Researchers use acoustic tools to detect underground insects that attack grapes

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(PhysOrg.com) -- University of Florida researchers are finding new ways to thwart crop-devouring pests — by being good listeners.

High-tech acoustic equipment makes it possible for them to listen in as insects gnaw on grapevine roots, making it much easier for vineyard owners to know where to focus their efforts against the pest called the grape root borer.

Will Sanders, a former UF entomology graduate student, conducted much of the research and outlines the project in the current issue of Florida Entomologist. Using sound to target the pest could one day save vineyard owners money and pay off for consumers in lower costs for grapes and wine, he said. Grapes are a $20 million annual industry for Florida.

The grape root borer, a moth that looks similar to a wasp, is a major pest in grapes in the Southeast. In its caterpillar stage, it feeds inside the grape plant's roots and damages the plant. There is a pesticide called chlorpyrifos that works well against the insect, but it is toxic to birds, fish and bees, making many vineyard owners reluctant to use it.

There is another relatively effective control that does not involve pesticide that growers can use, however, called "mounding."
Before grape root borer caterpillars become moths, they must burrow up to the soil surface. They form their cocoon while still submerged. When grape root borers become adults, they break free from the cocoon and

emerge from the soil. Placing a mound of soil around the base of the grapevine means the insects must travel farther as fragile adults before they reach the surface, and generally kills them.

But piling up mounds of dirt throughout a vineyard is time consuming, labor intensive and expensive, said Sanders, a former graduate student advised by Oscar Liburd, a professor in pest management with UF's Institute of Food and Agricultural Sciences.

Sanders said long before he began working on grape pests, he remembered seeing a presentation by Richard Mankin, an insect physiologist with the USDA's Agricultural Research Service, on how scientists were using a machine called an accelerometer to convert vibration to an electrical signal, then another to convert that signal into sound. Mankin had used the setup to detect underground sugarcane pests as well as pests munching away in grain silos.

As he began his graduate work, Sanders said he was trying to think of ways to attack the underground borers before they emerged from the soil, when he remembered Mankin's presentation.

"It seemed like a great idea — if they can find dinosaur bones with sound, and they can find beetles with sound, maybe I'll be able to find my caterpillars with sound," he said.Mankin, a member of UF's Institute of Food and Agricultural Sciences, helped Sanders with the research project. Sanders, Mankin, Liburd and Lukasz Stelinski, an assistant professor in entomology, wrote the journal article.

Sanders said it wasn't hard to tell the difference between underground insects and other noises, but it was difficult to distinguish grape root borer sounds from other insects. After listening in on over 30 root systems in commercial vineyards in Florahome and Lithia, Fla., they only captured one live grape root borer, as well as many other insects.

But the acoustic testing works, he said, because if growers were to count even ambiguous insect sounds as a positive, they could reduce the number of sites that require mounding by as much as 75 percent.

Mankin said he believes the grape root borer study will eventually prove useful to the state's 22 wineries and that he hopes Sanders can secure funding to devote more time to the research.

"I think it's potentially very useful," Mankin said. "This is the main pest of concern to grape growers in this part of the country."

Provided by University of Florida