

A Potential New Tool for Managing Strawberry Guava

The Problem Strawberry guava (*Psidium cattleianum*; Myrtaceae), one of Hawai'i's most disruptive alien weeds, infests hundreds of thousands of acres of forest across all the major Hawaiian islands. It forms dense thickets up to 30 ft. in height and suppresses native species, including many which are rare and endangered. Forests dominated by strawberry guava provide less water than do native forests – losing up to 27% more of this precious resource to the air. Strawberry guava is also a primary wild host of alien pest fruit flies that severely impact Hawaiian agriculture. Strawberry guava has the potential to invade and replace 90% of remaining forests across the state.

Biological Control Biological control or biocontrol involves the introduction of natural enemies from the native range of the pest plant to reduce its impact and spread. Biological control could provide a long-term management option, but until recently was considered infeasible for strawberry guava because of the risk to its relative, common guava. However over the last two decades, several insects that attack strawberry guava, but not common guava, have been identified in Brazil. A leaf galling insect, *Tectococcus ovatus*, was seen as being especially promising. Since that time, *Tectococcus*, has been evaluated carefully both in its native range and under quarantine in Hawai'i to reduce the risks to non-target species.

Host Specificity Biocontrol agents are more likely to feed on closely related plant species than on distantly related species. Thus, in evaluating the safety of potential biocontrol agents, it is important to test native and commercial plants related to the target weed. There are no native members of the genus *Psidium* in Hawai'i, although the common guava, *Psidium guajava*, is commercially important. In Hawai'i, the family Myrtaceae is represented by

49 species in 9 genera, including 8 native species. The dominant tree of native Hawaiian forests, `ohi`a (*Metrosideros polymorpha* Gaud.), and numerous introduced timber trees, including *Eucalyptus* species, are distant relatives of strawberry guava.

All laboratory tests and field observations indicate that *Tectococcus* is highly specialized to use only strawberry guava and closely related species within the genus *Psidium*. PSW scientists conducted quarantine tests on a broad spectrum of Hawaiian plant species, including all ecologically prominent Myrtaceae and some uncommon native members of this family. Data showed that no tested species serve as hosts for this insect. Evidence that *Tectococcus* cannot develop on common guava, includes laboratory tests in Hawai'i and Brazil as well as 15 years of observations of populations developing on strawberry guava in close proximity to common guava at field sites in Brazil.

Expected Impacts Biocontrol is expected to slow the spread of strawberry guava into native forests, with impacts developing gradually over a period of decades, as is typical of most biocontrol programs. *Tectococcus* produces growths, called galls, on young leaves of strawberry guava; wood is not affected. Trees will not be killed, but will grow slower. Seed and fruit production is expected to decline over time (up to 90% reduction observed in Brazil), decreasing the plant's ability to invade.

Expected Benefits Impacts of *Tectococcus* on strawberry guava are expected to have benefits including improved control of pest fruit flies, increased effectiveness of mechanical and herbicidal control, and long-term protection of vulnerable native forest ecosystems from one of their most serious threats.