USDA Forest Service
U.S. DEPARTMENT OF AGRICULTURE

# Forest Health 2024 highlights Hawai‘i

MARCH 2025



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## 2024 Summary

- **Rapid ‘Ōhi‘a Death (ROD)** continues to spread to higher elevations. SPLAT Verb, a beetle repellent that has the potential to slow the spread of ROD, is undergoing registration with the State of Hawai‘i. Disease resistance screening efforts continue with promising results.
- The **ramie moth**, which threatens native nettles and insects that rely upon the nettles, has spread across O‘ahu, Maui, and Hawai‘i Island.
- **Coconut rhinoceros beetle (CRB)** are damaging native loulu palms on O‘ahu. Management efforts continue on Kaua‘i, O‘ahu, Maui, and Hawai‘i Island.
- **Little Fire Ant (LFA)** continues to spread across the state of Hawai‘i, invading agricultural and natural ecosystems including forested areas, where they farm disease vectoring plant pests and reduce insect biodiversity. The Hawai‘i Ant Lab is working with local communities to eradicate LFA.

## Insect Pests and Pathogens

### Rapid ‘Ōhi‘a Death (ROD) or Ceratocystis Wilt of ‘Ōhi‘a
***Ceratocystis lukuohia* and *C. huliohia***

‘Ōhi‘a (*Metrosideros polymorpha*) is arguably the most bioculturally important tree in Hawai‘i, providing habitat to countless flora and fauna, creating Hawaii’s watersheds and serving as a 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 Hawai‘i Island and Kaua‘i as of 2024. The canker-forming *C. huliohia* is also found throughout Hawai‘i Island and Kaua‘i, in 15 cases on O‘ahu, and a single, eradicated case on Maui. The Department of Land and Natural Resources Division of Forestry and Wildlife (DOFAW), Island committees from Hawai‘i Invasive Species Council, the University of Hawai‘i, and the USDA Forest Service continue to monitor and collect samples to be tested by the USDA-Agricultural Research Services (ARS) in Hilo for new outbreaks. In 2024, 444 trees were sampled, with 190 new detections (167 *C. lukuohia*, 22 *C. huliohia*, and one co-infected with both fungi). This brings the total positive historical statewide detections to 3,084 (2,495 *C. lukuohia*, 547 *C. huliohia*, and 42 co-infected with both fungi).

A verbenone-based repellent called SPLAT Verb, which has the potential to reduce ambrosia beetle attack on both healthy and ROD-infested ‘ōhi‘a, is undergoing registration with the state as of December 2024. 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. Integrated science at the Forest Service is underway to understand the interactions among feral ungulates, fencing, strawberry guava biocontrol, and ‘ōhi‘a restoration and how they affect ‘ōhi‘a regeneration. A major component is understanding the role of pigs and whether they can directly vector ROD fungi and/or cause wounds for frass transfer.

*Figure 1. ‘Ōhi‘a (Metrosideros polymorpha) forest on Hawai‘i Island with trees killed by the Rapid ‘Ōhi‘a Death fungal pathogens, Ceratocystis lukuohia and C. huliohia. Recently killed trees have brown crowns while older dead trees are leafless and have gray crowns. Photo credit: Ryan Perroy, University of Hawai‘i at Hilo*

The ʻŌhiʻa Disease Resistance Program (ʻŌDRP) is a collaborative effort between the Forest Service, Institute of Pacific Islands Forestry, and the non-profit Akaka Foundation for Tropical Forests to locate putatively disease-resistant ʻōhiʻa trees and screen their seedlings or rooted cuttings for resistance to *C. lukuohia* via greenhouse inoculation trials. In 2024, three inoculation screening trials were run with results indicating variable levels of potential disease resistance. In addition to continued greenhouse trials, field plots will be established to determine the durability of resistance under natural conditions.

