Bark beetles' song could save forests

Study: Tree-eating insects deterred by their own calls

*by **Shaun McKinnon** - Feb. 9, 2010 12:00 AM*

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Researchers at Northern Arizona University think they may have found an environmentally safe and readily available weapon against the tree-eating armies of bark beetles.

It is, with apologies to the boys from Liverpool, the music of the beetles.

NAU's School of Forestry was on the hunt for ways to fight the marauding bugs, which have chewed through millions of acres of the West's pine forests, leaving behind dead trees and the risk of wildfires.

A research assistant suggested using sounds to aggravate the beetles, much as police sometimes blare music in hostage situations. The researchers tried Queen and Guns N' Roses and played snippets of radio talker Rush Limbaugh backward. None produced the desired results.

Then, the beetles were exposed to digitally altered recordings of their own calls, the sounds they make to attract or repel other beetles. The response was immediate. The beetles stopped mating or burrowing. Some fled, helter-skelter. Some violently attacked each other.

Most important, they stopped chewing away at the pine tree, suggesting that the scientists may have discovered a sort of sonic bullet that could help slow the beetles' destructive march.

"Our interest is to use acoustic sounds that make beetles uncomfortable and not want to be in that environment," said NAU forest entomologist Richard Hofstetter, who led the experiment nicknamed, without apology, "beetle mania."

Bark beetles have killed nearly 80 million ponderosa, piñon and lodgepole pines in Arizona and New Mexico and tens of millions more across the West over the past decade. Years of punishing drought left the trees unable to protect themselves against the attacks, which carve ugly scars into forests, weaken the surrounding ecosystem and heighten wildfire danger.

Forest managers can apply insecticide to individual trees or small stands, but forestwide treatments are impractical and would be wildly expensive and potentially risky to other plants and wildlife.

Enter Reagan McGuire, a research assistant who wondered what would happen if the beetles were blasted with noise, creating an acoustic stress that might change their behavior. He sold Hofstetter on the idea, and the experiment was hatched at NAU's School of Forestry lab.

They collected tree trunks infested with bark beetles and sandwiched slices of the trees between clear plastic plates, creating what looked like the old ant farms once sold in the back pages of magazines.

Working in the lab, McGuire piped in the music through tiny speakers, the sort you might find in a singing greeting card. He watched the reaction of the beetles using a microscope. The rock music didn't seem to annoy the bugs, nor did Rush in reverse.

McGuire and Hofstetter decided to try something different. They recorded the sounds of the beetles and played them back, manipulating them to test the response.

Suddenly, every little thing they did seemed to provoke the beetles.

"We could use a particular aggression call that would make the beetles move away from the sound as if they were avoiding another beetle," Hofstetter said.

When they made the beetle sounds louder and stronger than a typical male mating call, he said, the female beetle rejected the male and moved toward the electronic sound.

Even more surprising was what the beetles did to each other. The researchers manipulated the sounds and, at a certain point, the male stopped mating and tore the female apart, McGuire said.

"This is not normal behavior in the natural world," he said.

Questions remain about why and how the sonic attacks work. It's not even clear yet where the beetles' ears are. Other researchers hope they can work that out, seeking the best way to aim the offending sounds.

The lab hopes to find more funding to continue its research into acoustic pest control. Scientists think it won't be long before they can take the experiment into the field.

http://www.azcentral.com/arizonarepublic/news/articles/2010/02/09/20100209env-beetles0209.html