

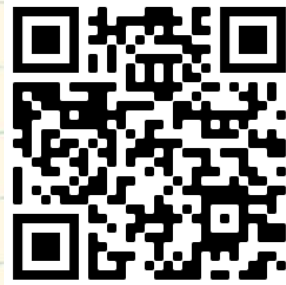
WE NEED YOUR HELP!



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
BEGINNER
ACTIVITY
BOOK

INSECT

SOUTHERN PINE BEETLE



Laura Wilkins



BE A PLANT HERO!
Help Laura stop the southern pine beetle from damaging pine forests.



Plant Protection Program

AMERICAN PUBLIC GARDENS ASSOCIATION

Meet the Plant Heroes!



The Plant Heroes are four friends who love spending time in nature more than anything else. They enjoy climbing trees, fishing, and camping.

Soon the heroes discovered that our beautiful forests are in danger! Some bugs and fungi are causing damage to our forests. The Plant Heroes have teamed up together to stop these pests.

Can you help the Plant Heroes stop these insect pests? Follow your tour guide, Laura, to hear how she saved our trees from the southern pine beetle...





It's All About Ecosystem Balance



SOUTHERN PINE BEETLE



Laura is studying to be an entomologist (a scientist who studies insects) at the University of Georgia. Today, she learns that pine forests in the southeastern United States are threatened by growing numbers of southern pine beetle.

The southern pine beetle is native to the area and serves a purpose: When the ecosystem is balanced, the beetles attack old, weak or dying trees and make room for young, stronger ones.



But when healthy trees become stressed because of drought, or because they were planted too close together and compete for water and other resources, the southern pine beetles suddenly have lots of weak trees to feed on and their numbers grow out of control.

With so many beetles around, even healthy trees are at risk of attack!

Laura's professor shares that, unfortunately, all the affected trees must be removed when the attack is confirmed. Foresters need to act quickly to prevent the beetle from spreading to new areas.



But what happens to the cleared area?

More resistant pine species should be planted, and they need extra care to keep them healthy, so they are not vulnerable to beetle attacks.



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

A natural area nearby was recently cleared and they are looking for volunteers to help replant longleaf and slash pine.

Laura invites her friends and they decide to have their annual spring break camping trip at Oconee National Forest!



The professor connects Laura with the Forest Service specialist at Oconee National Forest.



During spring break ...



Planting starts the next day, so they spend the afternoon setting up camp and exploring the area.



Laura shares what she learned in class: what the beetles look like and which trees they attack.

Laura and the rest of the heroes spend the next day replanting longleaf pines under the guidance of the Forest Service. Their efforts will help restore the balance and regenerate this forest!



The heroes learn that every insect has its place. Southern pine beetles are an important part of the ecosystem, but they turn into a problem when that delicate balance is lost.



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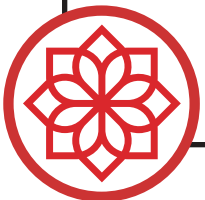
Coloring Page

The southern pine beetle is extremely small—about the size of a grain of rice! It burrows into the bark of pine trees and lays its eggs.