*Table 1. The number of ʻōhiʻa trees that tested positive for Ceratocystis lukuohia, C. huliohia, or both in 2024. The number of acres surveyed and trees felled are included by island across the State of Hawaiʻi.*

| | Hawaiʻi Island | Maui | Lanaʻi | Molokaʻi | Oʻahu | Kauaʻi | Total |
|---|---|---|---|---|---|---|---|
| ***Ceratocystis lukuohia*** | 125 | 0 | 0 | 0 | 0 | 42 | 167 |
| ***Ceratocystis huliohia*** | 6 | 0 | 0 | 0 | 0 | 16 | 22 |
| **Both species** | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| **Not detected** | 108 | 18 | 0 | 3 | 48 | 45 | 222 |
| **Inconclusive** | 14 | 0 | 0 | 4 | 3 | 2 | 23 |
| **Awaiting results** | 7 | 0 | 0 | 0 | 0 | 2 | 9 |
| **No. trees sampled** | 261 | 18 | 0 | 7 | 51 | 107 | 444 |
| **No. of acres surveyed (DMSM)** | 785,911 | 346,886 | 16,134 | 36,211 | 166,153 | 228,651 | 1,579,946 |
| **No. of trees felled** | 4 | 0 | 0 | 0 | 1 | 20 | 25 |

## Myrtle Rust (on ʻōhiʻa)

***Austropuccina psidii***

The myrtle rust fungus, *Austropuccinia psidii*, has negatively impacted members of the Myrtaceae family in Hawaiʻi since its discovery in 2005 on Oʻahu. Currently, only a single biotype, the pandemic biotype, is present in Hawaiʻi. This biotype is found across the world, however, other biotypes have been shown to be more virulent to ʻōhiʻa, posing a major threat. The Hawaiʻi Myrtle Rust Monitoring Network was established by researchers from the Forest Service, Institute of Pacific Islands Forestry, and Colorado State University to monitor the genetic background of the myrtle rust fungus, *A. psidii*, from tissue samples collected from sentinel gardens, natural, and residential areas to detect the introduction of novel *A. psidii* biotypes into the state. As of 2024, only the pandemic biotype has been detected in sentinel plants, suggesting no novel introductions.

## Koa Wilt

***Fusarium oxysporum* f. sp. *koae***

Over the past decade, the Division of Forestry and Wildlife (DOFAW) has worked with the Hawaiʻi Agriculture Research Center (HARC) to develop disease resistant koa trees (*Acacia koa*) for both commercial plantations and forest restoration. The fungal pathogen, *Fusarium oxysporum* f. sp. *koae*, causes a wilt disease in koa that can cause widespread tree mortality, especially at lower elevations (below 3,500 ft). Screening koa families for disease resistance by ecoregion has been conducted by HARC and seed orchards have been established throughout the state with the goal of providing seed to DOFAW and private landowners.

DOFAW and HARC collaborated on seed collections from the statewide network of wilt resistant orchards in 2024. Over 38 pounds of seed were collected (one pound = approximately 5,000 seeds). This included over nine pounds of seed from the orchard located at the Kapāpala Canoe Forest on the southern slopes of Maua Loa, Hawaiʻi Island. Some of the dozen families planted at this site in 2012 show strong potential for both disease resistance and growth form. However, a number of the original seed sources are no longer available, therefore collecting from those families is important for continuing koa improvement in this high-priority koa-growing region.

## Gall Rust in Koa

***Atelocauda digitata***

There was an outbreak of gall rust (*Atelocauda digitata*) in the DOFAW Halemanu koa seed orchard on Oʻahu, planted in 2022. Gall rust does not normally cause significant damage to koa trees, but many trees at this site were

*Figures 2 and 3. (Top) Healthy koa phyllodes and flowers. Photo credit: Kylle Roy, Forest Service, and (Bottom) Gall rust on koa phyllodes. Photo credit: Rob Hauff, DOFAW*

severely affected by the rust; HARC removed the most susceptible trees from the planting. Preliminary observations indicate there may be genetic resistance to the rust as some koa families are heavily infested while other families appear to have no symptoms.

## 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 that have 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 2024 have revealed koa seedworm to be the main seed predator, and management tools are underway including the uses of insecticidal spray drones and natural mating disruptors.

