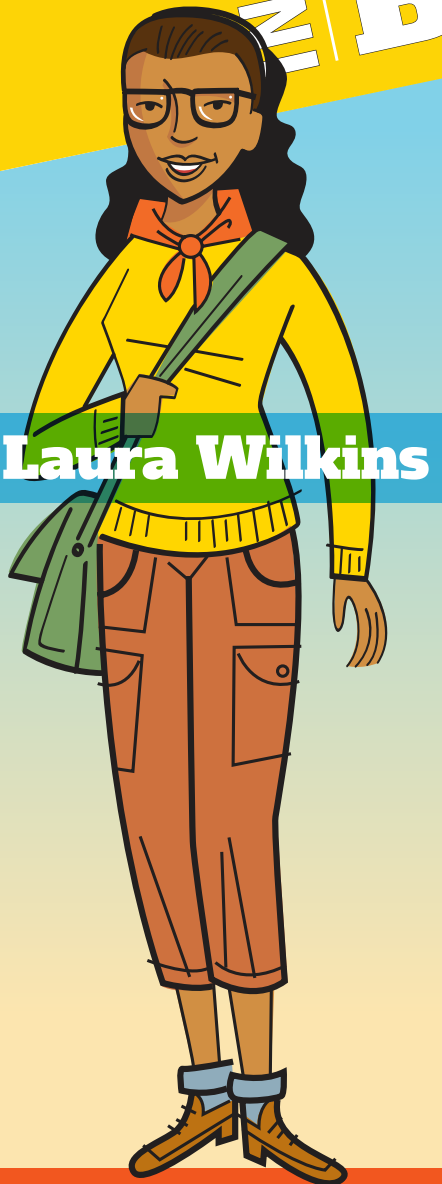




Help the Plant Heroes protect our forests
by slowing the spread of pests and diseases!

INSECT | REDBAY AMBROSIA BEETLE

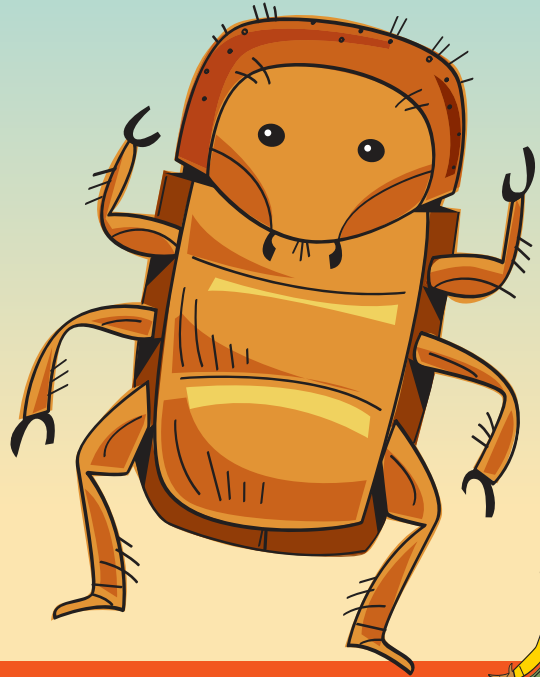
PLANTHEROES.ORG
ADVANCED
ACTIVITY
BOOK



Laura Wilkins



BE A PLANT HERO!
Help Laura slow the
spread of the redbay
ambrosia beetle!



Meet the PLANT HEROES!



LAURA WILKINS

From: Athens, Georgia
Hobbies: playing the trumpet,
gardening, studying ecology

FRANKIE BARKER

From: Shrewsbury, Massachusetts
Hobbies: climbing trees, camping

NATE GREEN

From: Tacoma,
Washington
Hobbies: going on
adventures, learning
about fungi

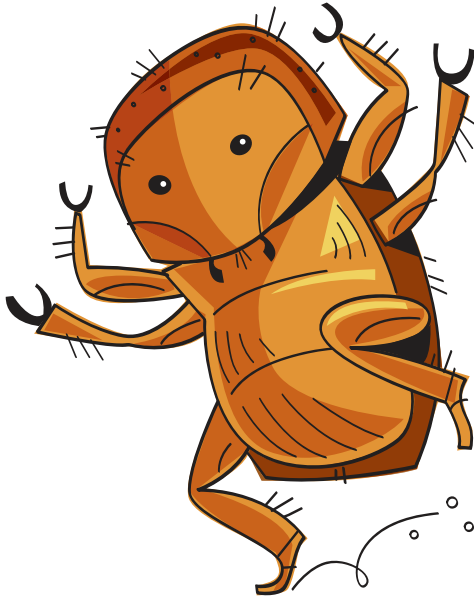
APONI STAR

From:
Southeast
Illinois
Hobbies:
learning
more about
entomology
(the study of
insects)



