

Australian Ladybug – Biological Control of Cottony Cushion Scale

After years of exhaustive research, and on CDF recommendation, the Australian ladybug (*Rodolia cardinalis*) has been deliberately introduced to combat the devastating effects of the cottony cushion scale insect (*Icerya purchasi*) and is having a beneficial effect. This marks the first recorded intentional introduction of an insect, as a biological control agent, to Galapagos.

Arrival in Galapagos

The cottony cushion scale insect also originates from Australia and feeds on plant sap. It causes premature loss of fruits and leaves, dieback of branches and death of some Galapagos plants. It produces large quantities of honeydew which encourages the growth of black sooty moulds that cover the leaves preventing photosynthesis.

Rodolia cardinalis has been successfully used to control cottony cushion scale in commercial citrus crops in over 60 countries. Virtually nothing, however, was known about how it might interact with Galapagos species.

Impact on Galapagos

Cottony cushion scale was reported for the first time in Galapagos in 1982 and spread to 15 islands. At the height of its threat:

- At least 69 species of native and endemic plant, as well as some crops, were attacked by the scale insect.
- Sixteen of the plant species found to be seriously affected are on the Red List of Threatened Species of the International Union for the Conservation of Nature (IUCN).
- Six of these species are classified by IUCN as Endangered or Critically Endangered, including the Critically Endangered daisy tree (*Scaevola atractyloides*).
- Cottony cushion scale infestation was also lethal for button mangrove and white mangrove trees, habitat of the already Critically Endangered mangrove finch.
- Finally, research showed that the cottony cushion scale could be causing local extinction of endemic moths which feed exclusively on plants affected by this introduced insect.

CDRS research activities

Adhering to strict security conditions, scientists at CDRS assessed the potential impact of introducing *Rodolia cardinalis* to Galapagos. Feeding

CDF FOCUS: RESTORATION



Key Facts

Species: *Icerya purchasi*

Common name:
Cottony cushion scale insect

Class: Invasive

Impact: Threatening endemic and native plant and invertebrate species

Origin: Australia

Range: Extensive, spread to 15 islands

Species: *Rodolia cardinalis*

Common name:
Australian Ladybug

Origin: Australia

Class: Introduced, see Action

Range: Released on 9 islands. Dispersed naturally to 3 islands.

Action: Ladybug introduced as biological control of cottony cushion scale insect

tests and behavioural studies were conducted to evaluate how it might interact with other Galapagos insects.

Test results showed that the cottony cushion scale was the only species *Rodolia cardinalis* was likely to feed on.

Additional research confirmed that *Rodolia cardinalis* does not affect insect-eating vertebrates such as the Darwin's finches and other small birds.

The GNPS concluded that the benefits of introducing the Australian ladybug outweighed any potential negative impacts and its release was authorized.

- In January 2002, *Rodolia cardinalis* were released simultaneously on the inhabited islands of Santa Cruz, San Cristóbal, Isabela, and Floreana.
- Over 2000 *Rodolia cardinalis* ladybugs have since been released in priority areas including Marchena, Fernandina, Pinta, Pinzón, and Rabida Islands.

For the future

In areas where monitoring has occurred, the positive effects are very clear. Before the release of *Rodolia cardinalis*, the mangrove stands of the town of Puerto Ayora on Santa Cruz Island were blackened and dying from the effects of the cottony cushion scale. These mangroves are now green and thriving. Many other areas affected by cottony cushion scale still need to be monitored.

Rodolia cardinalis can control but not eradicate cottony cushion scale. Numbers of *Rodolia cardinalis* will rise and fall with the presence or absence of cottony cushion scale.

The deliberate introduction of *Rodolia cardinalis* as a biological control agent is a positive example of how exhaustive research by CDRS scientists will have a dramatic impact on the future of the natural biodiversity in Galapagos.