

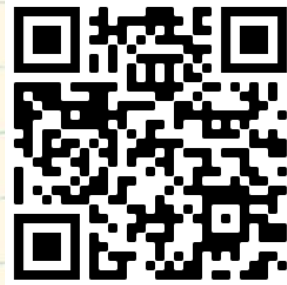
WE NEED YOUR HELP!



We are glad to provide these materials for free. In order for us to continue receiving funding for new materials, we need to collect information on how they are used.

Thank you for taking the time to answer the following one-minute survey.

There are three ways to complete the survey:



- 1** Scan this code with your smartphone camera
- 2** Type the following link into your web browser:
<https://plantheroes.org/educator-survey>
- 3** Email your answers to:
plantheroes@publicgardens.org



- 1) Job title
- 2) Name of organization you belong to
- 3) What kind of educator are you?
 - Teacher
 - Summer camp counselor
 - Home schooler
 - Public garden educator
 - Informal educator
 - Other (please describe)
- 4) What grade level do you teach?
 - Elementary (K-5)
 - Middle School (6-8)
 - High School (9-12)
 - Other (please describe)
- 5) Specify what subject area you teach:
 - Science
 - Math
 - Language Arts
 - Social Studies
 - Other (please describe)
- 6) How many students do you teach in a school year?



Help the Plant Heroes protect our forests
by slowing the spread of pests and diseases!

PLANTHEROES.ORG
**ADVANCED
ACTIVITY
BOOK**

RAPID 'ŌHI'A DEATH



Aponi Star



BE A PLANT HERO!

Help Aponi slow
the spread of rapid
'ōhi'a death!



Plant
Protection
Program

AMERICAN PUBLIC GARDENS ASSOCIATION

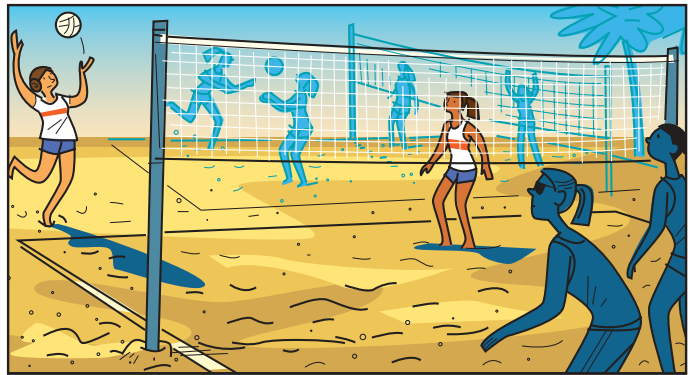
Hit the brakes!

Slowing the spread of Rapid 'Ōhi'a Death...



Apani and the rest of the high school girls volleyball team are traveling to Hawai'i Island for a national tournament. They are looking forward to seeing volcanoes, hiking in the rainforest, snorkeling with tropical fish, and of course—playing LOTS of volleyball!

When the plane begins its descent, Apani watches an in-flight movie about the ecological and cultural importance of Hawai'i's 'ōhi'a lehua trees, and a disease that is killing them—**rapid 'ōhi'a death...**



After getting settled at the hotel, Apani and her friends jump right into practice—there are volleyball teams from all over the country!



The tournament organizers planned a break mid-week so that all the teams could spend a day doing some volunteer work on the island. Apani and her friends sign up for trail restoration so they can see the tropical rainforest.

Apani notices that there are several dead and dying 'ōhi'a trees in this section of the forest.

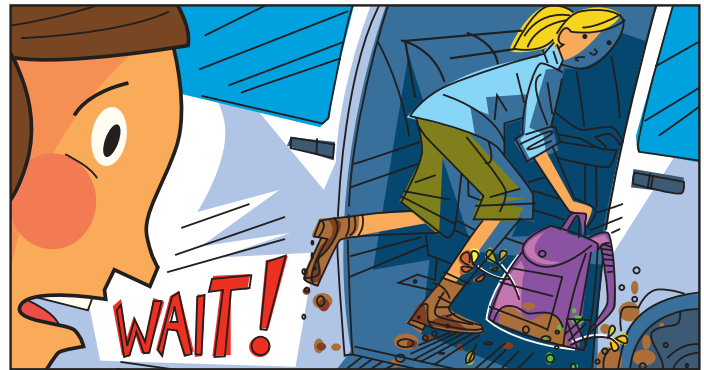


The Plant Heroes are brought to you by the American Public Gardens Association. This comic was developed with financial support from the USDA — Animal and Plant Health Inspection Service and reproduced with financial support from the USDA — Forest Service. Play games and learn how you can protect plants at plantheroes.org.