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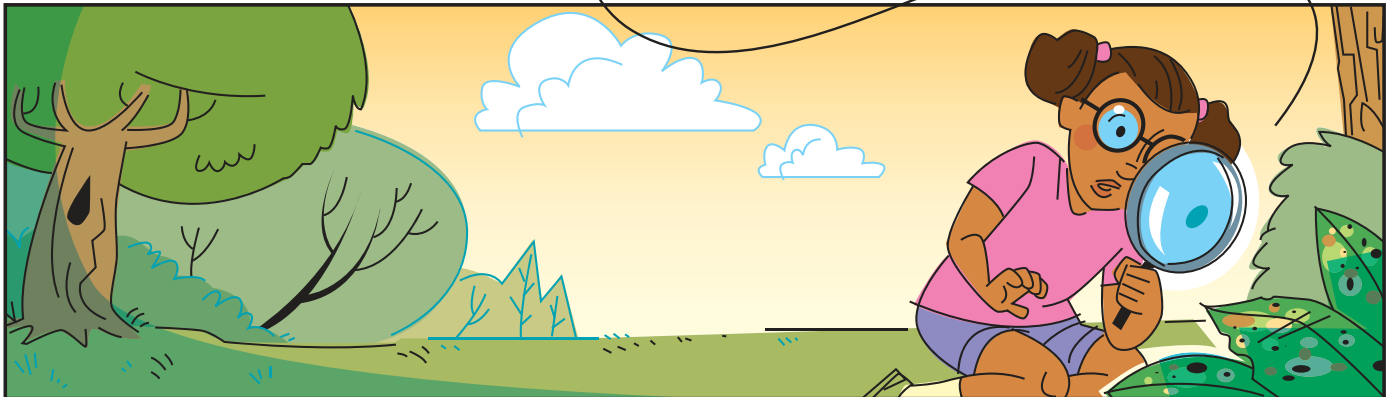
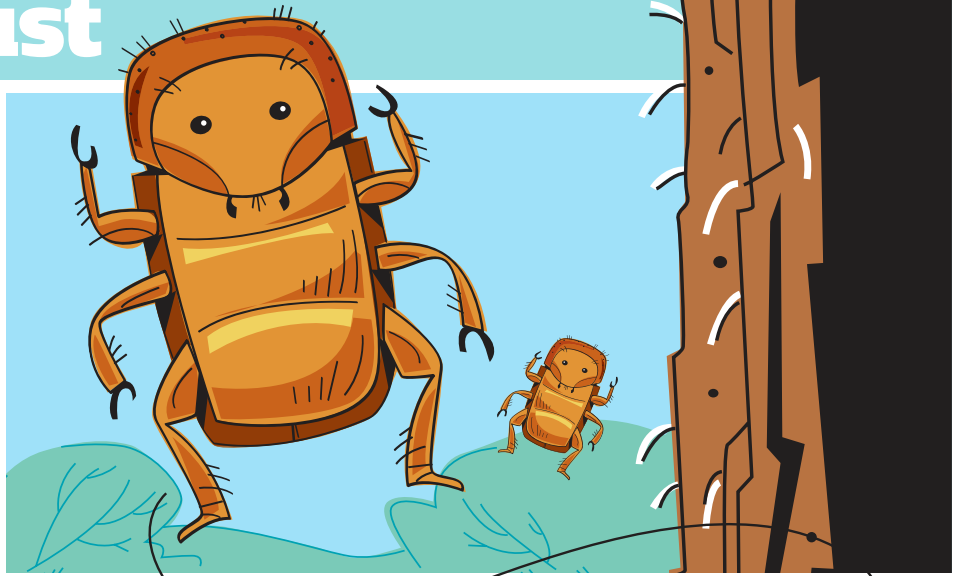
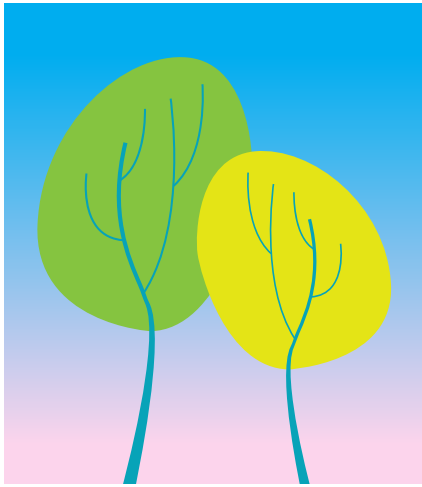