## Red Palm Mite

***Raoiella indica***

A new pest on DOFAW's early detection target list was detected on O'ahu in 2024. USDA confirmed the identification of the red palm mite, *Raoiella indica*, infesting a coconut palm at a local botanical garden, and subsequent detections were made on Maui and Hawai'i Island (official identifications pending). The infestation on O'ahu was quickly determined to be widespread, and no response was mobilized. The red palm mite attacks a wide range of palms including coconut palms, as well as banana and ginger.

The University of Hawai'i is investigating potential impacts. When found on palms, the red palm mite is usually part of a community of arthropods, most of which are pests. This makes it hard to determine what damage is caused by the mite and what damage is caused by the other pests.

Of concern in Hawai'i, in addition to coconut palms, bananas, and landscape ornamentals, are the palm species in the genus *Pritchardia*, commonly known as loulu in Hawai'i. These fan palms are the only palm trees native to the Hawaiian Islands. There are 23 species of *Pritchardia* endemic to Hawai'i and 10 of them are listed as endangered.

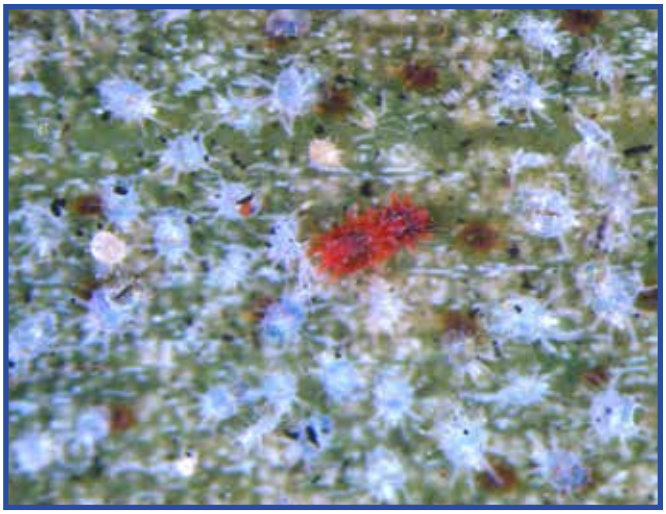


*Figure 4. Close up of red palm mites (red) and white cast skins. Photo credit: Darcy Oishi, Hawai'i Department of Agriculture*

## 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 tree death. The beetles breed in moist, decomposing organic matter, especially dead coconut material, leading to a destructive cycle if left unmanaged. Although the 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.).

Trapping, palm surveys, and treatment of CRB infested areas is primarily conducted by the Hawai'i Coconut Rhinoceros Beetle Response Team, individual island Invasive Species Committees, and the Hawai'i Department of Agriculture (HDOA). CRB was first detected on O'ahu in 2013 and has since spread throughout the entire island. In 2023, CRB was detected on Kaua'i, Maui, and Hawai'i Island. In 2024, five CRB were captured on Hawai'i Island and monitoring focused on the northern half of the island. Surveys on Kaua'i focused on the eastern and northern sides of the island, and a total of 171 CRB were trapped. On Maui, 17 CRB were collected from a single tree, and palm surveys focused on the central portion of the island. Moloka'i and Lana'i remain free of CRB.

Native loulu palms are being monitored for CRB damage across the state. The National Tropical Botanical Garden on Kaua'i hired a private company called Aloha 'Āina Drones, to treat 644 palms in its extensive native palm collections in December 2024. The Army Natural Resources Program on O'ahu (ANRPO) continues to monitor the managed loulu populations at 'Ōhikilolo and other high-altitude sites in the Wai'anae mountains, noting light damage but no CRB breeding sites. The Department of Land and Natural Resources (DLNR) has noted CRB damage in *Pritchardia lowreyana* in Kahana valley, O'ahu in April of 2024.

