

Section I: Invasive and Emerging Pests

BIOCONTROL OF ARTHROPOD PESTS: CURRENT PROJECTS BY THE OREGON DEPARTMENT OF AGRICULTURE

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Ash Whitefly Biological Control: High populations of ash whitefly, *Siphoninus phillyreae* (Hemiptera: Aleyrodidae; AWF) were reported from the Portland metro area to Oregon Department of Agriculture (ODA) and Oregon State University during late summer of 2015. Ash whitefly was first identified in OR from specimens collected in Oak Grove by ODA during October 2014. This insect poses a threat to Oregon's nursery industry as it has an extensive host range including many ornamental plants, and would affect export of nursery plants out of the state. It is considered a pest of citrus in many areas of the U.S. In 2015, Ash whitefly reached nuisance levels in Portland, OR and surrounding areas.

Two biological control agents imported from Israel were released in southern California in 1990 to combat infestations of AWF: *Encarsia inaron* (Hymenoptera: Aphelinidae) and *Clitostethus arcuatus* (Coleoptera: Coccinellidae). Following releases in multiple counties, both agents became established and AWF populations were reduced to nearly undetectable levels in just a couple of years. Both *E. inaron* and *C. arcuatus* were recovered and identified by ODA in September 2015 in Milwaukie, OR in AWF populations on ornamental *Pyrus* trees. Since then, the parasitoid has been recovered from multiple areas around Portland with high levels of parasitism reported (>90% in some areas). However, AWF populations discovered in Grande Ronde, Scappoose, and Corvallis, OR had very little to no parasitism. Populations of AWF in Oregon were observed overwintering on evergreen hosts in December 2015.

A colony of AWF and the parasitoid are being maintained over the winter of 2015-2016 at the ODA Hawthorne facility for inundative releases of the parasitoid in 2016.



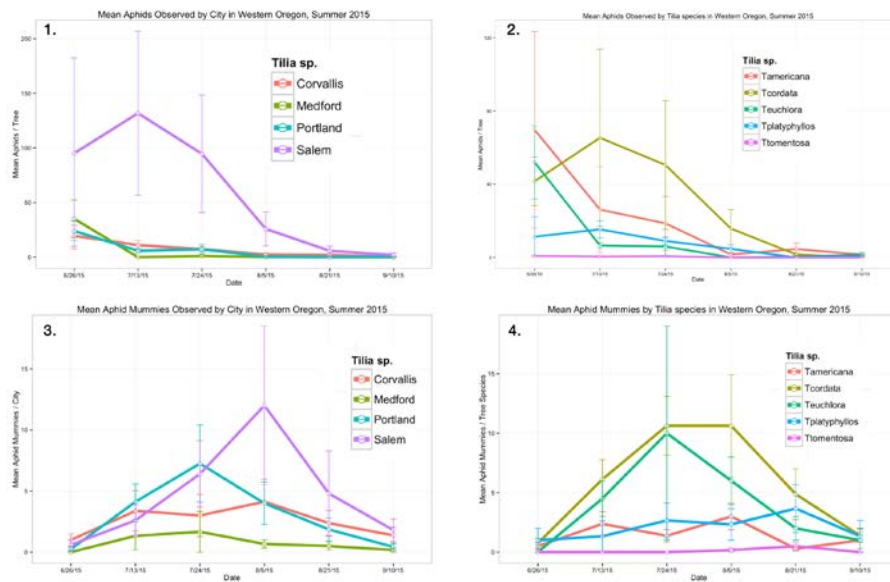
Figure 1: *Clitostethus arcuatus* (Coleoptera: Coccinellidae) and *Encarsia inaron* (Hymenoptera: Aphelinidae). Images by Thomas Shahan, ODA.

Linden Aphid Biological Control: In 2013, a pesticide spray to manage aphids on linden trees in Wilsonville resulted in the death of hundreds of bumblebees in a shopping center parking lot. This event

created a lot of public attention to the non-target effects of pesticides on pollinators and the importance of following proper protocol when applying chemicals to control insect pest. As linden trees (*Tilia sp.*) are popular urban forest trees throughout western Oregon, ODA is investigating the use of biological control to manage *Eucallipterus tiliae* (Hemiptera: Aphididae), a primary pest of lindens as an alternative to pesticide applications. These aphids are considered a nuisance pest because they produce copious amounts of honeydew, which falls on sidewalks, vehicles and furniture beneath the trees and increases amount of black sooty mildew on the trees. In some extreme cases aphids can damage or kill trees.

We conducted a preliminary survey during the summer of 2015 in order to determine the pest and natural enemy complex on linden street trees in Western Oregon. Surveys were conducted in Portland, Salem, Corvallis and Medford. Colin Park, Jodie Lombardi and Mark Hitchcox, USDA-APHIS conducted the samples in Portland. Three common species of linden trees were considered for the survey: *Tilia tomentosa* ('Silver-leaf' linden), *T. cordata* ('Little-leaf' linden) and *T. americana* ('Basswood'). Other species surveyed were *T. platyphyllos* in Corvallis and *T. euchlora* in Portland. Trees were sampled bi-weekly for aphid species, numbers of aphids, numbers of parasitized aphids, and the occurrence of other natural enemies. Parasitized aphids were collected and monitored for parasitoid emergence. Each city had two sites for each species being sampled. Thirty-two *Tilia* trees in total were sampled.

The only species of aphid recovered from our samples was *Eucallipterus tiliae*. Aphid populations were highest at the beginning of the survey in late June, but steadily declined in all cities samples (Figs. 1 and 2). Problematic honeydew accumulation only occurred on trees with the highest populations. Mean aphid mummies observed were much lower than the number of aphids observed, suggesting that parasitoids are not contributing to the decline in aphid populations (Figs. 3 and 4). Aphid mummy counts were higher later in the season than peak aphid populations. Parasitoids were recovered from aphid mummies in all four cities, but identifications are still ongoing. Other natural enemies observed included coccinellids, spiders, lacewings, and *Heterotoma planicornis*, a predacious bug (Hemiptera: Miridae).



Figures 1-4: Mean numbers of aphids and aphid mummies observed compared by *Tilia* species and area sampled during summer 2015. Error bars indicate SE.