RAPID ʻŌHIʻA DEATH
FREQUENTLY ASKED QUESTIONS

UPDATED MAY 2018

1. What is Rapid ʻŌhiʻa Death?

Rapid ʻŌhiʻa Death (ROD) is a disease killing ʻōhiʻa, Hawaiʻi's most abundant native tree. ROD disease is caused by two newly described fungi: *Ceratocystis lukuohia* (destroyer of ʻōhiʻa) and *Ceratocystis huliohia* (disruptor of ʻōhiʻa).

ROD infected tree.

2. Where do the fungi that cause ROD come from?

ROD is an exotic/introduced disease. We do not know exactly where the ROD-causing fungi came from, but we know they are not native to Hawaiʻi. There are several hypotheses for how these fungi originated: 1) a strain was brought in on a plant carrier that wasn't showing symptoms of the disease, 2) a different strain was brought to Hawaiʻi and mutated or 3) separate strains were brought to Hawaiʻi and recombined to create the strains that are killing ʻōhiʻa.

3. When did ROD disease first start?

We can't be exactly sure when ROD appeared since the disease itself has only been identified recently (2014). Stands of ʻōhiʻa trees that were dying as early as 2010 were later diagnosed with the fungal pathogen *Ceratocystis.*

4. Is the disease everywhere across the State of Hawaiʻi?

As of May 2018, cases of ROD have been found in all districts of Hawaiʻi Island except for South Kohala. The less agressive ROD-causing fungus *Ceratocystis huliohia* has also been confirmed on Kauaʻi.

From Left: Browning ʻōhiʻa leaves of ROD infected tree, dark staining of sapwood of ROD infected tree, ʻōhiʻa tree killed by ROD.

5. What does ROD do to ʻōhiʻa trees?

Microscopic spores of the fungi enter ʻōhiʻa through wounds which can be made by many things including people (mowing over roots, cutting through bark with a weedwhacker, pruning, etc.), other animals, strong winds causing broken branches, or roots growing over lava rock. Once the fungi enter the plant they grow through the vascular system (sapwood) and block water movement.

Large wound caused by poor maintenance/pruning.

6. How quickly can the fungus kill an ʻōhiʻa tree?

It may take months to more than a year before the tree shows symptoms of the disease (i.e., before the tree actually looks like it's dying).

7. How can I tell if a tree has ROD?

ROD fungi are not visible on the outside of a tree, so a few characters may help determine if your tree might be infected. First, an apparently healthy tree's crown will turn from green to yellow then brown and appear dead over a few days to weeks if it has ROD. Next, leaf death will not be scattered but entire branches or the entire crown will die at once. To be positive that the tree has ROD, you would have to submit a sample for testing.

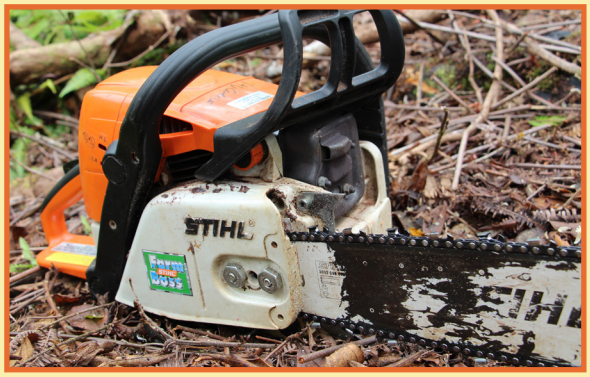
8. What should I do if I think my tree has ROD?

If you think your ʻōhiʻa tree has ROD, you can email photos of the tree, a description of the timeline of your observations (seeing a healthy tree progress to dead) and the tree location (e.g., neighborhood, town) to ohialove@hawaii.edu or call 808-969-8268. A short video explaining how to sample an infected tree can be viewed at **rapidohiadeath.org**. Hawai'i Island residents can mail or deliver wood samples to Lisa Keith, Research Plant Pathologist, USDA/ARS, DKI-PBARC, 64 Nowelo St., Hilo, HI 96720. *If you suspect you have ROD on islands other than Hawai'i Island, please contact the local Invasive Species Committee:

O'ahu Invasive Species Committee ~ Email: oisc@hawaii.edu, Phone: (808) 266-7994
Kaua'i Invasive Species Committee ~ Email: kisc@hawaii.edu, Phone: (808) 821-1490
Maui Invasive Species Committee ~ Email: miscpr@hawaii.edu, Phone: (808) 573-6472
Moloka'i Invasive Species Committee ~ Email: lbuchanan@tnc.org, Phone: (808) 553-5236

9. Who can help cut down ROD-Infected ʻōhiʻa trees?

We recommend that you work with an arborist who has been certified by the International Society of Arboriculture (ISA) to remove dead infected trees. Talk with the arborist about his/her current decontamination procedure as well as practices we recommend to prevent the spread of ROD. The Big Island Invasive Species Committee (BIISC) has a list of certified arborists for Hawai'i Island on their website www.biisc.org.



