Forest Service
U.S. DEPARTMENT OF AGRICULTURE

Forest Health
2025 highlights
Hawai‘i

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2025 Summary

- **Rapid ‘Ōhi‘a Death (ROD)** continues to affect ‘ōhi‘a, the keystone tree species of Hawai‘i, across multiple islands, prompting ongoing monitoring, sample testing, and new management tools such as the recent registration of a verbenone based repellent to help reduce beetle-driven spread. At the same time, the ‘Ōhi‘a Disease Resistance Program expanded greenhouse and field trials, identifying ‘ōhi‘a families showing potential resistance to *C. lukuohia* and improving propagation and tracking systems to support future restoration efforts.
- **Koa wilt** resistance work continues with greenhouse trials showing clear differences among 60 koa families, identifying groups with low, medium, and high susceptibility to the causal agent, *Fusarium oxysporum* (FOXY). In addition, researchers collected and tested 28 new FOXY isolates from O‘ahu and Kaua‘i to identify highly virulent strains for standardized screening and future breeding and seed orchard development across Hawai‘i.
- **Ramie moth** threatens māmaki and other native nettle species, with field surveys showing multiple generations per year and peak populations in winter. UHM studies indicate the moth can develop on several native hosts, including endangered ma‘oloa, but natural enemies can cause high early stage mortality.
- **Hala scale** is widespread on Maui and Moloka‘i, and while broader forest surveys show long term hala population declines largely driven by ungulates and invasive plants, its specific impact on regeneration remains unclear, though new baseline data now enable long-term monitoring. In 2025, University of Hawai‘i at Mānoa (UHM) field trials on Maui found that acephate and an essential oil–based treatment were the most effective low risk options for controlling hala scale.
- The **Queensland longhorn beetle** has expanded across Hawai‘i Island since 2009, with studies showing strong preference for hosts like kuku‘i and cacao, low risk to ‘ōhi‘a and koa, and successful development in ‘ōlapa. Current management efforts include deploying entomopathogenic nematodes to kill larvae inside trees and developing a promising pheromone lure for early detection and monitoring.
- **Little fire ants (LFA)** continue to spread across Hawai‘i and now require large-scale, coordinated mapping and treatment, including a major two phase response to an O‘ahu infestation near Tantalus. Drone-based bait applications are now being used in forested areas that are difficult to reach by foot, improving efficiency and reach of control efforts statewide.
- The **coconut rhinoceros beetle** is an invasive pest killing palms across multiple Hawaiian Islands, spreading mainly through human movement of infested breeding material. Despite ongoing trapping, treatments, and new quarantines, long-term protection of palms will rely on preserving native loulu palm genetic diversity and developing effective biological control programs, including promising nudivirus testing now underway at UHM.

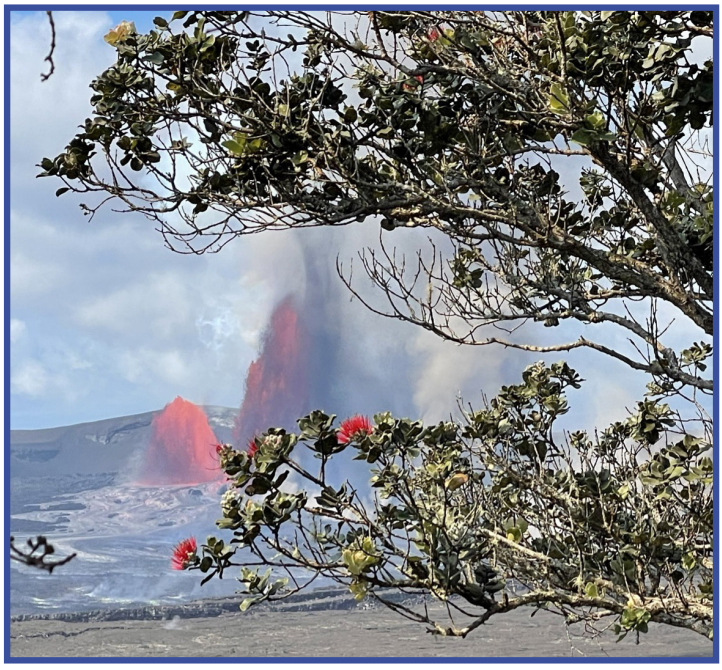

Figure 1. Healthy ‘ōhi‘a blooming in front of Halema‘uma‘u volcanic eruption in Hawai‘i Volcanoes NP. Photo credit: Sarah Knox, Akaka Foundation for Tropical Forests