PLANT HEROES

The volunteers break for lunch. Afterwards, they start piling into their vans so they can drive to another site where they will continue working for the rest of the afternoon...



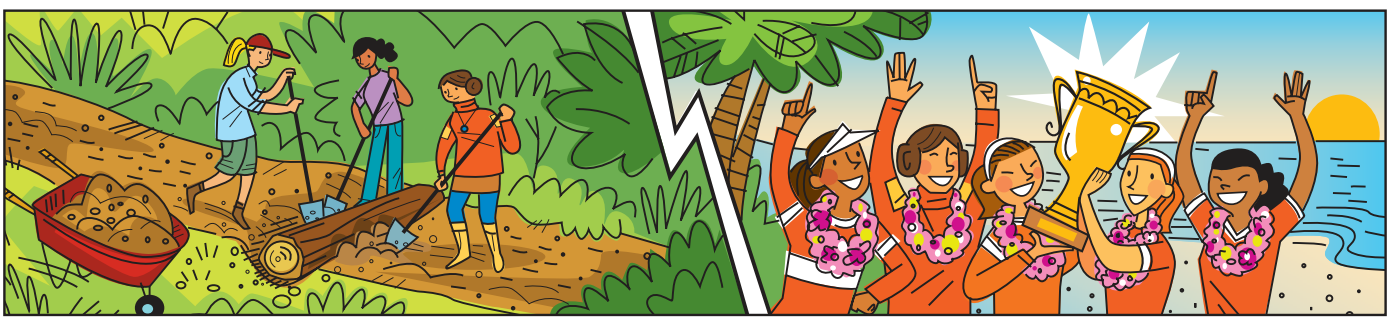
As one of her teammates climbs into the van ahead of her, Aponi notices that her shoes are covered in mud, and she has some 'ōhi'a branches tucked into the pockets of her backpack. She remembers from the video how important it is not to move soil or 'ōhi'a plants to avoid spreading the fungus that causes rapid 'ōhi'a death.

Aponi tells her teammates about the video, and about the dead 'ōhi'a trees she noticed when they walked along the trail.



Coach helps them use rubbing alcohol from their first aid kit to clean off all of their tools. They clean all the mud off their shoes and a local forest ranger takes care of the 'ōhi'a branches. **That was a close one!**

Aponi and the rest of the team spent the rest of the day installing water bars on a trail at another park. They return to the hotel and, after a good night's rest, win the rest of their volleyball matches! Taking 1st place in the tournament feels extra good knowing that they also had a chance to give back to the island, and they avoided spreading such a terrible disease into a new part of the rainforest.



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A Bountiful Tree

The 'ōhi'a tree is known as a "keystone" species. A keystone species is a plant or animal that supports many other plants and animals in an ecosystem (or community of living things and their environment). Without the 'ōhi'a tree, Hawai'i would be changed forever. Many animals that rely on the 'ōhi'a could become extinct, invasive plants might take over the forests, and the environment would be drastically different.

Why is the 'ōhi'a tree so special? Solve the riddles by filling in the blanks below to find out who relies on the 'ōhi'a tree. Use the words in the list to help you fill in the blanks.

1. I rely on the sweet _____ of the 'ōhi'a flowers for my food, and I make my _____ in the branches of the tree. What am I?
2. Another name for me is an epiphyte, or a living being that grows on another plant, like a _____ or an _____, and my roots rely on the 'ōhi'a tree for support. What am I?
3. All living things need me to survive. 'Ōhi'as collect me during a _____ so that the _____, _____, and _____ do not dry out. What am I?
4. We use the 'ōhi'a to make _____, use it for _____ for our buildings, and it provides us with _____ on a hot day. What are we?
5. I am a small animal that visits the 'ōhi'a flowers for their nectar and pollen. I have _____ legs and _____ love to eat me! What am I?



Did you know that the 'ōhi'a tree is only native to the state of Hawai'i? 80% of the trees in the native forests are 'ōhi'as! In other words, four out of five trees in a typical Hawaiian forest are 'ōhi'as!

