United States Department of Agriculture, Forest Service

Pacific Southwest Research Station
Institute of Pacific Islands Forestry

Biological Control of Strawberry Guava (Waiawi)
Frequently Asked Questions

Strawberry guava, or waiawi, is a small tree introduced to Hawai'i in 1825 from Brazil. It produces an edible fruit sometimes used to make jelly. It is also a very destructive plant which is degrading Hawaii's forests and boosting populations of fruit fly pests of agriculture. The scientific name for strawberry guava is *Psidium cattleianum* Sabine. There are three varieties in Hawai'i: *cattleianum* (red, spherical fruit), *lucidum* (yellow, spherical fruit), and *littorale* (yellow, spindle-shaped fruit). All varieties are host plants for the proposed biological control agent, *Tectococcus ovatus*, the Brazilian scale.

Q. Why is strawberry guava considered a problem for the native forests in Hawai'i?

A. State and federal agencies, land managers, and conservation groups across Hawai'i consider strawberry guava to be one of Hawaii's most destructive invasive species. It is now common on all the major Hawaiian Islands between sea level and 4000 ft., infesting thousands of acres of wet ohia and koa forest, where it forms dense thickets, replaces native plants and destroys habitat for native birds and insects. Its prolific fruit production and sprouting ability enable it to spread rapidly, reach high densities, and confound the ability of managers to bring it under control.

Q. Aren't there methods to control strawberry guava by hand?

A. Yes, however, only small patches can be managed in this way. For many years, forest managers have attempted to control strawberry guava by cutting along with herbicide treatments. Over hundreds of acres, these methods become extremely expensive and difficult, especially where the forest is on rough terrain only accessible by helicopter. Also strawberry guava resprouts easily, so repeated treatments are needed over many years. This natural enemy of strawberry guava is expected to improve the effectiveness of other control methods, by reducing the ability of strawberry guava to regenerate and spread following treatment.

Q. Why was this insect chosen to control strawberry guava here in Hawai'i?

A. The scale insect *Tectococcus* was selected after years of research in Brazil, the native home of strawberry guava, and under quarantine in Hawaii, because it has been shown to be both *safe* and *effective*. Extensive testing of native, commercial and ornamental species provides compelling evidence that *T. ovatus* will not attack any other species in Hawai'i. In fact, more than 10 years of careful study shows that T*ectococcus* is able to use only strawberry guava. In addition research in Brazil shows that this natural enemy of strawberry guava is *effective* in reducing fruiting and growth.

Q. How do you know this Brazilian scale will not hurt other species?

A. The Brazilian scale uses only one host plant, strawberry guava, and it is rare for insects with such narrow diets to be able to adapt to use other species. Among Hawaii's native plants, there are no close relatives, those likely to be most similar to strawberry guava and thus most vulnerable. The closest relative in Hawaii is the commercial guava, *Psidium guajava*. In Brazil the two guava species can grow side-by-side, yet commercial guava is never infested with the scale from strawberry guava. Years of study have shown that Hawaiian plants in the same family (distant relations), such as ohia, mountain apple, and jaboticaba, among others are all safe from attack by the scale. If strawberry guava populations gradually decline, the scale populations will decline as well.

Q. Isn't this insect likely to adapt to feed on other plants over time?

A. No. In the insect's native range in Brazil, strawberry guava has many close relatives that the insect does not use and the few closely related species of scale insects suggest that this insect has not adapted to feed on other species in many thousands of years. Adaptation to feeding on other plants is extremely unlikely for a gall-forming insect because it has such a close relationship with its host.

Q. What effects will this insect have on the strawberry guava plant itself?

A. Young *Tectococcus* scale insects settle and feed on the leaves of strawberry guava, inducing the plant to form a gall. Because the plant puts energy into forming the gall, it doesn't put as much energy into growth and fruit production. The presence of this natural enemy will reduce the vigor of strawberry guava, slowing its spread, and making it easier to control and for native plants to survive where it invades forest. The scale is not expected to kill strawberry guava plants. At the points of introduction of the scale, impacts on strawberry guava should be noticeable within a few years. The insect is expected to spread gradually over a period of decades.

Q. Won't strawberry guava be replaced by something worse?

A. Unlikely. This natural enemy is expected to reduce the vigor of strawberry guava, but not to kill trees. There will be no widespread die-off of strawberry guava which might expose watersheds or open the forest to the spread of other invasive plants. Reduced vigor of strawberry guava should enable native species to regenerate and spread.

Q. Don't native birds depend on the waiawi fruit?

A. No. Non-native birds, pigs, rats and insects eat waiawi fruit, but most native birds depend primarily on native Hawaiian plants and insects for their food. Strawberry guava destroys native forest habitats, reduces the abundance of native plants, and provides little in the way of insect food for birds. Because of its ability to degrade native forests, strawberry guava is considered one of the greatest threats to endangered forest birds on all the main Hawaiian Islands.

Q. How can I protect trees in my own yard from the Brazilian scale?

A. The scale insect has limited dispersal ability and property owners are unlikely to see effects on their trees for many years, Backyard trees can be sprayed with low-toxicity horticultural oil (summer oil) commonly used on fruit trees to control scales and other insects.

Q. Many people use the wood and fruits of strawberry guava. How will those uses be affected?

A. The Brazilian scale is not expected to eliminate strawberry guava, only reduce its vigor and spread. Wood should continue to be abundant. Fruit should still be common when in season, although not superabundant in forest areas as it is now.

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