Insect Pests and Pathogens

Rapid ʻŌhiʻa Death (ROD) or Ceratocystis Wilt of ʻŌhiʻa

Ceratocystis lukuohia* and *C. huliohia

ʻŌhiʻa (*Metrosideros polymorpha*) is arguably the most bioculturally important tree in Hawaiʻi, providing habitat to countless flora and fauna, creating Hawaii's watershed and foundation of Hawaiian culture. ROD is caused by two *Ceratocystis* fungi, *C. lukuohia* and *C. huliohia*. *Ceratocystis lukuohia* is the more virulent of the two and remains isolated to Hawaiʻi Island and Kauaʻi as of 2025. The canker-forming *C. huliohia* is also found throughout Hawaiʻi Island and Kauaʻi, in 17 cases on Oʻahu, and six trees on Maui, including five new detections in 2025. The Department of Land and Natural Resources Division of Forestry and Wildlife (DOFAW), Island committees from Hawaiʻi Invasive Species Council, the University of Hawaiʻi, and the USDA Forest Service (Forest Service) continue to monitor for new outbreaks and collect samples to be tested by the USDA Agricultural Research Service (ARS) in Hilo. In 2025, 425 trees were sampled, with 136 new detections (114 *C. lukuohia* and 22 *C. huliohia*). This brings the total positive historical statewide detections to 3,225 (2,614 *C. lukuohia*, 569 *C. huliohia*, and 42 co-infected with both fungi).

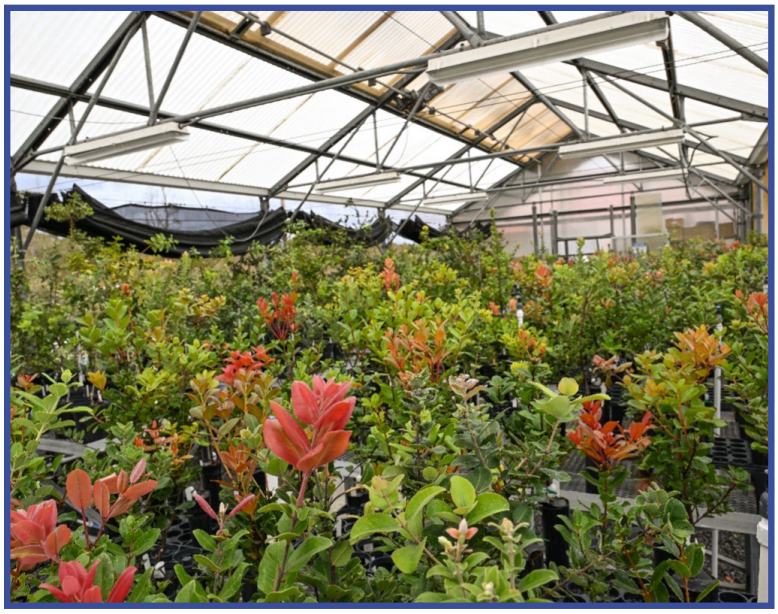

Figure 2. ʻŌhiʻa seedlings to be inoculated with Ceratocystis lukuohia to test for resistance at the Institute of Pacifc Islands Forestry in Hilo, HI.
Photo credit: Grace Tredinnick, Forest Service

A verbenone-based repellent called SPLAT Verb, that has the potential to reduce ambrosia beetle attack on both healthy and ROD-infested ʻōhiʻa, was registered in the State of Hawaiʻi under a special local needs permit in October 2025. Ambrosia beetles can spread ROD by direct vectoring and through the frass that they produce. This new tool could be used in ROD outbreaks to help slow down the spread of ROD. Kauaʻi DOFAW has treated nearly all infected ʻōhiʻa in their high priority area. Integrated science at the Forest Service continues, to understand the dynamics of how ungulates, beetles, fencing, strawberry guava biocontrol, and ʻōhiʻa restoration can interact and affect ʻōhiʻa regeneration.

