independent provider of agricultural and environmental consultancy.

Chloe Morgan, senior research scientist in Arable Crop Pathology at ADAS, said, "The results of the field trial were very promising, showing that polymers have a level of efficacy against *Septoria tritici*. With further optimization they could play a vital role in future disease control strategies, either by replacing or being applied in mixture with conventional fungicides, novel polymers could also reduce the risk of fungicide resistance development, extending the life of existing products."

Valentina said, "Our attention is now turning to a second field trial that's in the diary for this year to further hone and improve the polymer so we can continue turning our research into reality. The beauty of a material like this is its lack of toxicity, the relative simplicity of its production and the fact that it can be scaled up easily—making it an incredibly attractive prospect for several other industries, not just agriculture."

More information: Liam A. Crawford et al, A potential alternative to fungicides using actives-free (meth)acrylate polymers for protection of wheat crops from fungal attachment and infection, *Green Chemistry* (2023). [DOI: 10.1039/D3GC01911J](https://doi.org/10.1039/D3GC01911J)

Provided by University of Nottingham

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