PROJECT PROFILE

INSECTLIFE

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MIKLÓS DOMBOS attained a PhD in Soil Ecology from Szeged University, Hungary, in 2001 before becoming a research associate at Szent Istvan University. He is currently a senior researcher in the Centre for Agricultural Research at the Hungarian Academy of Sciences (MTA ATK), where he leads the LIFE-funded INSECTLIFE project.

RESEARCH GOALS

There is a diverse yet largely invisible world beneath the soil, with around 90 per cent of all insects spending some portion of their lives buried in the earth. They can be harmful, causing damage to roots or emerging to eat plants above the soil, but many are beneficial. Detecting soil organisms is an essential component of pest management, and can also be beneficial for conservation and environmental work. However, measuring insect populations in an area is currently an expensive and time-consuming process, only really possible on small scales, and even then with limited accuracy.

To solve this problem, Dr Miklós Dombos, a researcher at the Hungarian Academy of Sciences' Centre for Agricultural Research, is developing an innovative system to automatically monitor organisms living in and above the ground. In a previous LIFE+ project called MEDAPHON, he and his team developed the EDAPHOLOG sensor system. This biological monitoring tool uses probes in the soil to continuously and automatically monitor tiny invertebrates called microarthropods. These help to break down organic material into a form that bacteria can consume and are essential to the formation of soil.

METHODS

The EDAPHOLOG sensor system is an online, *in situ* monitoring system, consisting of opto-electronic probes, radio/internet data loggers and a central server application. The sensors are equipped with data communication units, which transmit data directly to a server via the internet. The data on insects observed in the field can then be visualised in real time, using a computer or smart phone, enabling researchers and farmers to receive accurate data on a daily basis, which would not be possible with traditional human counting methods.

Now, Dombos and his team aim to assemble the EDAPHOLOG sensors into ZooLog – a new system to detect both pests and beneficial insects living in and above the ground. This is the goal of his current project: Innovative Real-time Monitoring and Pest-control for Insects (INSECTLIFE), which is also funded by the LIFE+ scheme. INSECTLIFE aims to combine EDAPHOLOG sensors with CSALOMON pheromone traps, which are already in use for several pest species. When arthropods enter the trap, drawn in by pheromones, they are captured and preserved in alcohol. In the newly proposed system, opto-electronic sensors would automatically count the trapped organisms, and even estimate the body size of the animals using a beam of infrared light.

IMPACT

Such a system would be able to detect not only pest emergence, but also changes to populations, based on the addition of locally measured meteorological data and forecasts. Furthermore, because the pheromone 'baits' of CSALOMON are pest-specific, sensors inserted into the traps would only detect a specifically targeted pest, ensuring extremely precise data collection. The INSECTLIFE project aims to create a prototype of this system and test it in field conditions across four pilot areas.

The project, which will continue through to 2018, presents a novel route to integrated pest management. Dombos' proposed monitoring device achieves *in situ* monitoring of soil and surface living or flying insects rapidly, cost-effectively and in real time. It could facilitate more widespread pest monitoring, which has to date been limited by the costs associated with regular checks and the manual counting of catches. By contrast, the automatic counting technique provides accurate data on a daily basis – something currently unimaginable for most farmers.

Furthermore, the system will enable pest trapping to form the basis of informed decisions regarding crop protection, resulting in more precise and environmentally friendly practices. Indeed, detailed forecasting of pest emergence should prevent unnecessary pesticide use – an important goal in an era of environmentally friendly farming. The project will also deliver important benefits to its users, as the automatically operating ZooLog system eliminates the need for manual checks, saving both time and money.