The ʻŌhiʻa Disease Resistance Program (ʻŌDRP), a collaboration between the Forest Service, Institute of Pacific Islands Forestry (IPIF), and the Akaka Foundation for Tropical Forests, continued efforts in FY2025 to identify ʻōhiʻa families with potential resistance to *C. lukuohia*. Greenhouse inoculation trials were expanded this year, with several candidate families showing reduced disease severity compared to susceptible controls. Field plots established in late 2024 supported their first full year of durability assessments under natural conditions, providing early indications of which families maintain resistance outside the greenhouse. Improvements in propagation and data tracking increased throughput, positioning the program to supply resistant-candidate material for future restoration planning.

Myrtle Rust (on ʻōhiʻa)

Austropuccina psidii

Myrtle rust remains a statewide concern, with only the pandemic biotype detected in Hawaiʻi as of 2025. Although ʻōhiʻa shows moderate resistance to this lineage, several native Myrtaceae remain highly susceptible, and the introduction of more virulent global biotypes found in South America would pose a significant threat to forest health.

The IPIF leads the Hawaiʻi Myrtle Rust Monitoring Program, which expanded early detection capacity through coordinated sampling, sentinel plantings, and molecular diagnostics. From 2023–2025, partners collected 114 samples from 20 *Myrtaceae* species across Hawaiʻi Island, Oʻahu, Maui, and Kauaʻi. Sentinel ʻōhiʻa plantings on Maui, established with the Hawaiʻi Agricultural Research Center (HARC), support monitoring for both myrtle rust and Rapid ʻŌhiʻa Death.

A new loop-mediated isothermal amplification (LAMP) assay developed at Colorado State University enables rapid screening and differentiation between the pandemic biotype and potential new lineages. All results feed into a statewide geospatial database that supports real time tracking and outreach, strengthening Hawaii's ability to detect emerging myrtle rust threats.

Koa Wilt

Fusarium oxysporum* f. sp. *koae

Over the past several years, HARC in collaboration with the Forest Service, DOFAW, and UHM have been evaluating koa (*Acacia koa*) families for resistance to koa wilt in support of native forest and watershed restoration and commercial plantings. Koa wilt, caused by the soil-borne fungus *Fusarium oxysporum* f. sp. *koae* (FOXY), is a vascular disease that can cause extensive mortality of seedlings and young trees, particularly in low to mid-elevation sites. Screening of koa families for disease response under controlled inoculation was conducted in greenhouse trials, where replicated seedlings were exposed to virulent isolates and monitored for wilt incidence and severity. This provides a foundation for developing resistant seed orchards in koa-growing areas with the goal of providing improved seed to land managers and private landowners.

In 2025, a greenhouse screening trial was established in collaboration with UHM where 60 koa families were evaluated. The trial revealed clear differences among koa families in their response to infection, demonstrating that resistance and susceptibility are segregating traits within

the breeding population. Some families exhibited high wilt incidence, while others showed much lower levels of disease. Families were classified into low, medium, and high wilt severity groups using percentile thresholds, providing a practical framework to identify resistant or tolerant families that can be prioritized for deployment in disease-prone sites and incorporated into future breeding and seed orchard programs across Hawai'i.

A virulence screening trial of FOXY isolates was established to identify virulent and non-virulent isolates for future koa resistance trials. HARC and UHM collaborated on isolate collections from Halemano Wilderness Area, O'ahu and the Pu'u Ka Pele Forest, Kaua'i in 2025 and samples were collected from roots and bark of diseased koa trees. Following isolation and identification, 28 new FOXY isolates were selected for virulence testing. Seedlings were monitored under strict aseptic conditions to attribute wilt symptoms directly to isolate pathogenicity and select highly virulent FOXY for standardized screening of koa germplasm resistance.

