Researchers collect 'signals intelligence' on insect pests

March 23 2011

Using commercially available parts, U.S. Department of Agriculture (USDA) scientists and colleagues have developed a new automated system for detecting insects based on the peculiar sounds the insects make while moving.

According to entomologist Richard Mankin of USDA's Agricultural Research Service (ARS), one likely application will be to automate routine monitoring of industrial-scale traps, especially those placed in hard-to-reach areas like crawl spaces or near food processing equipment.

Automated insect monitoring could also be useful in situations where frequent checking of traps is impractical, adds Mankin, with the ARS Insect Behavior and Biocontrol Research Unit in Gainesville, Fla. ARS is USDA's principal intramural scientific research agency, and the research supports the USDA priority of promoting international food security.

Mankin developed the device in collaboration with North Carolina State University researchers Ryan Hodges, Troy Nagel and Coby Schal, all in Raleigh, and Roberto Pereira and Philip Koehler, both at the University of Florida in Gainesville. The team's objective was to make automated insect monitoring affordable, easy to use and reliable.

Toward that end, they integrated commercially available sensors (LEDs, microphones and piezoelectric film) with high-gain amplifiers and laptop-run software for analyzing signals. The system uses the sensors to collect infrared, acoustic and vibration signals generated by three kinds

of insect movements: wriggling, crawling and scraping. The software analyzes the signals to create a profile of the target insect that distinguishes it from other species.

The researchers tested the device on three stored-product pests (rice weevil, red flour beetle and drugstore beetle) and two household pests (German cockroach and bed bug). In tests, individuals of each pest species were placed in small arenas where their signals could be collected and analyzed for differences in profile, amplitude and duration.

All species tested generated all signal types, but red flour beetles mostly wriggled, German cockroaches typically ran or crawled, and bed bugs mostly scraped.

Mankin envisions users placing the devices in traps or near infested structures and monitoring them remotely.

More information: Read more about the research in the March 2011 issue of Agricultural Research magazine.
www.ars.usda.gov/is/AR/archive … mar11/insect0311.htm

Provided by United States Department of Agriculture

Citation: Researchers collect 'signals intelligence' on insect pests (2011, March 23) retrieved 2 May 2024 from https://phys.org/news/2011-03-intelligence-insect-pests.html

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