NATURAL ENEMIES OF EMERALD ASH BORER IN SOUTHEASTERN MICHIGAN

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ABSTRACT

Agrilus planipennis Fairmaire (Coleoptera: Buprestidae), the emerald ash borer (EAB), is native to China, Japan, Korea, Mongolia, Russian Far East, and Taiwan. In 2002, EAB was identified as the causative agent of extensive ash (*Fraxinus* spp.) mortality in southeastern Michigan and nearby southwestern Ontario. EAB was inadvertently introduced in solid wood packing materials or dunnage approximately 5-10 years ago, resulting in millions of dead and dying ash trees. In 2003, satellite infestations were found in Lower Michigan, northern Ohio, Maryland and Virginia due to transport of infested ash nursery stock, firewood, and logs. Federal and state agencies adopted a strategy of EAB eradication in North America. Should these efforts fail, however, EAB management will require augmentation of existing natural enemies or introduction of EAB natural enemies from Asia. As EAB is only a minor pest in Asia, information and literature are scant; however, one braconid parasitoid (*Spathius* sp.) was recently reported from EAB (Xu Gongtian 2003).

To this end, we surveyed natural enemies attacking EAB in a woodlot in Wayne County, Michigan from August 2002 through July 2003. Infested ash trees were felled every other week, and from paired logs, we either 1) removed the insects and placed them on artificial diet, or 2) allowed the insects to emerge directly from infested ash logs in cardboard tubes in a greenhouse. Live EAB and parasitoids were reared to the adult stage, and dead EAB were cultured for insect pathogenic fungi. In July 2003, we collected EAB eggs from ash trees in the woodlot, placed them in petri dishes in the laboratory, and allowed them to hatch. We sent the potential insect parasitoids and predators to USDA Agricultural Research Service, Systematic Entomology Laboratory, for identification.

During the course of our one-year survey, we dissected approximately 6,000 EAB from infested ash logs to culture entomopathogenic fungi and rear natural enemies. Less than 2 percent of immature EAB were infected with five species of fungi: *Beauveria bassiana* (24 isolates), *Paecilomyces farinosus* (30 isolates), *Paecilomyces fumosoroseus* (7 isolates), *Verticillium lecanii* (36 isolates), and *Metarhizium anisopliae* (2 isolates). We reared seven potential hymenopteran parasitoids of immature EAB from infested logs: a braconid (*Heterospilus* sp.), a chalcid (*Phasgonophora sulcata*), two eupelmids (*Balcha* sp. and *Eupelmis* sp.), and three ichneumonids (identification not complete). *Balcha* sp., a solitary ectoparasitoid, was the most prevalent EAB parasitoid, and some were successfully reared to adult in the laboratory. *Balcha* exotic parasitoid from Asia and was recently discovered in Maryland and Virginia (Michael Gates, USDA Agricultural Research Service, Systematic Entomology Laboratory, personal communication). A species of eupelmid (*Pediobius*

sp.) was reared from 0.3 percent of EAB eggs collected in early July. Two other braconid species, reared from EAB-infested logs cut in different woodlots, included *Atanycolus* sp. and *Spathius simillimus*. Predators included a species of clerid (*Enoclerus* sp.), a passandrid (*Catogenus* sp.), and a trogossitid (*Tenebroides* sp.). Other EAB mortality factors included woodpecker predation, starvation, desiccation, and cannibalism, especially in heavily infested logs. Our results revealed that mortality of EAB in Michigan due to parasitoids is low compared to that reported for some of our native *Agrilus* spp.

Xu Gongtian. 2003. *Agrilus marcopoli* Obenberger, pp. 321-322, In Xu G-T (ed.), Atlas of ornamental pests and diseases. China Agriculture Press, Beijing, China