The Plant Heroes are four friends who love spending their free time in nature climbing trees, fishing, and camping. They've teamed up together because they've heard that the forests they love are in trouble. Insects and fungi who live overseas are often introduced to the United States accidentally. Unfortunately, these insects and fungi sometimes become invasive (spreading rapidly and causing harm to other insects and plants) because they are not in their native habitat. The plant heroes are working to stop the spread of these invasive pests.

Follow Laura to learn the story of how she slowed the spread of the redbay ambrosia beetle...



The Redbay Ambrosia Beetle Bust



Laura grew up on the Georgia coast, so she was very familiar with the symptoms of laurel wilt decline and mortality in redbay, *Persea borbonia*. When she finished high school, she decided to study this problem at the University of Georgia.



While on a camping trip with some college friends in nearby Oconee National Forest, she observed some sawdust-like threads coming out of the bark of a redbay and knew that it could be symptoms of the disease.



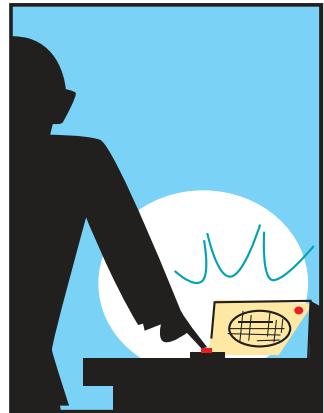
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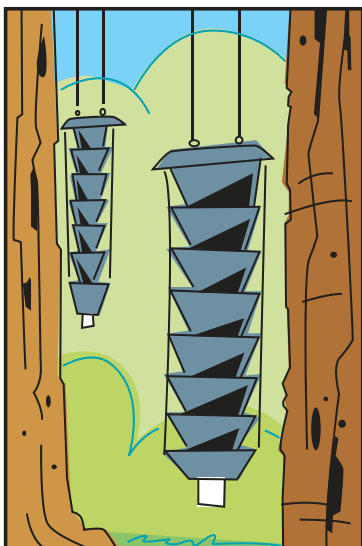


Concerned and ever curious...

Laura asked her teacher back at school about what she saw. Her teacher said that it might be the first documented case of laurel wilt in that part of the state. She put Laura in touch with their state's pest survey coordinator...



...who alerted the Plant Heroes team about the problem. They helped Laura put up redbay ambrosia beetle traps and lead a survey throughout the park.



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A Small Beetle and a Fast-Growing Fungus



Redbay ambrosia beetle is a tiny beetle, hardly visible without a microscope. It was accidentally brought to the US in 2002 from its home in Asia. It is not the beetle but the fungus it carries that really can hurt trees. The beetle vectors (or carries) the fungus inside special pouches in its mouth, so when it chews tunnels into another tree, the tree will also be infected with the fungus.



**REDBAY
AMBROSIA
BEETLE**

WHAT IS A FUNGUS?

A fungus is a living organism, or being, that is neither a plant nor an animal. Fungi are the great recyclers of the environment, taking their nutrition from organic matter (like a tree). Some common fungi that you might recognize include mushrooms and molds.

HANDY TIP:
Fungi means more than 1 fungus; fungus means just one fungus.

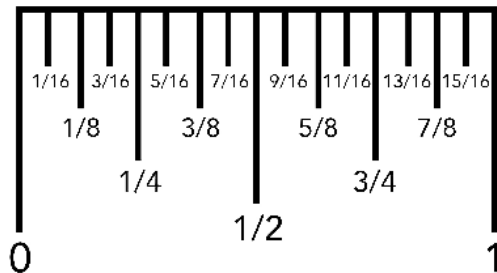


**FUNGUS
RAFFAELEA
LAURICOLA**

This *Raffaelea lauricola* fungus was purposely grown in this petri dish in a lab for scientists to study it more closely.