Figures 3 and 4. (left) Greenhouse virulence screening trial of Fusarium oxysporum f. sp. koae (FOXY), in (right) koa seedlings. Photo credit: Olatubosun Ojo, University of Hawai'i at Mānoa

Koa Seed Worm

Cryptophlebia illepida

The Forest Service in collaboration with HARC and Siglo Tonewoods is re-visiting the effects of koa seed insect predators, which has not been evaluated in over 40 years. Several insect pests are known to predate on the seed and damage upwards of 90% of wilt resistant seed yield. Several historic pests include koa haole seed weevil (*Aracerus levipennis*), bruchid beetle (*Stator limbatus*), and koa seedworm (*Cryptophelbia illepida*). Continuing statewide surveys in 2025 has revealed koa seed worm to be the main seed predator, and management tool development is underway, including the uses of insecticidal spray drones and natural mating disruptors.

Myoporum Thrips

Klambothrips myopori

Klambothrips myopori (Thysanoptera: Phlaeothripidae), commonly referred to as myoporum thrips, was first detected in the Hawaiian Islands in 2009. The initial discovery involved heavy infestations on the endemic naio (*Myoporum sandwicense*) in the Waikoloa region of Hawai'i Island. Following this detection, the pest rapidly expanded its range across multiple habitat types occupied by *Myoporum* species, including coastal zones, dry forests, and wet forests. Subsequent island records indicate establishment on O'ahu in 2018, Moloka'i in 2024, and Kaua'i in 2025.

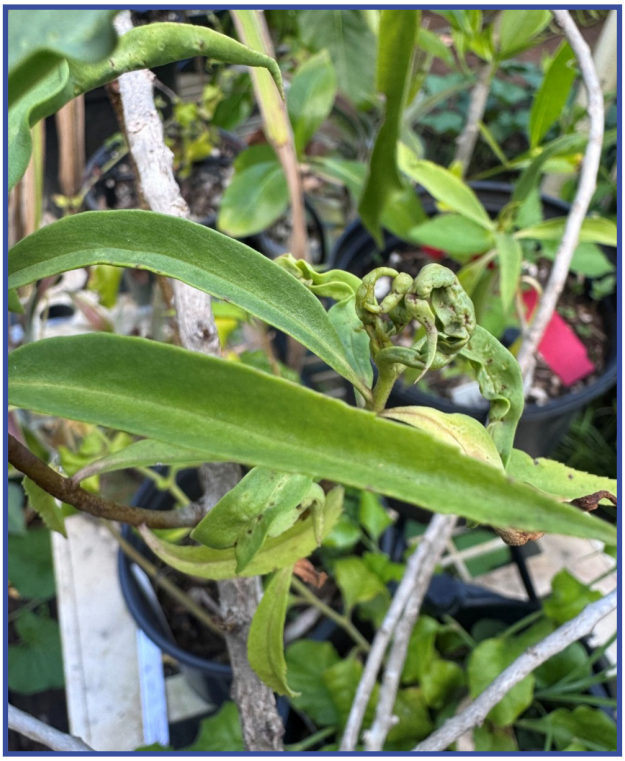

Figure 5. Naio plant infested with thrips. Photo credit: Kaua'i Invasive Species Committee

In August 2025, a member of the public submitted an online report to 643pest.org describing symptoms consistent with myoporum thrips infestation on a potted naio plant on Kaua'i. Additional public reports and follow-up surveys confirmed that the thrips were already widespread across southern and western Kaua'i, occurring in residential neighborhoods, botanical gardens, coastal parks, and native forest areas. Although initial detections were treated, responding agencies determined that the extent of field infestations rendered the pest no longer feasible to control through physical or localized management efforts, particularly within natural areas.