## Ramie Moth

***Arcte coerula***

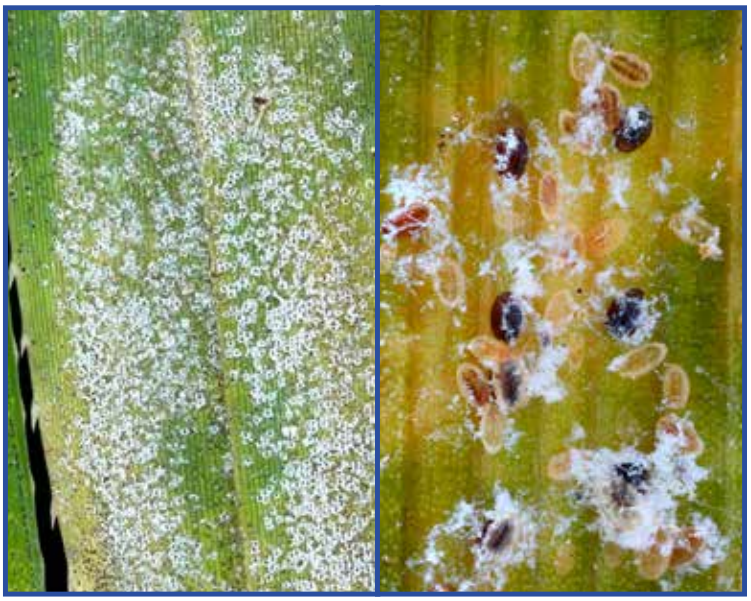
Ramie moth, *Arcte coerula* (Erebidae, previously Noctuidae), is a recent invasive species in Hawai'i, feeding on endemic nettle plants. It was first discovered in 2018 feeding on Hawaiian māmaki or *Pipturus albidus* (Urticaceae) on Maui, in both wild and cultivated populations. By November 2020, this new pest had spread to Hawai'i Island. As of December 2024, the ramie moth is now widespread across O'ahu. Native to Southeast Asia, this moth has the potential to inflict substantial damage through its leaf feeding on māmaki and other native and non-native nettles. This impacts our native forests including endemic animals, such as our Hawaiian tree snails, Kamehameha butterfly, and several of the lesser-known endemic insect species. Māmaki is also a critical component of mesic native forests, which are home to

the few remaining native birds and provide vital watershed replenishment services, as the primary understory tree.

Field surveys conducted by University of Hawai'i at Mānoa from previous years on Maui and Hawai'i Island have shown ramie moth to have more than one brood per year, with populations peaking in the spring, from March to May, and decreasing dramatically in the summer. However, recent surveys in early May found a higher number of eggs and caterpillars compared to previous years when populations started to drop. Additionally, there has been a spike in ramie moth detections starting in November 2024 and moving into 2025 where there has been a record number of reports to date. This indicates that the ramie moth may be adapting to Hawaii's environment and could persist throughout the year in higher numbers. Islands currently without ramie moth are being monitored for the potential arrival of this pest.

Over the last several years, there has been an increase in biotic resistance by resident natural enemies. Egg parasitism makes up most of the apparent mortality for the ramie moth. There are currently two known egg parasitoids. Larval parasitism has also been observed, though less frequent. Predation by birds and reptiles may play a large role in ramie moth mortality as well as several pathogens that have been observed killing a large number of caterpillars. Partial life table studies will continue to be conducted in the coming year. Please see https://cms.ctahr.hawaii.edu/ce/mamaki for more information and report all ramie moth sightings to https://www.643pest.org/ or to ipmlab@hawaii.edu.

*Figure 5. First instar ramie moth larva on mamāki that recently emerged from its egg. Photo credit: Michelle Au, University of Hawai'i at Mānoa*



*Figures 6 and 7. Images of hala scale at no magnification (left) and 10x magnification (right). Photo credit: Mason Russo, University of Hawai'i at Mānoa*

## Hala Scale

***Thysanococcus pandani***

*Thysanococcus pandani*, colloquially referred to as hala scale, was first detected in Hawai'i in Hāna, Maui in 1995 and subsequently spread throughout the entire island. A recent survey of the Hawaiian Islands indicates that hala scale is now widespread on Moloka'i, and established populations on O'ahu have been detected (Russo and Cheng 2021). Hala is a very common landscape tree throughout the state, and an expanded range of hala scale could have negative impacts on both urban and rural ornamental plantings (Wong 2008). Widespread distribution of this insect pest throughout the Hawaiian Islands could not only cause potential negative ecological impacts in coastal hala forests but also interfere with the continuing of Native Hawaiian weaving practices, specifically ulana lauhala, for future generations (Keawe et al. 2014).

