

# Minnesota DOA Releases Bioagents Against Gypsy Moth and Emerald Ash Borer

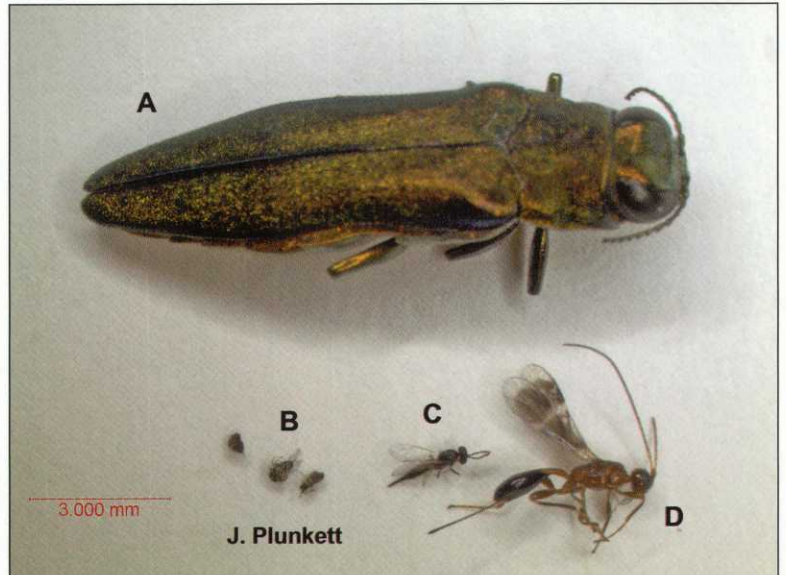
By MONIKA CHANDLER

Biological Control Coordinator, Minnesota Department of Agriculture

Gypsy moth (GM), *Lymantria dispar*, and emerald ash borer (EAB), *Agrilus planipennis*, arrived in North America from Europe and Asia respectively. Without their natural predators, parasites and pathogens in their North American home, GM and EAB populations have reached outbreak levels destroying millions of forest trees resulting in severe environmental and economic damage. GM caterpillars feed on the leaves of more than 300 host species. Repeated defoliation events can result in tree and shrub mortality. In contrast, EAB larvae feed under ash (*Fraxinus* sp.) bark disrupting the flow of nutrients and water. Tree mortality occurs when larval densities exceed the host tolerance threshold. A study in Michigan showed that tree mortality is 99% within six years of initial EAB infestation. The estimated loss of over a billion trees to these pests would be catastrophic. Biological control has been shown to be an effective tool against some invasive species such as leafy spurge, spotted knapweed and purple loosestrife. It is possible that reuniting GM and EAB with their natural enemies in Minnesota will reduce GM and EAB populations.

## Gypsy Moth Biological Control

Northeastern Minnesota has widespread low-level populations and thus far, prescribed treatments have all been successful. However, male moth trap catches indicate increasing numbers of GM. A multi-agency decision was made to implement biocontrol with the fungal pathogen *Entomophaga maimaiga*, which is very specific to GM caterpillars. The pathogen was released this summer at sites in Hovland, Grand Marais, Finland, Ely, Two Harbors and Duluth. Pre- and post-



Pictured are the adult Emerald Ash Borer beetles, *Agrilus planipennis* (A), and the parasitoids that control it in China, including the egg parasitoid *Oobius agrili* (B), and the larval parasitoids, *Tetreriastichus planipennis* (C) and *Spathius agrili* (D)

release monitoring of these sites will be conducted to determine pathogen establishment. Biocontrol will be one management tool integrated with other treatments such as the biopesticide Btk and mating disruption. As GM populations increase and treatments become less effective, the goal is that *E. maimaiga* will be established and consequently lessen the economic and environmental impact from GM outbreaks. Other states have successfully established *E. maimaiga* in areas with newly established GM populations and maintained populations below outbreak levels.

