

Entomologists say biocontrol of insect pest in the Galapagos Islands is a major success

April 22 2010



This image shows an adult *Rodolia cardinalis* attacking an adult cottony cushion scale. Credit: Mark Hoddle, Entomology, UC Riverside.

The Galapagos Islands, made famous by Charles Darwin, have a unique biota now highly threatened by invasive species because of increased tourism and population growth. Indeed, alien or exotic insects today constitute 23 percent of the Galapagos insect fauna. One of these insect invaders is the cottony cushion scale, a sap sucking bug native to Australia.

Capable of infesting many woody ornamentals and crops, the cottony cushion scale decreases the vitality of its host by sucking phloem sap from the leaves, twigs, branches, and trunk. But natural enemies, such as the lady bug beetle, *Rodolia cardinalis*, can bring the cottony cushion



scale under control in a short time - a form of pest suppression called biocontrol.

In fall 2009, entomologist Mark Hoddle, the director of the Center for <u>Invasive Species</u> at the University of California, Riverside, and colleagues visited the Galapagos Islands to assess the impact and safety of the lady bug beetle that had been released in 2002 to suppress the cottony cushion scale.

"Populations of cottony cushion scale in 2002 were so high and spread across so many islands that several endemic and <u>native plant</u> populations were thought to be going into decline because of heavy infestations," said Hoddle, also a biocontrol specialist in the >Department of Entomology.

Combating the cottony cushion scale was a joint effort between the Charles Darwin Research Foundation and the Galapagos Islands National Park Service, which neighbors the foundation on the island of Santa Cruz in the Galapagos.

"Soon after release, the lady bug beetle readily established and spread," Hoddle said. "Subsequent monitoring indicated that it was having the desired effect on the cottony cushion scale populations, which were collapsing because of feeding by larval and adult lady bug beetles. Our project was to follow up to see whether the lady bug beetle in 2009 was still exerting high levels of control over the cottony cushion scale and whether the project was safe as predicted by lab studies."

After about three months of survey work Hoddle, along with Christina Hoddle (UCR), Charlotte Causton (<u>Charles Darwin</u> Research Station), and Roy Van Driesche (University of Massachusetts, Amherst), concluded that the cottony cushion scale populations were very low in most areas on the <u>Galapagos Islands</u>.



"Pest numbers have been reduced by more than 99 percent on some native plants like mangroves, which were very susceptible to attack by cottony cushion scale," Hoddle said. "While from other rarer native plants, like *Darwiniothamnus tenuifolius*, the pest appears to have been completely removed."

To assess the impact of the beetle on the cottony cushion scale, Hoddle's team surveyed native plants across five different islands - Santa Cruz, Isabela, Espanola, San Cristobal, and Santiago - and recorded the presence and absence of cottony cushion scale and the lady bug beetle, and their densities. The team then compared the data to similar data from the same areas - and in many instances, from the very same trees - that had been collected before the lady bug beetle was released into the Galapagos.

"We also found no evidence that the lady bug beetle was attacking nontarget species," Hoddle said. "The bug was never seen feeding on other insects in the Galapagos even when the cottony cushion scale and the nontarget species were side by side on the same twig."

The cottony cushion scale project with the beetle was born in Southern California in 1888-1889 and saved California's then fledging citrus industry.

"The project in the Galapagos is an extension of the California success story," Hoddle said. "But in the Galapagos the biocontrol agent is protecting native plants instead of agricultural crops. The project has gone full circle - from 1880's citrus protection in Southern California to, in 2010, conservation of endangered plants in the Galapagos. A pretty incredible progression that would have been inconceivable by California entomologists and citrus workers back in 1888!"



Provided by University of California - Riverside

Citation: Entomologists say biocontrol of insect pest in the Galapagos Islands is a major success (2010, April 22) retrieved 6 May 2024 from <u>https://phys.org/news/2010-04-entomologists-biocontrol-insect-pest-galapagos.html</u>

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