Use these words for help!

wood	six
shade	birds
nectar	lakes
fern	nest
rivers	rainstorm
waterfalls	lei
orchid	



Frightening Fungi

Rapid 'ōhi'a death is caused by an infection from a fungus that blocks the water transport cells of the tree, causing trees to die from lack of water. Fungi are living beings that are neither a plant or an animal. They are often parasites (or something that steals resources from and causes harm to another living thing), but they don't always cause harm! They are the great recyclers of the environment, taking their nutrition from organic matter; often dead animals or plants. Some common fungi that you might recognize include mushrooms and molds.

The 'ōhi'a tree is a "host" for the fungi, because the fungi are the guests that use the tree as their home. The fungal spores, which allow the fungus (singular of fungi) to reproduce enter the tree through a wound or broken branch. The fungus begins to grow, spreading throughout the tree.

After the spores land on an 'ōhi'a tree, they begin to grow into a thread-like network of hyphae, which together are called a mycelium.



Photo by Kirill Ignatyev, flickr.com

The fungi that causes rapid 'ōhi'a death can only be seen under a microscope. Therefore, they are difficult to detect! Here are some clues that an 'ōhi'a tree might be hosting a fungus. Look in the forest near you; do you see any of these symptoms on your trees? Check off any of the symptoms you see.



Photo by Andrej Kunca, bugwood.org

Black staining from the fungus inside the tree.



Photo by J. B. Friday for the University of Hawai'i, flickr.com

Yellowing or browning leaves.



Stop the Spread!

It is easy for the fungi which cause rapid 'ōhi'a death to spread, but fortunately you can stop the fungi in their tracks! Fill in the blanks to learn more; you can use the comic for help!

When you go hiking or camping out in the woods, make sure you clean off and wash the _____ off your _____ and clothes before you return home. The _____ that cause rapid 'ōhi'a death can stay alive in the soil for over a year, and can _____ 'ōhi'a _____ on your property if you aren't careful! Make sure you don't _____ any parts of the 'ōhi'a tree, to use for _____ or _____ for your campfire! If you use any _____ to cut down or trim branches or flowers on an 'ōhi'a tree, make sure you _____ them with _____ to kill any fungal spores.

wood
rubbing alcohol
mud
spores

fungal
move
tools
shoes

disinfect
lei
infect
trees



Photo taken by Eric Hunt, flickr.com, CC BY-NC-ND 2.0

Why are scientists so concerned about rapid ohia death?

Concern 1: Rapid 'ōhi'a death spreads easily and kills quickly. A tree might appear healthy and be completely dead several weeks later!

Concern 2: There is nothing that can be done to help the tree once it has the disease—it must be cut down.



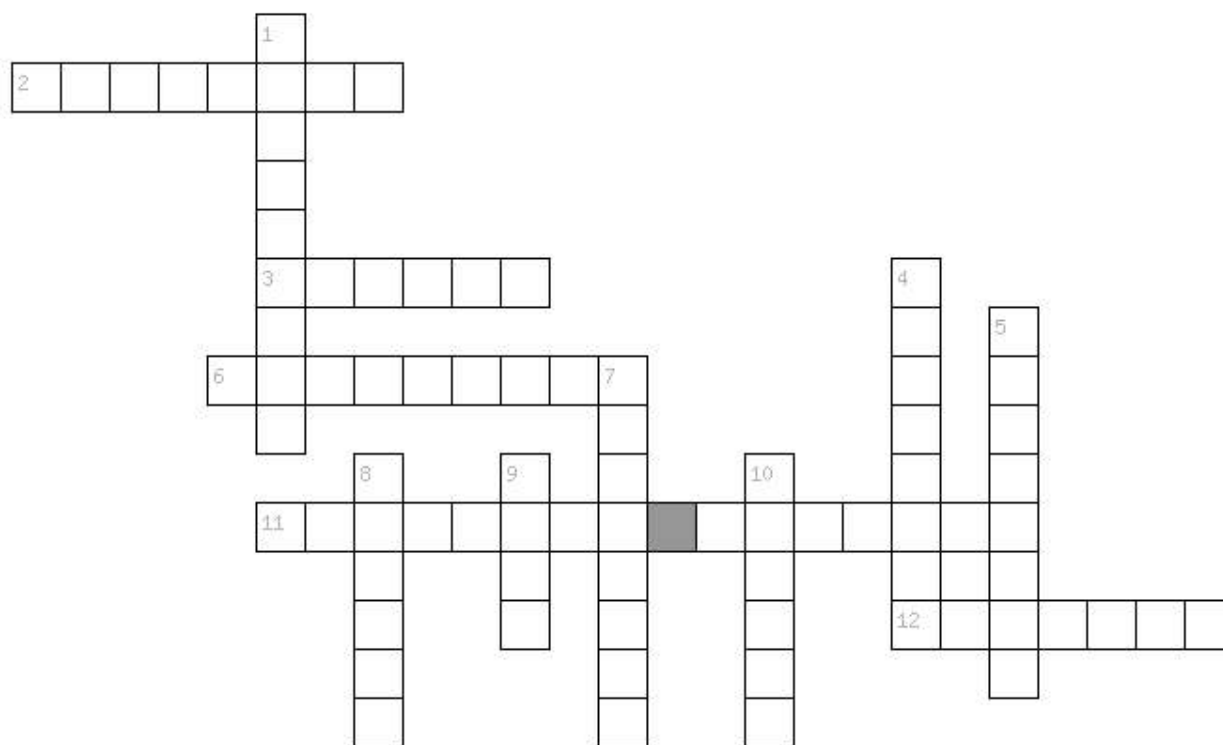
Rapid 'Ōhi'a Death in Your Backyard!