At present, researchers at UHM are conducting trials to identify potential resistance to *K. myopori* within *Myoporum* species. Concurrently, conservation practitioners are seedbanking *Myoporum* spp. from populations statewide to support long-term conservation and restoration efforts.

Ramie Moth

Arcte coerula

Ramie moth, *Arcte coerula* (Noctuidae), is a recently introduced invasive species in Hawai'i that feeds on endemic nettle plants (Urticaceae). Native to Southeast Asia, this moth was first detected in 2018 on Maui, where it was feeding on Hawaiian māmaki, *Pipturus albidus* (Urticaceae), in both wild and cultivated areas. Since then, it has spread across the Hawaiian Islands: Hawai'i Island (2020), O'ahu (2024), Kaua'i (2025), and Lāna'i (2025). Ramie moth populations occur in agricultural and residential areas as well as remote forested regions across the islands. Their spread threatens native forests including endemic animals, such as our Hawaiian tree snails, the Kamehameha butterfly, and other endemic insects. Māmaki is an important understory tree in mesic native forests, which supports some of Hawaii's remaining native birds and provides vital watershed replenishment services as an understory tree.

Figure 6. Ramie moth caterpillar on mamāki. Photo credit: Michelle Au, University of Hawai'i at Mānoa

Field surveys over the last five years have shown ramie moth to produce more than two generations within a year. Populations typically increase in winter beginning around November, peak in March, and decline during the hot, dry summer months. However, on some islands the moth can be found year-round.

Ongoing experiments at the UHM are evaluating additional nettle host plants in Hawai'i. Laboratory studies show that the ramie moth can complete development on trumpet tree (*Cecropia obtusifolia*), ma'oloa (*Neraudia angulata*), and ōpuhe (*Touchardia sandwicensis*). In the field, larvae have been observed feeding on endangered ma'oloa in conservation areas. Although the moth's host range may be expanding, there is also evidence of increased biotic resistance from resident natural enemies. Partial life table studies indicate low overall survivorship, with few individuals persisting from egg to adulthood. Most mortality occurs during the egg and early larval stages, when caterpillars cause the least damage. More information can be found at https://cms.ctahr.hawaii.edu/ce/mamaki and report all ramie moth sightings to 643pest.org or to ipmlab@hawaii.edu.

Figure 7. Open-field potted plant hala scale trials in Maui. Photo credit: Dr. Zhiqiang Cheng, University of Hawai'i at Mānoa

Hala Scale

Thysanococcus pandani

The hala scale, *Thysanococcus pandani*, was first detected in Hāna, Maui, in 1995, and its primary host plant is the indigenous hala tree, *Pandanus tectorius*. There are extensive hala forests across some of the Hawaiian Islands that provide ecological benefits and sustain Native Hawaiian cultural practices of weaving or ulana. The impacts of heavy infestations of *T. pandani* on the regeneration of hala forests was unknown, and there are currently populations infesting forests across the islands of Maui and Moloka'i. An extensive forest demography survey across these islands, along with non-infested forests in Kaua'i and Hawai'i Island collected data on canopy openness, invasive plant understory species cover, and hala forest population structure. There was projected long-term population decline in more than half of the transects, likely as a result from ungulate damage and non-native plant incursions. The impact of the hala scale on the recruitment of larger saplings was less clear, as more data was needed to quantify its impact on regeneration in open areas. This study provides the first baseline study of hala populations across Hawai'i and thereby allows for long-term monitoring of both hala and the hala scale.

In 2025, Dr. Cheng's Lab at the UHM, conducted a field trial to evaluate the efficacy of multiple low-risk insecticides (chemical or biological) against hala scale. The open-field potted plant experiment was conducted on Maui where hala scale is widespread. The plants were treated with various insecticides and essential oils, inoculated with hala scale, and mortality was measured using a taping removal method. Results showed that overall, acephate and an essential oil based treatment were most effective against hala scale.