Hala scale adults are around 0.5 mm in size and from the naked eye appear as a black dot within the vein lines of a pandanus leaf, with or without a white waxy fringe. Negative aesthetic and physical impacts of infestations range from foliage distortion, discoloration and yellowing, to crown drop and early plant death, while it impacts the quality of Hawaiian weaving practices (Matsunaga 2021). Matsunaga (2021) indicates that hala scale infestations prevent seedling regrowth, suggesting that the hala forests on Maui and Moloka'i may not regenerate. As of 2024, work done by University of Hawai'i at Mānoa has revealed heavy infestations of hala scale were present in all transects across forests on Maui and Moloka'i, while Kaua'i and Hawai'i Island did not have any infestations. International trips are underway to explore the possibility of biocontrol agents.

*Figure 8. Frass and sap reaction evidence of Queensland longhorn beetle (QLB) presence in kuku'i. Photo credit: Helen Sofaer, USGS-PIERC*

## Queensland Longhorn Beetle

***Acalolepta aesthetica***

*Acalolepta aesthetica*, colloquially referred to as Queensland Longhorn Beetle (QLB), 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 including ulu (*Artocarpus altilis*), kuku'i (*Aleurites moluccanus*), citrus (*Citrus* spp.), cacao (*Theobroma cacao*), and avocado (*Persea americana*), with a preference for kuku'i (Miles 2022). 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 is conducting laboratory studies to test whether female QLB will oviposit on and develop in native forest tree species including 'ōhi'a (*Metrosideros polymorpha*), koa (*Acacia koa*), 'ōlapa (*Cheirodendron trigynum*), and kāwa'u (*Ilex anomala*).

In 2023, QLB was discovered infesting alahe'e, kuku'i, and ulu in the Liko Nā Pilina agroforestry plots at the Keaukaha Military Reservation on Hawai'i Island. Due to the cryptic habitat of the larvae, management approaches are limited. 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. In 2024, Liko Nā Pilina staff were trained on the technique of nematode application and methods for rearing the nematodes in insect hosts for inoculum production. In addition, the University of California, Riverside, in collaboration with Purdue University, USDA-ARS, and the Forest Service, are developing a promising pheromone lure for QLB that may be effective enough to trap-out QLB populations. Together, the scientists are working on developing an integrated pest management program using both nematodes and pheromone lures.

*Figure 9. Queensland longhorn beetle adults. Photo credit: Kylle Roy, Forest Service*

## Little Fire Ant

***Wasmannia auropunctata***

The little fire ant (*Wasmannia auropunctata*) is one of the worst invasive ants in the world and has been spreading across the state of Hawai'i for at least 25 years. Mostly known for its impressively painful sting despite its tiny size (>2 mm), little fire ant (LFA) are not just a pest of people. While LFA does reduce our quality of life, the ants also invade agricultural and natural ecosystems where they farm disease vectoring plant pests and reduce insect biodiversity. Invasions of natural forests and coastal habitats often begin with a bordering residential infestation. Because of this, protecting Hawaii's natural ecosystems from LFA invasion must include treatment and control of residential infestations.

In 2024, the Hawai'i Ant Lab (HAL) began a community action program (CAP) on O'ahu as a response to the growing number of infestations and HAL's limited capacity. The program entails working with community volunteers to treat a known LFA infestation under the guidance of HAL. Communities are provided pesticides (ant baits), training, treatment plans, and ongoing technical support throughout the treatment process. To ensure the efforts are successful, HAL conducts population monitoring to assesses treatment efficacy and to detect and treat remnant colonies that were able to persist after a full 12-month treatment regimen.