Rapid 'ōhi'a death has invaded your backyard! Where did you find the fungus? How did the fungus get there? Who will you contact to help you? What will you do to make sure it doesn't spread? Draw your own comic below telling the story of how you saved your 'ōhi'a trees from the fungus!



Crossword

Test your knowledge about rapid 'ōhi'a death with this crossword!



Created using the Crossword Puzzle Generator on
Tools for Educators (www.toolsforeducators.com)

Across:

2. a living being such as a fungus, plant, or animal
3. an organism that produces spores—they are often parasites of living plants or animals or feed on dead or decaying organic matter
6. a collection of living things and the environment they live in
11. a species that is crucial for the health of all the species in an ecosystem
12. a word to describe once living organisms who have all died due to a harmful change in their environment

Down:

1. to clean thoroughly to kill something harmful like a bacteria or fungus
4. an organism that is not in its native habitat, and is multiplying rapidly and causing harm to the ecosystem
5. an organism that steals resources from and causes harm to another living thing
7. name for all of the hyphae in a fungus
8. a thread-like network of cells that together makes up a fungal mycelium
9. name for a specific plant an organism (such as a plant or fungus) requires to live
10. tiny, speck-like, reproductive parts that can grow into fungi

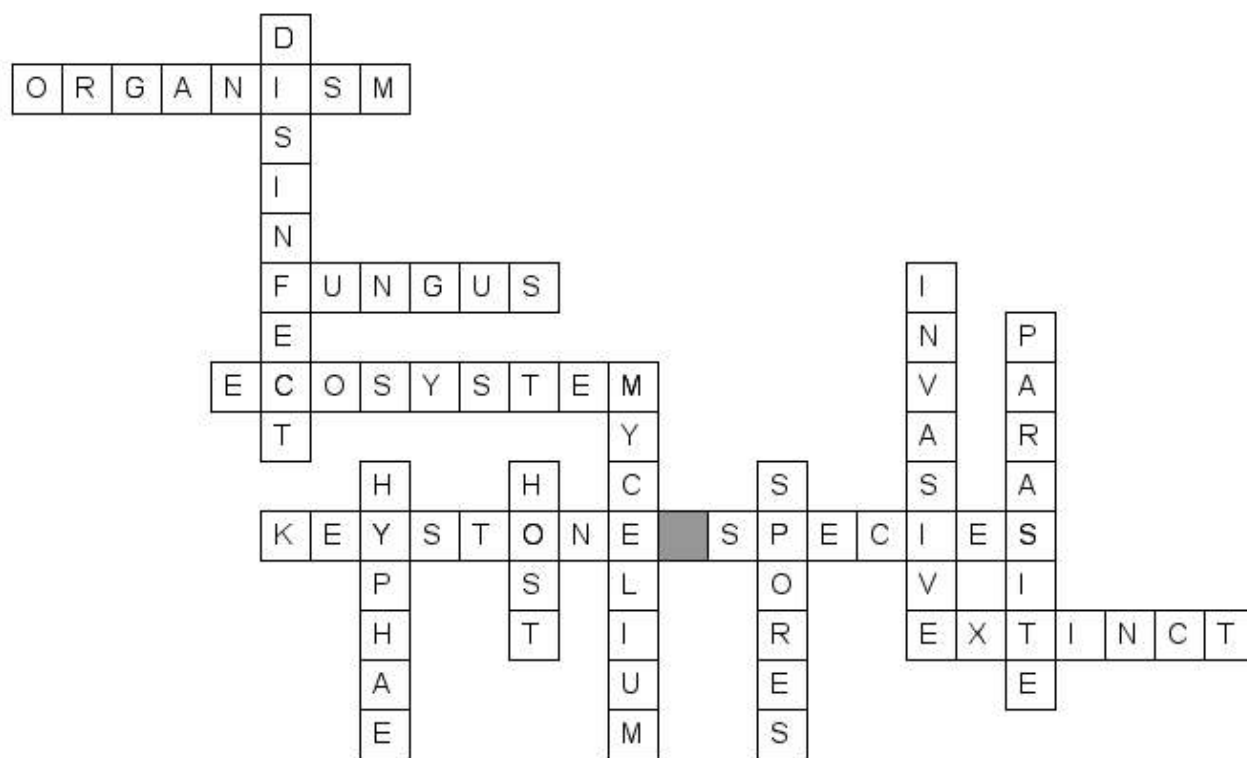


Answer Key

A Bountiful Tree: 1. Nectar, nest; I am a bird. 2. Fern, orchid; I am a plant. 3. Rainstorm, rivers, lakes, waterfalls; I am water. 4. Lei, wood, shade; We are humans/people. 5. Six, birds; I am an insect.

Stop the Spread!: When you go hiking or camping out in the woods, make sure you clean off and wash the [mud] off your [shoes] and clothes before you return home. The [fungal] [spores] that cause rapid 'ōhi'a death can stay alive in the soil for over a year, and can [infect] 'ōhi'a [trees] on your property if you aren't careful! Make sure you don't [move] any parts of the 'ōhi'a tree, to use for [lei] or [wood] for your campfire! If you use any [tools] to cut down or trim branches or flowers on an 'ōhi'a tree, make sure you [disinfect] them with [rubbing alcohol] to kill any fungal spores.

Crossword:



Created using the Crossword Puzzle Generator on Tools for Educators (www.toolsforeducators.com)



Plant Heroes Pledge

This Certifies That

is an Official Member of the Plant Heroes Team and pledges to:

**Learn about the
pests and diseases
that affect the
plants in my region**

**Be on the lookout
for symptoms of
pests and diseases
on trees in my
neighborhood**

