



Don't spread pests.
Burn firewood where you get it!

Frequently Asked Questions on Biological Control for Emerald Ash Borer (EAB) in Missouri

Biological Control Overview

What is biological control? Biological control is the use of natural enemies to control non-native pests. Non-native pests can be very destructive when introduced to new areas because the predators, parasitoids, and diseases that normally limit their populations are not present.

How does biological control work? Classical biological control reunites natural enemies, such as insects and pathogens, with the target pest to minimize pest damage. The goal is to reduce the target pest population and its impacts to acceptable levels. Before any natural enemy is considered a viable candidate to be used in biological control, USDA scientists study it carefully in quarantined facilities to make sure it will not harm people or the environment.

What are advantages of biological control? Biological control is a long-term, sustainable management strategy. The best types of biological control agents are selective because they are very specific to the target pest, and they benefit the environment by reducing the pest population so that desirable plants and animals can flourish. Successful natural enemies can provide lasting pest control, and they can reproduce and disperse without further human assistance. They persist after the pest population is reduced to low density, thus providing ongoing control.

When is biological control a good option? Biological control is most appropriate when there is a large pest population or infestation, when the pest is in an environmentally sensitive area, when other potential control methods are ineffective or too costly, and when integrated with other control methods.

Biological Control of Emerald Ash Borer

Are there native predators and parasitoids that attack emerald ash borer (EAB) (*Agrilus planipennis*)?

Although there are several native parasitic wasps that attack EAB, the observed parasitism rate is generally

low. Woodpeckers and other bark-foraging birds can consume a significant portion of EABs, but not enough to prevent tree mortality.

Why is biological control emphasized for managing EAB infestations? Biological control is currently the only management option that can be applied at the forest landscape level. The goal of EAB biological control is to use natural enemies to bring EAB populations into balance and reduce damage.

What biological control agents are used for EAB?

Three species of parasitic wasps are approved for release (*Spathius agrili*, *Oobius agrili*, and *Tetrastichus planipennis*). These species were selected by the US Department of Agriculture's Animal and Plant Health Inspection Service (APHIS) and Forest Service. The parasitoids (parasitic insects that kill their host) were tested extensively to ensure that they will not negatively impact other species or the environment.

Where did the selected parasitoids originate? EAB is native to eastern Russia, northern China, Japan and the Koreas. In its natural range, EAB is only an occasional pest of ash because of resistant host trees, climatic conditions and the presence of natural enemies. Chinese and US scientists collaboratively searched that region for natural enemies of EAB.

How effective are the parasitic wasps? Percent parasitism by *Spathius*, *Oobius*, and *Tetrastichus* is over 50% in China and all three species produce multiple generations each year. Effectiveness of these parasitic wasps is being evaluated in the US.

What testing is done to ensure that introduced biological control agents won't harm the environment or become some other kind of problem? A candidate for biological control must be very host-specific to the target pest. An environmental assessment is completed to evaluate the risk of importing the biological control agent. This important process of testing and assessment minimizes the risk of non-target damage. This process was not in place when some of our most notorious biological control agents such as the

multicolored Asian lady beetle (*Harmonia axyridis*), were first imported in the early 1900s. Generalist predators like this lady beetle would not be approved for release with today's standards.

Do the introduced wasps from China only attack EAB?

Based on host-specificity testing conducted in the field in China and in laboratory studies in the US, the three selected parasitic wasps are acceptably host-specific and are not expected to attack other insect species besides EAB, although there may be incidental attack of other wood-boring beetles in the same genus (*Agrilus*). To test for specificity, the parasitic wasps were offered insects that are related to EAB or share the same habitat or environmental niche. *Spathius* and *Tetrastichus* did not oviposit (lay eggs) into non-target species other than some *Agrilus* species. *Oobius* did not oviposit into eggs other than *Agrilus* eggs of similar size to EAB.

The USDA Environmental Assessment concluded that "Three Chinese EAB parasitic wasps posed no significant risk to native wood borers or their environs." USDA approved the release of the parasitoids in July of 2007.

How do the wasps kill EAB? The parasitic wasps deposit their eggs within an EAB egg or larva (the immature stage), and the young parasitoid feeds on its EAB host, thus killing it.

Will the wasps sting humans? The wasps being released for the EAB Biological Control Program are small and are stingless. They will not harm humans and are easily handled.

Are the parasitic wasps available for purchase? The parasitic wasps are reared in a specialized laboratory at the USDA EAB Biological Control Facility. They are provided at no cost but only to state cooperators and researchers.

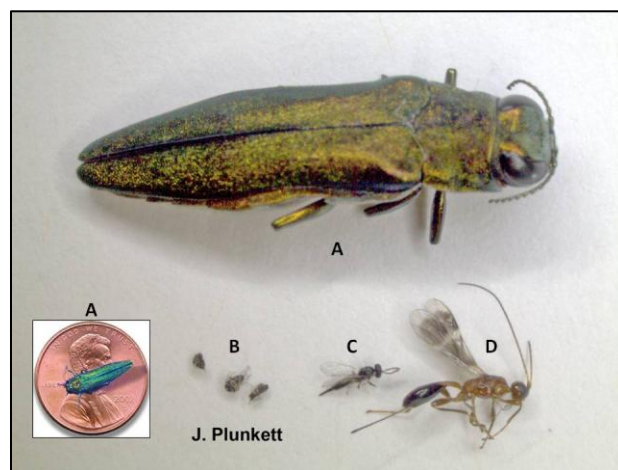
How and where are parasitic wasps released? Parasitic wasps have been released in areas with a range of EAB population densities, ash species, and habitats to determine the conditions under which each species is most effective. Results from the different sites will help determine the locations for larger scale releases in subsequent years and potentially for establishing locations for field facilities for rearing more parasitoids to release.

Where have the three parasitic wasps been released in the US? Production methods have steadily improved

and during 2014 the USDA Biological Control Facility in Brighton, Michigan produced almost 784,000 parasitic wasps for release. State program partners are monitoring releases in most of the 22 states that have detected populations of EAB.

Will the wasps eradicate EAB? No. The goal with biological control of EAB is to use natural enemies to bring EAB populations into balance and reduce damage; it is not a tool for eradication. Eradication of EAB in the US is impossible at this point due to the broad areas over which it has spread.

Where can I find more information about EAB and biological control? USDA has more information on each of the parasitic wasps and their biological control program at aphis.usda.gov. General information on EAB, including a national map, biological control and other management options can be found at emeraldashborer.info. Missouri information can be found at eab.missouri.edu.



Size comparison of emerald ash borer (EAB) adults and three wasps selected for EAB biological control. EAB adults (A) are ½ inch long or shorter. Parasitoids are parasitic insects that kill their host. The egg parasitoid *Oobius agrili* (B) attacks EAB eggs; larval parasitoids *Tetrastichus planipennisi* (C) and *Spathius agrili* (D) attack EAB larvae or the immature stage. Photo credits: Josh Plunkett, Minnesota Dept. of Agriculture; inset of penny: Howard Russell, Michigan State University, bugwood.org

This FAQ sheet was developed as part of the educational efforts of the interagency Missouri Invasive Forest Pest Council. For additional information on EAB biological control contact Collin Wamsley, State Entomologist, Missouri Dept. of Agriculture at 573-751-5505 or collin.wamsley@mda.mo.gov.