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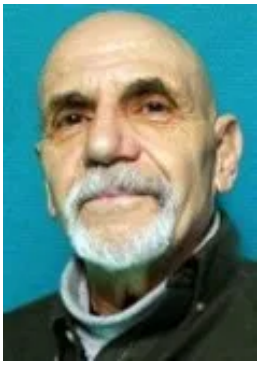
Fungus Could Help Control Emerald Ash Borer

LISA JUNKER 3 DAYS AGO 2 COMMENTS

Emerald ash borer (*Agrilus planipennis*). Photo courtesy of Pennsylvania Department of Conservation and Natural Resources – Forestry, Bugwood.org.

By Ed Ricciuti



Ed Ricciuti

Canadian scientists have figured out how to hit the tree-killing emerald ash borer (*Agrilus planipennis*) where it really hurts by employing a fatal fungus that turns mating into a way of decreasing, not increasing, its numbers. Male emerald ash borers infected with the fungus on contact inside a small chamber readily transmit it females during mating, with both dying thereafter, according to research published in the *Journal of Economic Entomology* (https://doi.org/10.1093/jee/toz256).

The fungus involved is the ubiquitous *Beauveria bassiana*. Its snowy spores cause white muscardine disease, lethal to many insects, and it has figured prominently in the history of science. In the early 1800s, Italian bacteriologist Augustino Bassi determined that the disease, which was wiping out silkworms that were the basis of a thriving industry northern Italy and France, was caused by a fungus, leading him to describe how some diseases are caused by parasites. His insight anticipated the later affirmation of the germ theory of disease by Louis Pasteur and Robert Koch. Today, the fungus is used as a control for a host of harmful insects, including grasshoppers, locusts, bed bugs, and house flies. The emerald ash borer may be next on its hit list.

The emerald ash borer (EAB) beetle was detected for the first time in North America in Detroit, MI, and Windsor, ON, Canada, in 2002, but examination of tree rings suggests that it was present from the early 1990s. Newly-hatched larvae chew through the bottom of the egg and tunnel by D-shaped holes into the ash tree host, where they feed on phloem and xylem tissues, destroying the plumbing that distributes food and water and killing the tree. The borer has claimed thousands of ash trees as it has spread to 35 U.S. states and five Canadian provinces.

When the beetles come into contact with the white, powdery spores of the fungus, the spores germinate, penetrate the cuticle of the insect, and grow inside the insect's body, killing it. White mold grows out of the dead insect and generates new spores, which can then spread to other beetles and repeat the process.

"EAB males are the promising vector to transmit mycosis to their partners during mating," write the authors. "[The results of the study] strengthen the potential of the

fungal autodissemination device as a powerful biological strategy to control EAB populations."

During experiments, male borers were placed in a chamber containing a beanbag-like pouch, made of fiberglass mosquito netting filled with pearl barley, whose surface had been inoculated with a suspension containing the fungus. Males picked up the fungus when they crawled over the pouch. They were then allowed to have contact with females and successfully transmitted the fungus.

"To reduce the risk of indirect contamination [of females] associated with insect movement, females were glued on the surface of all experimental units," says Claude Guertin, Ph.D, one of the authors on the paper.

The research followed up previous work by Dr. Guertin and colleagues (https://doi.org/10.1603/EC12325) on the development of a system that would allow the beetles to infect themselves by contact.

The use of fungus as a control tool may provide managers of forests, including trees in urban areas, with an alternative to chemical insecticides. The research suggests that, as in some other insects, males are better transmitters of the fatal infection than females. The lethal effect of the fungus can be enhanced by the fact that some males mate with at least two females, multiplying the control impact.

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"Horizontal Transmission of the Entomopathogenic Fungal Isolate INRS-242 of Beauveria bassiana (Hypocreales: Cordycipitaceae) in Emerald Ash Borer, Agrilus planipennis (Coleoptera: Buprestidae) (https://doi.org/10.1093/jee/toz256)"

Journal of Economic Entomology

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world. He specializes in nature, science, conservation issues, and law enforcement. A former curator at the New York Zoological Society, and now at the Wildlife Conservation Society, he may be the only man ever bitten by a coatimundi on Manhattan's 57th Street.

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Research News

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