10. The ROD-infected tree has been cut down - now what do I do?

Wood from ROD-infected trees should not be moved off site, but the wood can safely be used for firewood in an imu, fireplace, or barbeque pit. If you cannot burn the wood, then you can cut it up and cover it with a tarp, cloth, or weed mat to deter boring beetles.

11. What can I do to help prevent the spread of ROD?

Practice the “5 things you can do to help prevent the spread of ROD.”

1. Avoid injuring ‘ōhi‘a. Wounds serve as entry points for the fungi and increase the odds that the tree will become infected with ROD. Avoid pruning and contact with heavy equipment wherever possible.

2. Don’t move ‘ōhi‘a wood or ‘ōhi‘a parts. If you don’t know where the ‘ōhi‘a material is from, don’t move it.

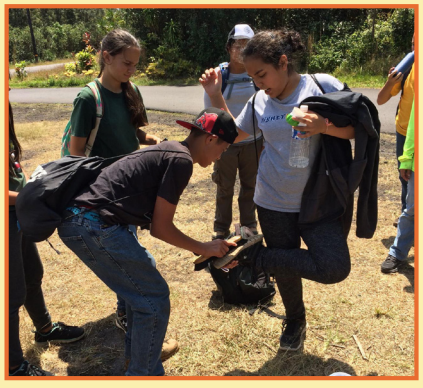
3. Don’t transport ‘ōhi‘a off of Hawai‘i Island. Follow the Hawai‘i State Department of Agriculture quarantine rule and help to keep ROD from reaching the other islands.

4. Clean all gear, including shoes and clothes, before and after entering forests, especially if you have been on Hawai‘i Island and are now returning to another island. Brush all soil off of shoes then spray with 70% rubbing alcohol. Wash clothes with hot water and soap.

5. Wash your vehicle with soap and a pressure washer to clean all soil off of the tires and vehicle undercarriage if you’ve been driving off-road and have picked up mud.

12. Is there anything I can do to save ‘ōhi‘a on my property?

Because the ROD fungi enter trees through wounds, the best thing you can do to protect your trees is to not injure them. Mechanisms of injury include: lawnmowing, weed-whacking, cutting, sawing, pruning, etc.



Forest users removing soil from shoes and spraying with 70% rubbing alcohol.

Mulch around trees saves them from injury by weed-whackers and lawnmowers.

13. Can the fungi or the spores of the fungi be carried on the wind?

The fungi grow inside the sapwood of infected trees and not on the bark or leaves. The fungal spores themselves are not windborne. However, beetles boring into infected trees create a fine dust that is contaminated by fungal spores and can be blown on the wind, spreading the disease. Infected sawdust generated during the felling of an infected tree can also become windborne.

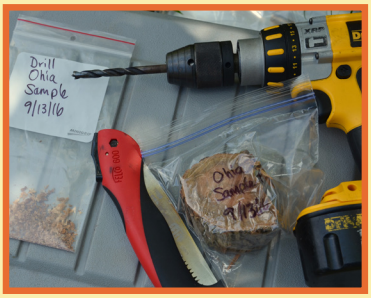
Fine beetle boring dust around a boring hole.

14. Are there any chemicals that can kill the ROD fungi?

There are currently no recommended fungicides (fungus-suppressing chemicals) for treating Rapid ʻŌhiʻa Death. Researchers are currently testing available products; however, a successful chemical would only be used in a greenhouse setting or on individual trees and would likely be expensive. A successful fungicide would not be able to cure a tree that is already infected, but it may help delay the infection process.

15. What research is being conducted to address and improve understanding of ROD?

- Mapping the distribution of ROD
- Using remote sensing techniques to discover locations of stressed trees that may be infected with ROD fungi
- Using computer modeling and geographic information systems to examine landscape or ecological patterns of the disease
- Monitoring long-term forest plots to learn how the disease progresses over time in a given location
- DNA testing on beetles and beetle-made boring dust
- Fine dust trapping to see if fungal spores are being carried by wind
- Testing fungicides for effectiveness against *Ceratocystis*
- Testing different varieties of ʻōhiʻa to search for resistance to ROD
- Testing best methods for preventing the spread of ROD
- Testing methods for treating wood products so that they do not carry spores of the ROD fungi



From Top: Sampling tools, fungal fruiting bodies with spore clusters, ʻōhiʻa seedlings grown for testing resistance.

ʻŌHIʻA FOR OUR FUTURE
rapidohiadeath.org
UH MĀNOA COLLEGE OF TROPICAL AGRICULTURE AND HUMAN RESOURCES
USDA AGRICULTURE RESEARCH SERVICE
USDA INSTITUTE OF PACIFIC ISLANDS FORESTRY
DEPARTMENT OF LAND AND NATURAL RESOURCES, DIVISION OF FORESTRY AND WILDLIFE