



## Flowers promote aphid suppression in apple orchards

Lessando Gontijo<sup>1,2</sup>, Elizabeth Beers<sup>2</sup>, William Snyder<sup>2</sup>

<sup>1</sup>*Departamento de Entomologia – Universidade Federal de Viçosa (Brazil)*

<sup>2</sup>*Department of Entomology – Washington State University (USA)*

Predators and parasitoids often benefit from feeding on nectar and/or pollen, such that the addition of flowering plants should bolster natural enemies and improve biological control. Nonetheless, this conceptually-simple approach often fails to reduce pest numbers. We examined whether flowering annual plants drew more natural enemies to apples (*Malus domestica*) in Washington State, USA, and in turn whether this improved suppression of woolly apple aphids (*Eriosomalaniigerum*) on nearby trees. Initial screening of candidate flowers indicated that syrphid flies (Diptera: Syrphidae), thought to be important aphid predators, were particularly attracted to sweet alyssum flowers (*Lobulariamaritima*). Therefore, in two subsequent field experiments we compared aphid densities on trees placed adjacent to, or relatively far from, flowering sweet alyssum. The results were striking: after one week aphid densities were significantly lower on trees adjacent to flowers than on those on control plots, and these differences were maintained for several weeks. It was unlikely that aphid decline was primarily due to syrphid predation, because lower aphid densities were observed despite few syrphid larvae being present. Rather, a diverse group of generalist-predator spiders and bugs increased significantly near sweet alyssum plantings, and may have been responsible for much of the aphid suppression that we observed. Immunomarking revealed that natural enemies regularly moved from sweet alyssum to the surrounding orchard. In summary, the floral resources that sweet alyssum plants provided attracted natural enemies and indirectly suppressed densities of woolly apple aphids, suggesting an effective means for apple growers to enhance biological control.

Keywords: conservation biological control, aphids, immunomarking

Funding: Washington State University BioAg program.