

***OBIUS AGRILI* (HYMENTOPTERA: ENCYRTIDAE),
A SOLITARY EGG PARASITOID OF EMERALD ASH BORER
FROM CHINA**

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ABSTRACT

Agrilus planipennis Fairmaire, a buprestid native to Asia, was identified in 2002 as the causal agent of ash (*Fraxinus* spp.) decline and mortality in Michigan and Ontario. Since then, infestations have been found in Ohio, Indiana, Maryland, Virginia, and Illinois. Efforts to contain and eradicate this pest in North America are proving difficult due to the size of the infestation and lack of effective detection and control methods. As managers shift from a policy of eradication to one of management, biological control may become an increasingly important method of controlling and slowing the spread of *A. planipennis*. With few natural enemies attacking this aggressive buprestid in North America, our research expanded to China where two new parasitoid species, *Tetrastichus planipennisi* Yang (Hymenoptera: Eulophidae) and *Oobius agrili* Zhang and Huang (Hymenoptera: Encyrtidae), were found attacking *A. planipennis* larvae and eggs, respectively (Liu et al. 2003; Bauer et al. 2006). In Jilin province field sites, where the distribution of these two parasitoids overlap, we estimate their combined impact resulted in ca. 74% reduction in local *A. planipennis* populations during 2005.

Oobius agrili Zhang and Huang (Hymenoptera: Encyrtidae) is a solitary egg parasitoid discovered parasitizing *A. planipennis* eggs on ash trees in Jilin province during 2004. Field studies in 2005 showed *O. agrili* completed at least two generations per year, and parasitism rates peaked during July and August at 56.3 percent and 61.5 percent, respectively. *O. agrili* is parthenogenic, and its sex ratio is female-biased at 14.5:1 (female:male). A portion of the *O. agrili* population undergoes diapause within *A. planipennis* eggs during the winter and emerges the following summer, providing synchrony with its host life cycle.

We developed a standard rearing protocol for *O. agrili* in our containment room in Michigan using laboratory-reared *A. planipennis* eggs. In the laboratory, *O. agrili* completes its life cycle in 20-25 days at 25°C, and females fed honey and water have an average adult longevity of 14 days. *O. agrili* oviposit in *A. planipennis* eggs ranging from newly laid to 9 days old. Each female produces an average of 24 eggs in her life time, with a daily maximum of five and lifetime maximum of 62.

We evaluated the host specificity of *O. agrili* using laboratory assays. In no-choice assays, *O. agrili* were exposed to eggs of six buprestids (*Agrilus anxius*, *A. bilineatus*, *A. cyaneoscens*, *A. egenus*, *A. ruficollis*, and *A. subcinctus*), two cerambycids (*Megacyllene robiniae* and *Neoclytus acuminatus*) on their respective host plants, and the eggs of four lepidopterans (*Bombyx mori*, *Choristoneura rosaceana*, *Manduca sexta*, and *Pieris rapae*) on small ash branches. *Oobius agrili* did not parasitize eggs of cerambycids, lepidopterans, or *A. cyaneoscens*, *A. subcinctus*, *A. egenus*, whereas eggs of the larger *Agrilus* spp. (*A. anxius*, *A. bilineatus*, and *A. ruficollis*) were parasitized. Eggs from *Agrilus* spp. unacceptable to *O. agrili* are approximately half the size of eggs from *Agrilus* spp. accepted by this parasitoid, suggesting *Agrilus* egg size may limit acceptance. In the choice assays, *O. agrili* were exposed to eggs of *A. planipennis* and eggs of the three larger *Agrilus* spp. accepted during no-choice assays (*A. anxius*, *A. bilineatus*, or *A. ruficollis*). When given a choice, *O. agrili* demonstrated a strong preference for *A. planipennis* eggs on ash versus the other three species on their respective host plants (birch, oak, or raspberry, respectively). These results suggest that *O. agrili* is a good candidate for the biological control of *A. planipennis* in North America.

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