Queensland Longhorn Beetle (QLB)

Acalolepta aesthetica

Acalolepta aesthetica, colloquially referred to as Queensland longhorn beetle, was first detected in the Puna District of Hawai'i Island in 2009 and has since expanded its range northwards as far as Honoka'a according to 2024 surveys conducted by US Geological Survey Pacific Island Ecosystems Research Center (USGS-PIERC). QLB attacks a broad range of agriculturally and culturally important woody plants in Hawai'i. The larvae create galleries when feeding within the tree, which girdle the branches and trunk, causing structural damage, dieback, and ultimately death of its host.

USGS-PIERC conducted a host preference study, revealing that the most preferred host is the Hawaiian state tree, kukuʻi (*Aleurites moluccanus*), and cacao (*Theobroma cacao*) was the second-most preferred host, followed by species including citrus, ʻulu (*Artocarpus altilis; breadfruit*), and avocado (*Persea americana*). Laboratory no-choice tests were conducted to assess risks to common native woody species. Larvae growing within ʻōhiʻa and koa all died, indicating QLB poses a low risk to these two species which are foundational to Hawaiian native forests. QLB was able to complete its development within ʻōlapa (*Cheirodendron trigynum*), and this species could be monitored.

Promising results from USDA-ARS have been observed using a local isolate of the entomopathogenic nematode, *Heterorhabditis indica*, which hunt the larvae when applied into the QLB feeding galleries using a trunk injection method. The nematodes infect the insect, cause mortality, and reproduce within the cadaver. Subsequent generations of nematodes emerge within the galleries and hunt additional QLB larvae inside the tree. Big Island Invasive Species Committee continues to distribute these entomopathogenic nematodes within the Hawaiʻi Island community. In addition, the University of California, Riverside, in collaboration with Purdue University, USDA-ARS, and the Forest Service, have developed a promising pheromone lure for QLB that may be used for early detection and QLB monitoring.

Figure 8. Larvae of Queensland longhorn beetle. Photo credit: Kylle Roy, Forest Service

Little Fire Ant

Wasmannia auropunctata

Of the more than 60 ant species introduced to Hawaiʻi, the little fire ant (*Wasmannia auropunctata*) is considered the most damaging invasive ant pest in the state. Once established, LFA can reach extremely high population densities and form expansive, three-dimensional super colonies that extend from the ground up into the forest canopy. Rather than excavating soil nests, they occupy existing cavities and sheltered spaces, including leaf litter, beneath rocks, within cracks and crevices on trees, and inside decaying organic material.

Figure 9. Little fire ants feeding on honeydew. Photo credit: Melody Euaparadorn, Hawaiʻi Ant Lab

Since LFA was first discovered on Hawaiʻi Island in 1999, it has continued to spread throughout the state for more than 26 years. The ants are readily transported through the movement of infested potted plants, cuttings, foliage, produce, soil, mulch, and other landscaping materials. In addition to negatively affecting human and animal health, LFA can also degrade agricultural and natural ecosystems by altering soil invertebrate communities and tending plant pests that vector disease.

Natural forested areas are vulnerable to infestation when bordered by LFA-infested residential communities. For example, on Oʻahu, at the intersection of Papakōlea, Makiki Heights, and Tantalus, a forested area of more than four acres is surrounded by infested properties. This infestation will be addressed in two phases. For Phase 1, the Hawaiʻi Ant Lab (HAL), in collaboration with the Hawaiʻi Department of Agriculture and Biosecurity (DAB), is surveying more than 300 properties to define the extent of the infestation. Once residential treatments begin, Phase 2 will focus on mapping and treating the adjacent forested area.

Drone technology provides a fast and efficient way to apply growth-regulating ant bait in forested areas that are difficult to access on foot due to dense vegetation and steep terrain. On Oʻahu, the Oʻahu Invasive Species Committee (OISC) and the Division of Forestry and Wildlife (DOFAW) are currently using drones to treat two acres on the eastern slope below the Kaʻiwa Ridge Trail in Kailua, a 17-acre forested area in Waiheʻe Valley, and a 20-acre forested tract that includes both residential properties and preservation land within the Hauʻula Forest Reserve. By incorporating drone operations into treatment efforts, natural resource managers now have an effective and innovative tool to help protect forests from the growing threat of LFA.