The redbay ambrosia beetle is super small! It measures between a 1/16th to an 1/8th of an inch long.

See if you can draw the size of a beetle next to the ruler. →



**LAUREL
WILT**

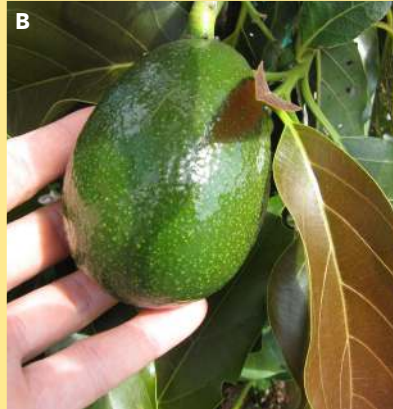


Fertile Ground for Farming

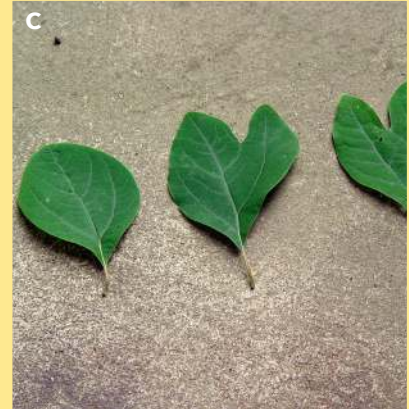
Scientists refer to redbay ambrosia beetles as farmers because they “farm” the fungi they carry with them. The adult beetles “plant” spores of the fungi inside the tunnels they chew from trees, and when their eggs hatch into larvae, the larvae eat the fungus that has grown throughout the tunnels. Redbay ambrosia beetles won’t farm fungi anywhere—they prefer specific trees to raise their young. Learn about a couple of the most common trees they prefer below by matching the descriptions to the images below.



**Redbay /
Persea borbonia**



**Avocado /
Persea americana**



**Sassafras /
Sassafras albidum**

1

- This tree has leaves in many different shapes; some look like mittens, and some look like mittens with two thumbs on either side!
- Its leaves smell spicy when crushed.
- This tree is medium sized and its leafy part is shaped kind of like a pyramid!

2

- Its long, glossy leaves grow up to 8” long and stay on the tree during the winter.
- This tree’s pear-shaped fruit has a dark green bumpy exterior and a pit inside.

3

- It can grow as a small tree or large shrub.
- This tree’s thick, leathery leaves have a spicy smell and stay on the tree during the winter.
- Its fruit is small and blue-black.

For more images of host plants, see pages 3 & 4 in your field guide!



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PHOTO CREDITS: A: Karen A Rawlins, Bugwood.org; B: Forest and Kim Starr, Flickr.com; C: Chris Evans, Bugwood.org

Trees in Trouble



Trees give us several different clues that they are suffering from laurel wilt. Learn more about the symptoms of laurel wilt by matching up the descriptions with the photos.

1



Once the fungus spreads throughout the tree, the inside of the tree will be streaked black from the fungal infection.

.....

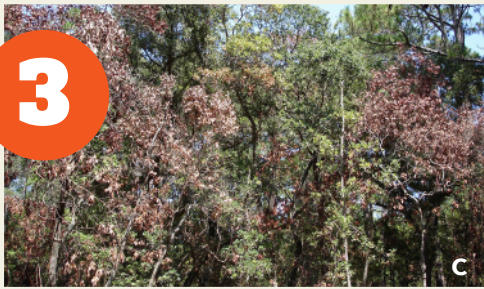
2



The spores carried by the mother beetle grow into hyphae inside the tunnels. The white hyphae coat the walls of the tunnels and serve as a food source for larvae.

.....

3



The fungal threads block the parts of the tree that take up water, so the tree cannot drink. The infected tree wilts and its leaves turn brown.

.....

4



Larvae excavate tunnels through the trunk, pushing out sawdust in the process. These sawdust tubes are visible on the bark of the tree.

