

RESTORING BALANCE TO HAWAII'S FORESTS

USDA FOREST SERVICE
INSTITUTE OF PACIFIC ISLANDS FORESTRY

BIOLOGICAL CONTROL OF INVASIVE PLANTS

The insect *Tectococcus ovatus* causes gall formation on strawberry guava, reducing the spread of this highly invasive tree.

Providing Hawai'i safe and cost-effective invasive species control.



Applying *Tectococcus ovatus* using an extendable pole

LANDSCAPE-SCALE SOLUTIONS THAT LAST

Non-native invasive plants cause enormous damage to native Hawaiian ecosystems and agricultural lands. Weeds like strawberry guava, Christmas berry, albizia, Himalayan ginger, miconia and Koster's curse have spread across vast areas. They outcompete and displace native species, and impede agriculture. These invaders transform Hawaii's landscapes, compromise access, reduce biodiversity, and degrade watersheds. Controlling these invasive plants by hand or with herbicides at large scales and in remote areas is simply not practical. Since 1984, scientists at the Institute of Pacific Islands Forestry have been carefully researching, testing, and monitoring insect species that can provide targeted, long-term weed control at an island-wide scale.

ACCOMPLISHMENTS

In close collaboration with partners, the Forest Service has:

Fostered international research to discover natural enemies for controlling invasive plants from Brazil, Central America, India, China, and Indonesia.

Identified, tested, and released the gall insect *Tectococcus ovatus* to slow the invasive spread of strawberry guava, one of Hawaii's worst weeds.

Evaluated several potential control agents Melastome weeds including miconia, Koster's curse, and cane tibouchina. Releases are planned for a miconia butterfly and tibouchina beetle, with additional species under final testing.

Screened dozens of natural enemies for roughly 20 invasive species and determined that around 10 to 20 could be suitable control agents.

OUR EFFORTS WILL REDUCE IMPACTS OF INVASIVE SPECIES AND HELP PROTECT NATIVE ECOSYSTEMS.



A tibouchina beetle shows promise as a biocontrol agent for reducing the negative impacts of Melastome weeds.

HOW BIOCONTROL WORKS

A non-native plant introduced to Hawai‘i may become invasive in part because insects or diseases from its native range were left behind and aren’t around to keep the weed in check. Biological control, or biocontrol, reunites a natural enemy, or “agent”, with its invasive host plant. The agent may feed on the host plant’s leaves, stems, flowers, fruit, or roots, which slows the plant’s growth and spread. Forest Service researchers partner closely with state, federal, and international organizations over many years to identify suitable biocontrol agents for the most damaging invasive plants in Hawai‘i.

DISCOVERY & EVALUATION

Scientists find biocontrol agents by searching in the foreign home range of an invasive plant for insects and diseases that evolved to use that specific plant. Experts collect these specialized natural enemies, identify them, and evaluate them for their potential as biocontrol agents. For the most promising species, researchers develop methods to rear populations in the laboratory. All these efforts rely on assistance from researchers based in the weed’s home range.

TESTING & ENVIRONMENTAL REVIEW

Potential biocontrol agents are brought to secure quarantine facilities for repeated testing. The tests check whether the agent effectively damages the target plant but does not feed or grow on other species. Agents that do not meet these criteria cannot be approved for biocontrol. Researchers must follow strict state and federal guidelines when transporting, testing, and releasing a biocontrol agent. Regulatory agencies must complete environmental reviews and address public comments prior to an agent’s release.

APPLICATION & MONITORING

Once approved for release, biocontrol agents are carefully processed through quarantine facilities to ensure that only the intended species is introduced. Researchers and managers then collaborate to establish new populations of a biocontrol agent on the target weed . Typically, biocontrol gradually reduces the growth and spread of the target plant, so several years of follow-up monitoring is needed to understand the effectiveness of a new biocontrol agent.

FUTURE TARGETS

The Forest Service and partners are investigating possible biocontrol for:



Albizia
Weak limbs pose hazard for residences & power lines.



Devil weed
Dense thickets reduce biodiversity. Fire hazard.



Christmas berry
Suppresses native species, reduces livestock forage.