## Emerald Ash Borer Biological Control

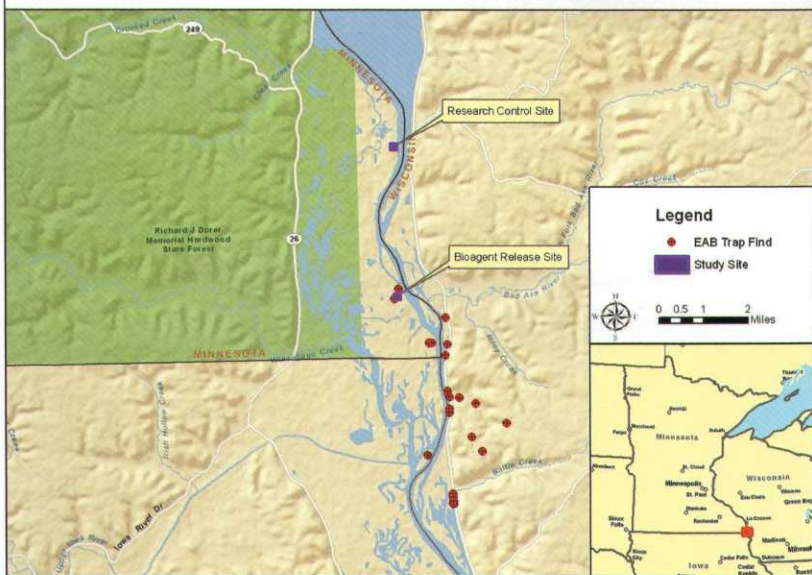
The Minnesota Department of Agriculture (MDA) and partners conducted the state's first release of biological control insects against EAB in mid-September. Partners include the U.S. Department of Agriculture's Animal and Plant Health Inspection Service (APHIS), U.S. Fish and Wildlife Service, the U.S. Army Corps of Engineers and the Minnesota Department of Natural Resources. The release site is an island in the Upper Mississippi River Refuge in Houston County. The site will be monitored and compared to a research control site (no bioagents released) for at least five years to determine bioagent establishment and efficacy. We hope that by releasing the parasitoids now, when EAB populations are low, they will move with EAB as it spreads. Biological control

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Dead Gypsy Moth caterpillars.

## Emerald Ash Borer Biocontrol in Minnesota



Cooler: Emerald Ash Borer Bioagents

## Bioagents-

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is the only option for managing EAB on a forest scale. EAB treatments such as insecticides and tree removal are options for urban areas or for treating individual trees, but are neither cost-effective nor practicable on a forest landscape level.

Three species of tiny parasitoid wasps are approved for release. These species were developed by APHIS and were tested extensively to ensure that they will not have a negative impact on other species or the environment. They will not sting humans. APHIS rears these bioagents at a specialized facility in Michigan. Two species kill EAB larvae under ash bark. *Tetrastichus plannipennisi* adults find and insert their eggs into EAB larvae.

**"The strategy is to prevent GM and EAB spread and utilize biological control in infested areas."**

*Spathius agrili* behaves similarly except that the wasp eggs and developing wasps are attached to the outside of the EAB larvae. The developing wasps feed on and eventually kill the EAB larvae. Egg parasitoid, *Oobius agrili*, adults insert their eggs into EAB eggs on ash bark. The developing wasps feed on and destroy the eggs. We released the two larval parasitoids. These parasitoids prefer mature EAB larvae (3rd and 4th instar) so our timing was in sync with EAB development. We plan to release the egg parasitoid next summer.

### *Integrating Biological Control With Other Management Activities*

Biological control is one part of MDA's GM and EAB programs. In addition, we work to prevent the spread of these pests by regulating the movement of targeted wood products such as firewood (potential vector), training First Detectors to identify infestations in early stages, and educating communities and the public about GM and EAB. We set and enforce the quarantine in infested counties and search for new infestations. The strategy is to prevent GM and EAB spread and utilize biological control in infested areas.