The redbay ambrosia beetle has four different life stages; **egg, larva, pupa, and adult.**



Beetles and a Warming Climate



Scientists are discovering that the redbay ambrosia beetle, which currently is only in the southeast United States, could spread to almost every state in the US. The beetles can only survive at certain temperatures—when it becomes too cold, they die. Unfortunately, because our climate is warming, beetles can move further and further north which means more and more trees will suffer from laurel wilt.

Global warming is a big problem, and it causes many pests and diseases to harm even more trees. It is caused when greenhouse gasses (such as carbon dioxide) are trapped in our atmosphere and cause the earth to warm. There are things you can do to help!

Put an **X** near things that pollute our atmosphere and put a **✓** next to some things you can do that are great for the planet!

- **1. Recycling, to keep waste out of landfills**
- **2. Planting trees that turn carbon dioxide into oxygen**
- **3. Cars that use lots of gas, creating lots of pollution**
- **4. Factories that burn coal and create pollution**
- **5. Composting, to reuse your food scraps and create soil for your garden**
- **6. Buying things you don't need and throwing them away**
- **7. Forgetting to turn the lights off when you leave a room**
- **8. Riding a bike instead of driving a car**
- **9. Buying used clothing and goods**
- **10. Taking long showers and letting the water run while you brush your teeth**

Can you think of anything else that causes pollution in our atmosphere?
Is there anything else you can do to help decrease pollution?

.....

.....

.....



Be a Plant Hero!

Please help us in our quest to stop laurel wilt. To be a Plant Hero, please follow this guide below!

1 DO NOT MOVE FIREWOOD.
Beetles can be transported inside the firewood and spread to new places. It is always best to buy your firewood at your campsite!

2 MULCH AND NURSERY PLANTS CAN CONTAIN BEETLES TOO!
Find a local place to buy your plants and mulch for your own garden. Inspect the plants for any signs of laurel wilt before bringing them home!

3 IF YOU NOTICE SOMETHING SUSPICIOUS, TELL AN ADULT.
You might see trees that are showing symptoms of laurel wilt like dead leaves, sawdust tubes, or even beetles if you look closely enough.

See another way scientists are helping control the beetle on page 6 of your field guide!



Try This At Home: Fresh Guacamole!

Ask an adult to help you with chopping the ingredients for this recipe.
Serve it with some tortilla chips for a delicious snack!

- 2 avocados, skin and pit removed, mashed
- 1 tomato cut into small pieces
- 2 limes, juiced
- ¼ red onion, diced small
- 2 tablespoon chopped fresh cilantro
- ½ teaspoon cumin
- Several drops of hot sauce (optional)
- A bit of sea salt and fresh ground pepper

Stir all the ingredients together in a bowl. Enjoy!

Recipe amended from Fresh from Florida (<https://bit.ly/floridaguacamolerecipe>)



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Try This At Home: Grow your own avocado tree!

MATERIALS NEEDED:

Kitchen knife
An avocado
Toothpicks
A glass full of water
A sunny window
An adult's help
Planting pot
Potting soil



Scan this QR code on your phone, or type in this link to view a short video describing how to grow an avocado from seed! bit.ly/growyourownavocadotree

1. Ask for an adult to help you carefully cut the avocado in half and remove the pit. Clean the avocado fruit off the pit and rinse it in water.
2. One end of the pit should be a bit pointier. The shoot will come out of this end. The other end should be flatter—this is where the roots will come from. Place the root side down and stick three toothpicks into the pit—these will support your pit as it floats in a glass of water.
3. Place the pit root-side down in a glass of cold water. Make sure the bottom of your pit is always submerged in the water—it should never dry out! Place the glass on a sunny windowsill.
4. Wait for the root to grow. Make sure to change the water every few days. It can take up to two months for the avocado to grow roots. When the avocado is ready to put out roots, a crack will form in the pit, and the root will begin to grow.
5. Next, the shoot will start to grow. When the shoot is several inches tall, plant the avocado in a pot with potting soil. Enjoy your new avocado tree!



ANSWER KEY

Far From Home: Fertile Ground for Farming: 1. Sassafras; 2. Avocado; 3. Redbay

Trees in Trouble: 1. b; 2. d; 3. c; 4. a

Beetles and a Warming Climate:

Help the earth: 1, 2, 5, 8, 9

Harm the earth: 3, 4, 6, 7, 10



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

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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.



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