**Report any suspicious
findings to an adult
who can notify the
local extension agent**

**Refrain from
moving firewood**

Awarded by the
American Public
Gardens Association





Join our team of Plant Heroes and learn about trees, forests, and the natural world around you!

PLANTHEROES.ORG

You can be a Plant Hero!

Are you curious about plants and animals? Do you like asking questions about nature? Do you enjoy being outdoors and having fun, climbing trees, balancing on logs, or finding a new butterfly or beetle? If so, you are already on your way to becoming a Plant Hero! We invite you to join forces with Nate, Laura, Aponi, and Frankie to protect the plants and ecosystems we all love.

How can you become a Plant Hero?

Join our team and go on a journey with Nate, Aponi, Laura, and Frankie. As a Plant Hero, you will learn to notice when plants are in trouble. You will also find out ways you can act quickly to help find solutions in your own neighborhood. Follow their adventures and learn how they help plants and ecosystems stay healthy.

On the Plant Heroes website, you will find materials to help you learn about plants, forest health, and ecosystem balance. The more you know, the more you can help protect plants and ecosystems in your own yard, neighborhood, and community!

Plant Heroes strives to spark curiosity about nature and science in all children. Our program provides hands-on, nature-based learning materials for educators to engage children in topics of plant health, ecosystem balance, and forest health. We also spotlight the amazing work our public gardens do in protecting the plants and ecosystems we all depend on through our website and printed materials. Visit plantheroes.org today to learn more!

Plant Heroes is brought to you by the American Public Gardens Association, founded in 1940. Over the last eight decades, the Association has supported the work of public gardens in North America and beyond. Our mission is to champion and advance public gardens as leaders, advocates, and innovators in the conservation and appreciation of plants. Our vision is "A world where public gardens are indispensable" as they provide botanic, conservation, community, education, and economic resources to their community.

The Association is committed to increasing the knowledge of public garden professionals throughout North America through information sharing, professional development, networking, public awareness, and research, so that they have the tools to effectively serve visitors and members.



**American
Public Gardens
Association**

PublicGardens.org



This publication was developed with financial support from the US Forest Service and the USDA Animal and Plant Health Inspection Service.

