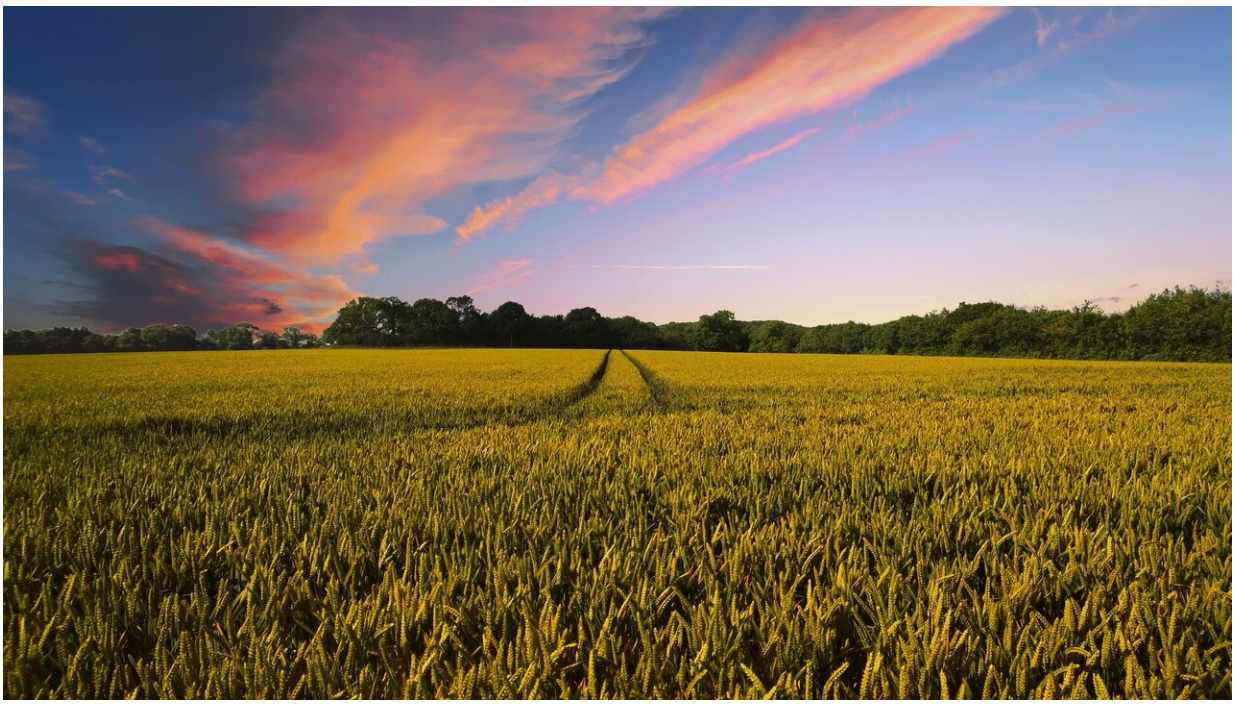
Researchers use science of light to reduce pesticides used to protect crops from pests and diseases

July 27 2022



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Experts at two Midlands universities are starting a new project to develop a photonic 'nose' to monitor crops for pest infestations and plant disease.

Aston University is collaborating with Harper Adams University to research and develop technology using light to monitor crop health.

According to the Food and Agriculture Organization of the United Nations up to 40 percent of global crop production is lost to pests annually. Each year, plant diseases cost the global economy over $220 billion, and invasive insects at least $70 billion.

The Midlands-based research will be using strawberries to test the new technology. The fruit is worth £350 million to the UK economy but it is vulnerable to potato aphid which has the potential to wipe out an annual harvest.

Currently crops are treated with pesticides, but there's increasing pressure to find alternatives due to the environmental impact.

One method is to use integrated pest management (IPM) to create an early warning system. It monitors plants for build-up of insects and diseases rather than spraying plants with chemicals, but so far it's proven unreliable and expensive.

The new project uses recent developments in photonics technology that can analyze low levels of volatile organic compounds (VOCs) emitted by plants, which indicate their health. This is coupled with machine learning hardware which makes it practical to use artificial intelligence in commercial settings. Professor David Webb of Aston Institute of Photonic Technologies (AIPT) says that "better invertebrate pest and plant disease monitoring technologies will significantly help cut crop losses."

"However most electronic noses use electrochemical sensors, which suffer from sensitivity issues, sensor drift/aging effects and lack specificity."

"We intend to address this by building on the fast-moving technology of photonics—the science of light—whilst collaborating with scientists in other disciplines."

The 12-month project is to receive £200,000 from the Biotechnology and Biological Sciences Research Council (BBSRC) and the Natural Environment Research Council. The grant is the maximum amount given from their molecules to landscapes project, which funds interdisciplinary solutions to 'real world' challenges.

Dr. Joe Roberts from Harper Adams University says that "with the projected increase in the global population there is increasing pressure on the agricultural sector to achieve higher crop yields."

"Reducing crop losses within existing production systems will improve food security without increasing resource use."

"We intend to establish an interdisciplinary community of agricultural science, optical sensing and machine learning experts to develop novel plant health monitoring platforms that enhance agricultural production through localized pest and disease monitoring to detect hotspots."

The research was published in the *International Journal of Fruit Science*.

More information: Philip Lieten, Strawberry Production in Central Europe, *International Journal of Fruit Science* (2006). DOI: 10.1300/J492v05n01_09

Provided by Aston University

and diseases (2022, July 27) retrieved 11 May 2024 from https://phys.org/news/2022-07-science-pesticides-crops-pests-diseases.html