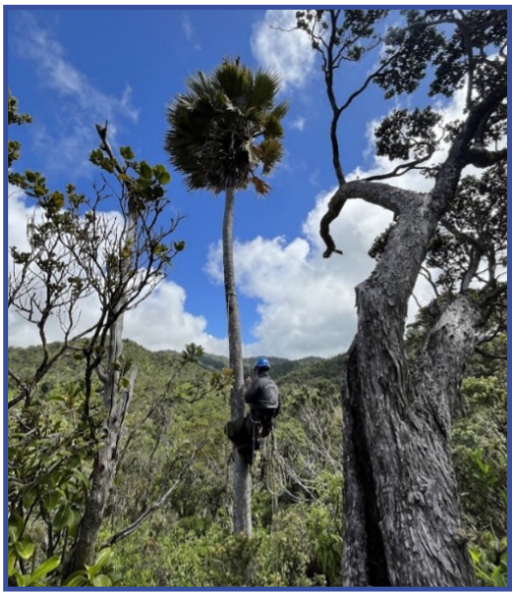

Figure 10. A DOFAW manager trained on climbing wild trees to collect fruit while not damaging the trunk of Pritchardia kahukuensis. Photo credit: DOFAW

Coconut Rhinoceros Beetle

Oryctes rhinoceros

The coconut rhinoceros beetle (CRB), *Oryctes rhinoceros*, is a pest of many palm species and several non-palm plants and is native to South and Southeast Asia. The adult beetles damage trees by boring into tree crowns where they injure young, growing tissue to feed on sap. The subsequent damage can cause eventual tree death. The beetles breed in moist, decomposing organic matter, especially dead coconut material, leading to a destructive cycle if left

unmanaged. Although beetles can fly up to two miles, regularly feeding on coconut palms and returning to breeding sites, spread is primarily through human movement of infested breeding material (e.g., green waste, dead trees, etc.). In addition to coconut palms, the beetles can feed on and kill Hawaii's native loulu palms in the genus *Pritchardia*.

CRB was first detected on O'ahu in 2013 at Joint Base Pearl Harbor Hickam and has since spread throughout the entire island, including the mountainous interior where native palms occur. Dead coconut palms are now a common site driving around the island and communities are struggling to protect this important cultural resource. Trapping, palm surveys, and treatment of CRB infested areas is primarily conducted by the Hawai'i CRB Response Team housed at the University of Hawai'i, island invasive species committees, and the Hawai'i Department of Agriculture and Biosecurity.

In 2023, CRB was detected on the islands of Kaua'i, Maui, and Hawai'i. On Kaua'i, the beetles were found to be widespread and the rapid response ended, leaving management to the community and county government. The detection on Maui appears to have been eradicated with no signs of beetles found since 2023. In 2024, five CRB were captured on Hawai'i Island and monitoring focused on the northern half of the island. This detection appears to have been eradicated; however, a new infestation was detected near the Kona airport in March 2025. Another response has been launched by DAB, UH and the Big Island Invasive Species Committee including treatment of infested green waste and pesticide treatments of coconut palms.

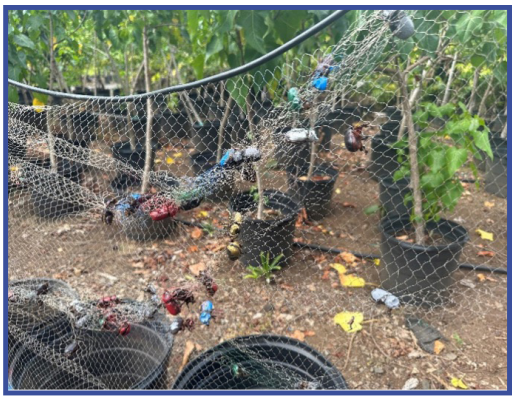

Figure 11. Coconut rhinocerous beetle(s) caught in a net trap and painted different colors to track the number of beetles landing over time.
Photo credit: Kylle Roy, Forest Service

Figure 12. A coconut rhinocerous beetle caught in netting used to protect a native loulu palm grown in a nursery on O'ahu. Photo credit: Kylle Roy, Forest Service

CRB have not been detected on Moloka'i, and in 2025 the Department of Agriculture and Biosecurity passed an emergency rule prohibiting the importation of any breeding material or potted plants into the island for one year. Managers on Lana'i intercepted beetles in potted plants but destroyed the shipment and the island remains CRB-free.