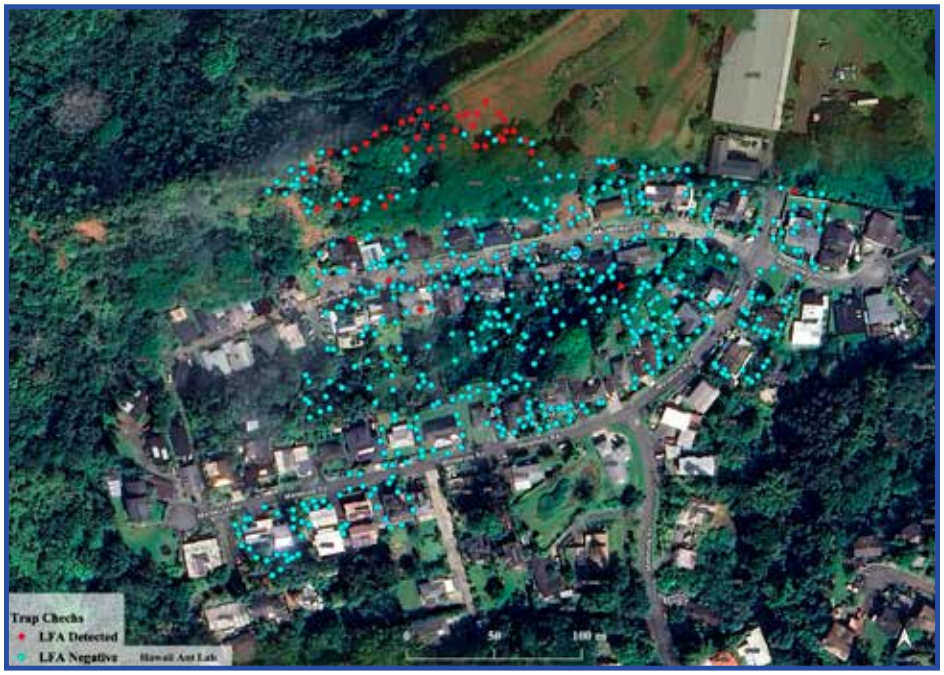



*Figure 10. A May 2024 survey at a residential infestation bordering natural forest. This survey was conducted at the halfway point and consisted of collecting 551 ant samples using a peanut butter lure over 12 acres. The results from this survey provided evidence that treatments were working and suggested the infestation in the neighborhood had been substantially reduced. As of January 2025, the residential area at this site has entered a long-term monitoring phase and Community Action Plan treatments are focused on the forested area.*
*Map credit: Michelle Montgomery*

To date, 14 communities and town home complexes have begun LFA treatments under HAL's CAP. These sites range in size from approximately one acre to over 40 acres and several abut natural forest or coastal habitat. For the larger sites, HAL often partners with the O'ahu Invasive Species Committee, Coordinating Group on Pest Species, US Fish and Wildlife Services, Conservation Dogs Hawai'i, Key Project, and Hui o Ko'olaupoko as well as community volunteers for surveys. As of the end of 2024, seven of the 14 CAP sites have undergone a full 12-month treatment regimen and shifted into long term monitoring and surveillance. Once no LFA have been detected for at least three consecutive years, a site may be declared eradicated.

## 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.

*Figure 11. Devil weed.*
*Photo credit: Molly Murphey, Big Island Invasive Species Committee*

*Figure 12. Conservation Dogs of Hawai'i dog sitting in alert at detection of devil weed in Puna.*
*Photo credit: Conservation Dogs of Hawai'i*

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 40 miles of road surveys and over 100 reports from the public, an additional ten populations of devil weed were found on the east side of the island, a largely 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 50,000 devil weed plants in three years. 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 2024 alone, BIISC removed 16,000 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.

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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 Department of Agriculture, Hawai'i Agricultural Research Center, Univeristy of Hawai'i at Mānoa, Univeristy of Hawai'i at Hilo, US Geological Survey Pacific Island Ecoystem Research Center, Coconut Rhinoceros Beetle Response Team, U.S.D.A. Agricultural Research Service, Big Island Invasive Species Committee, and Daniel K. Inouye U.S. Pacific Basin Agricultural Research Center.

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