



## ARTICLE SUBMITTED

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### Questions on Strawberry Guava and Biocontrol

Strawberry guava is a well-known ornamental plant that was introduced to Hawai'i from Brazil in 1825. Its fruit are a tangy trailside snack for some, and the free and plentiful wood is used for smoking meat, employed as fence posts, and more. However, strawberry guava is also a fast-growing tree from Brazil that is spreading in forests statewide, forming dense thickets, outcompeting and replacing virtually all other native and non-native watershed plants, and reducing surface and drinking water. Because of these impacts, the Hawai'i Department of Agriculture submitted a draft Environmental Assessment for the release a Brazilian scale insect for the long-term management of strawberry guava. Although the public comment period closed on July 23, there continues to be questions about this topic and biocontrol in general.

Q: What is biocontrol?

A: Biological control (biocontrol) uses a natural predator from an invasive plant or insect's native range to manage widespread plant and insect pests that are beyond feasible control by physical, mechanical and herbicidal means. Since the 1970s, natural predators being considered for use must pass rigorous, step-by-step testing under stringent regulations to ensure that the selected natural predator will benefit Hawai'i's environment without causing harm.

Q: Isn't the state concerned about introducing a new insect?

A: Everyone should be concerned about introducing new insects, as Hawai'i has too many examples of species introduced to control other species, without testing or even concern for non-target impacts. However, these hard lessons have not gone unheeded. Since the 1970s, strict regulations and protocols for selecting and testing potential natural predators (including insects) have served Hawai'i well. Since then, more than 50 natural predators passed the selection and testing criteria, and have been released. None of these have switched hosts from the invasive species they were intended to control, none have resulted in the extermination of their host, and none have become pests in their own right. It may also be interesting to note that hundreds of other natural predators did not pass these tests, and these were not released.

Q: Why doesn't the state hire workers or use prisoners to remove strawberry guava manually?

A: There are 500,000 acres of moderately infested forests or true strawberry guava thickets, statewide. One study documented an average of 9 stems per square meter in a semi-infested forest. This would mean that one acre holds 36,000 stems that require cutting and treating, which seems like a lot, but it greatly underestimates the numbers of trees in dense thickets over thousands of acres. Anyone in the landscape industry that has tried to manage

strawberry guava knows that cutting it is difficult, and herbicides don't always kill the plant. Imagine the army, herbicides, and funding necessary for such an undertaking, now imagine that each mature tree produces hundreds of seeds each season, which will soon sprout.

Q: So why don't they use bulldozers or controlled burns?

A: Bulldozers and controlled burns certainly have their place. However, this "scorched earth" option is undesirable in the many areas where strawberry guava is just invading native forests--fire and bulldozers are indiscriminate and would harm native species and the watershed. In other areas, fire and bulldozers are completely impossible because the infestation is remote and there would be no way to move equipment or keep a fire from spreading. Finally, each of these options, from manual removal to fire and bulldozers would leave huge tracts of land bare and open to erosion and possibly other invasive plants.

Q: Since this Brazilian scale bug won't kill strawberry guava, what's the point of taking the risk?

A: This bug won't kill strawberry guava, but instead it feeds on the leaves, which makes the plants form galls. This diverts energy that it would normally use for growing quickly and putting out large numbers of fruit. It will still grow and put out some fruit, just not the overabundance that we would normally see. Native Hawaiian forest plants just need a more even playing field to be able to compete for space, light, water, and nutrients. Slowing the growth of strawberry guava does just that. Alternately, the risk of not managing strawberry guava is the loss of the native forest and the water that it provides.

Q: Where's the data on water impacts?

A: University of Hawai'i researcher Thomas Giambelluca compared a forest dominated by native 'ōhi'a (*Metrosideros polymorpha*) with a strawberry guava-infested forest, and found that the infested forest lost 27% more water, with the difference rising to 53% during dry periods. For many decades to come forests dominated by strawberry guava will be diverting water that would otherwise recharge aquifers and streams for our drinking water and farms. If nothing is done to protect native forests, the spread of strawberry guava across island watersheds will result in widespread, perpetual reductions of water to our island water supplies.

Q: Won't wild pigs be affected if there are fewer fruit?

A: This isn't expected to impact wild pig populations because they feed on other food sources for the better part of the year when strawberry guava isn't in season.

Q: I see galls on 'ōhi'a leaves. Is this the Brazilian scale?

A: No. The Brazilian scale has not been released. Furthermore, it cannot survive on 'ōhi'a, it has a mutual relationship only with strawberry guava. The galls on 'ōhi'a leaves form when a native psyllid (*Trioza* spp.) feeds on 'ōhi'a leaves. This psyllid has a mutual relationship only with 'ōhi'a.

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