There are 23 endemic species of *Pritchardia* in Hawai'i, 10 of which are listed as endangered. On O'ahu, managers continue to detect damage and mortality at remote restoration sites and damage was first detected on native loulu palms in the wild on Kauai in 2025. In response, managers are preemptively collecting seed from important populations. With a grant from the Forest Service, DOFAW managers are creating a living collection of loulu palms that are most susceptible to infestations of CRB on all of the main Hawaiian Islands. DOFAW managers are first collecting seeds from wild trees, growing them in nurseries, and then out planting them at either botanical gardens or established field sites where measures to control rats and CRB can be implemented. This living collection method is the most practical way to preserve the genetic diversity of *Pritchardia* trees, as their seeds currently do not take to long-term storage.

Although chemical and mechanical tools have been developed to help control CRB, successful management in the long-term will require effective biological control. Researchers at UH Manoa, College of Tropical Agriculture and Human Resilience have acquired nudivirus isolates from other Pacific islands and are testing the virus against CRB reared from Hawaii's population. Initial results have shown susceptibility of Hawai'i CRB larvae to one of the isolates and scientists are proceeding with non-target testing.

Devil Weed

Chromolaena odorata

In 2021, the noxious weed, *Chromolaena odorata*, was detected on Hawai'i Island for the first time. Commonly called "devil weed" for the pitchfork-shaped venation in the leaves, this aggressive plant had been known to be spreading on O'ahu for nearly a decade before it made its way to a neighbor island. Devil weed is no longer considered eradicable on O'ahu, but may be on Hawai'i Island. The weed poses a direct threat to hundreds of thousands of acres of productive ranch land in Hawai'i, and has demonstrated the ability to invade native forests disturbed by fire, animal activity, or seasonal drought, altering ecosystem function by affecting the intensity of future wildfires and competing for scarce water resources.

After the initial detection in Hilo, Hawai'i Island, the Big Island Invasive Species Committee (BIISC), a project of the University of Hawai'i, launched an intensive roadside survey and public outreach campaign to detect additional populations of devil weed. After more than 100 miles of road surveys and over 150 reports from the public, an additional twelve populations of devil weed were found on the east side of the island, a largely

Figure 13. Flowering devil weed.
Photo credit: O'ahu Invasive Species Commitee

rural district of large residential properties interspersed with small scale agricultural operations bordering areas of native forest including Wao Kele o Puna, a Forest Legacy Program project. BIISC crews working to eradicate the plant have controlled more than 68,000 devil weed plants since 2021. Scent detection dog teams are utilized to prioritize survey areas and expand buffer zones for search, and sustained public outreach continues throughout the island to locate any unknown populations. In 2025 alone, BIISC removed 14,000 plants. Host specificity testing of the potential biocontrol agent, *Cecidochares connexa*, a tephritid fly, is being conducted by the Forest Service, Institute for Pacific Islands Forestry.

Figure 14. Conservation Dogs of Hawai'i dog found devil weed with handler Kiyoko Johnson. Photo credit: Molly Murphy, Big Island Invasive Species Committee

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Data Sources

The data sources for this report include the Division of Forestry and Wildlife, US Forest Service Region 5, US Forest Service Institute of Pacific Islands Forestry, Hawai'i Agricultural Research Center, Univeristy of Hawai'i at Mānoa, US Geological Survey Pacific Island Ecoystem Research Center, U.S.D.A. Agricultural Research Service, Big Island Invasive Species Committee, and Hawai'i Invasive Species Council.

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