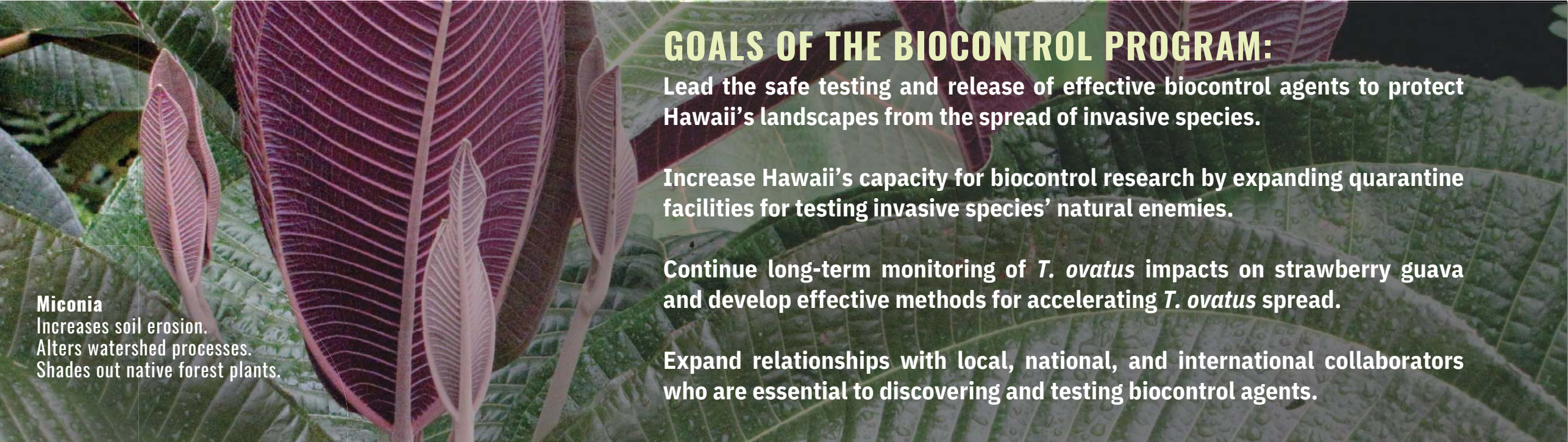
Himalayan raspberry
Large thorny thickets invade forests and pastures.



Faya tree
Alters native forest soil chemistry and blocks sunlight.



Himalayan ginger
Changes forest understory. Blocks next generation of native trees.



Miconia
Increases soil erosion. Alters watershed processes. Shades out native forest plants.

GOALS OF THE BIOCONTROL PROGRAM:

Lead the safe testing and release of effective biocontrol agents to protect Hawaii’s landscapes from the spread of invasive species.

Increase Hawaii’s capacity for biocontrol research by expanding quarantine facilities for testing invasive species’ natural enemies.

Continue long-term monitoring of *T. ovatus* impacts on strawberry guava and develop effective methods for accelerating *T. ovatus* spread.

Expand relationships with local, national, and international collaborators who are essential to discovering and testing biocontrol agents.

BIOCONTROL PROGRAM COOPERATORS

Successful biological control of weeds depends on a network of international cooperators, sustained funding of projects for up to 10 years or more, and the commitment of trained personnel and specialized quarantine facilities.

PARTNERSHIPS AND SUPPORT



The Institute of Pacific Islands Forestry operates the Hawai‘i Volcanoes National Park Quarantine Facility, one of only two USDA-APHIS-certified insect containment laboratories for biocontrol in the state. Our ability to develop safe, effective agents is strengthened by partnerships with the National Park Service, U.S. Geological Survey--Biological Resources Division, University of Hawai‘i, Hawai‘i Department of Agriculture, Hawai‘i Division of Forestry and Wildlife, the U.S. Fish and Wildlife Service, and the Hawai‘i Invasive Species Council. We also collaborate with researchers outside of Hawai‘i, including scientists working where our target weeds are native.

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FOR MORE INFORMATION ABOUT BIOCONTROL VISIT:
<https://dlnr.hawaii.gov/hisc/info/biocontrol/>
<https://www.aphis.usda.gov/plant-pests-diseases/biocontrol>