



Controlling Strawberry Guava

Many of us grew up with strawberry guava, so it isn't easy to view this common plant as one of the most harmful invasive plants in Hawai'i. Introduced to Hawai'i as an ornamental in 1825, this plant was brought without the natural enemies that keep it in check in its native Brazil. Unimpeded, strawberry guava has spread out of control on all the major islands in Hawai'i by producing copious amounts of fruit and seeds, which are spread by birds and feral pigs. Today, large swaths of strawberry guava are expanding exponentially, outcompeting native forest plants for space and light, and preventing the next generation of native plants from surviving. Nearly 38% of Hawaii's forested areas are now heavily invaded by this species, shrinking the remaining habitat for 'ōhi'a, koa, native birds, and thousands of other native species.

Loss of 'ōhi'a forests to strawberry guava also impacts fresh water. Strawberry guava forests lose 27-53% more water into the atmosphere¹, compared to 'ōhi'a forests, which hold mist and moisture and allow it to slowly seep into the ground. Strawberry guava also affects native Hawaiian cultural practices, subsistence gathering, recreation, and local agriculture.



Thick stands of strawberry guava, like this one on Mahana Ridge in West Maui, are now present on all the islands. Although some other trees are visible above the strawberry guava, they are not being replaced by a next generation. Photo by Randy Bartlett



Large numbers of fruits are produced each fall, with numerous seeds per fruit. Over 90% of seeds sprout, even in the shade. Photo by Forest and Kim Starr

¹Takahashi, M., Giambelluca, T. W., Mudd, R. G., DeLay, J. K., Nullet, M. A. and Asner, G. P. (2011), Rainfall partitioning and cloud water interception in native forest and invaded forest in Hawai'i Volcanoes National Park. *Hydrol. Process.*, 25: 448–464. doi: 10.1002/hyp.7797

Over the years, agencies have used conventional management tools to control strawberry guava, with limited success on small plots of a few acres. However, these methods are insufficient to control the many millions of trees and the production of new seeds, much of which is occurring in otherwise healthy, remote watershed forests.

In 2011, the Hawai'i Department of Agriculture with the assistance of the U.S. Department of Agriculture (USDA) Forest Service, Institute of Pacific Islands Forestry released a Brazilian scale insect, *Tectococcus ovatus*, one of the key insects that keeps strawberry guava in check in Brazil, to slow the growth rate and seed production of strawberry guava. The insect lives most of its life inside the strawberry guava leaves, causing leaf galls or bumps, which reduces the vigor of the plant, but does not kill it. The damage is similar to galls frequently found on 'ōhi'a, which are caused by native insects.



'Ōhi'a trees above a sea of strawberry guava at Wao Kele o Puna on the island of Hawai'i. Photo by G. Asner, Carnegie Airborne Observatory.

Researchers spent more than 15 years testing to make sure the scale could not survive on, or complete its life cycle on any other type of plant. During public scoping, some concerns were raised that the insect would affect native species, or that there would be a loss of food or wood for smoking meat. Misinformation and emotional responses also caused concern. However, after careful analysis of these concerns, the research, and in light of the documented harm caused by strawberry guava, the decision to approve the release of the biocontrol was issued. And since it merely slows down growth and spread, there will always be lots of strawberry guava available for food and as a source of wood. Even with the help of the scale insect, conventional control methods and restoration will still be necessary.



Strawberry guava leaves with Brazilian scale (*Tectococcus ovatus*) in leaf galls. Plants use energy to form galls around the insect, which means less energy is available for growth and seed production.

Although biocontrol in Hawai'i has a somewhat checkered past, new procedures and strict regulatory processes were established in the 1970s. Since then, more than 50 biocontrol agents have been studied and released in Hawai'i to control invasive insects and plants, and none have switched hosts or have become invasive themselves. For more information about strawberry guava, visit <http://www.fs.fed.us/psw/topics/invasives/strawberryguava/>. For more about biocontrol, visit <http://hdoa.hawaii.gov/pi/files/2013/01/Biocontrol-Flier-4.27.10-cmps.pdf>.