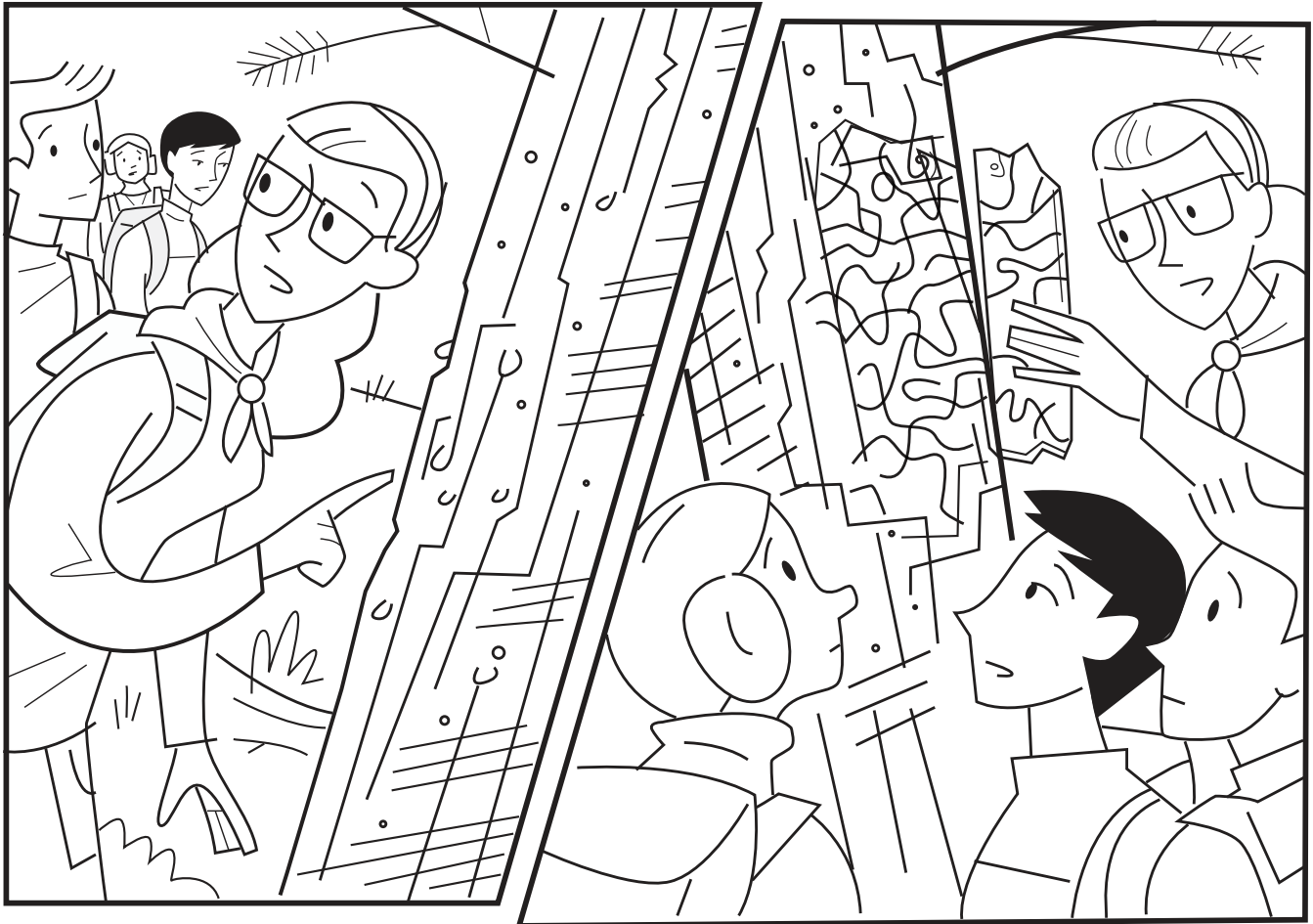


Is that popcorn?

You might not spot the southern pine beetle unless you look really, really closely. Instead you might see something that looks like popcorn. It is not popcorn; what you see is pitch (a sticky fluid) from the inside of the tree. The tree produces this pitch to push the beetles out of its trunk.



Tunneling Beetles



When she was on the lookout for southern pine beetles, Laura discovered tunnels created by the beetles in pine trees. These tunnels are called galleries. The beetles live inside the tunnels they have created. Can you think of any other animals that live in tunnels? List them below.

1. _____ 2. _____ 3. _____

Unfortunately, the southern pine beetle starves the tree by making its tunnels. Inside the tree are many tubes to transport food to other parts of the tree. When the beetles chew away at the inside of the tree, the tubes cannot carry food, and the tree cannot eat.



Lifecycle Maze

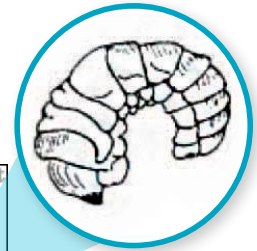
Humans change as they get older. Did you notice that you get a little taller every year? Beetles look different as they get older too. The beetle starts as an egg, then becomes a larva, then a pupa, and finally an adult beetle. Follow the lifecycle of this beetle through the maze to learn more.



1

1. EGG

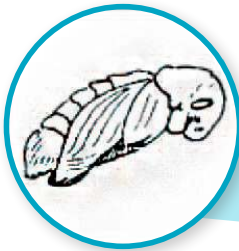
The beetle begins its life as an egg inside a pine tree.



2

2. LARVA

Larvae, which look like little white grubs, hatch from the eggs and dig tunnels through the tree as they eat.



3

3. PUPA

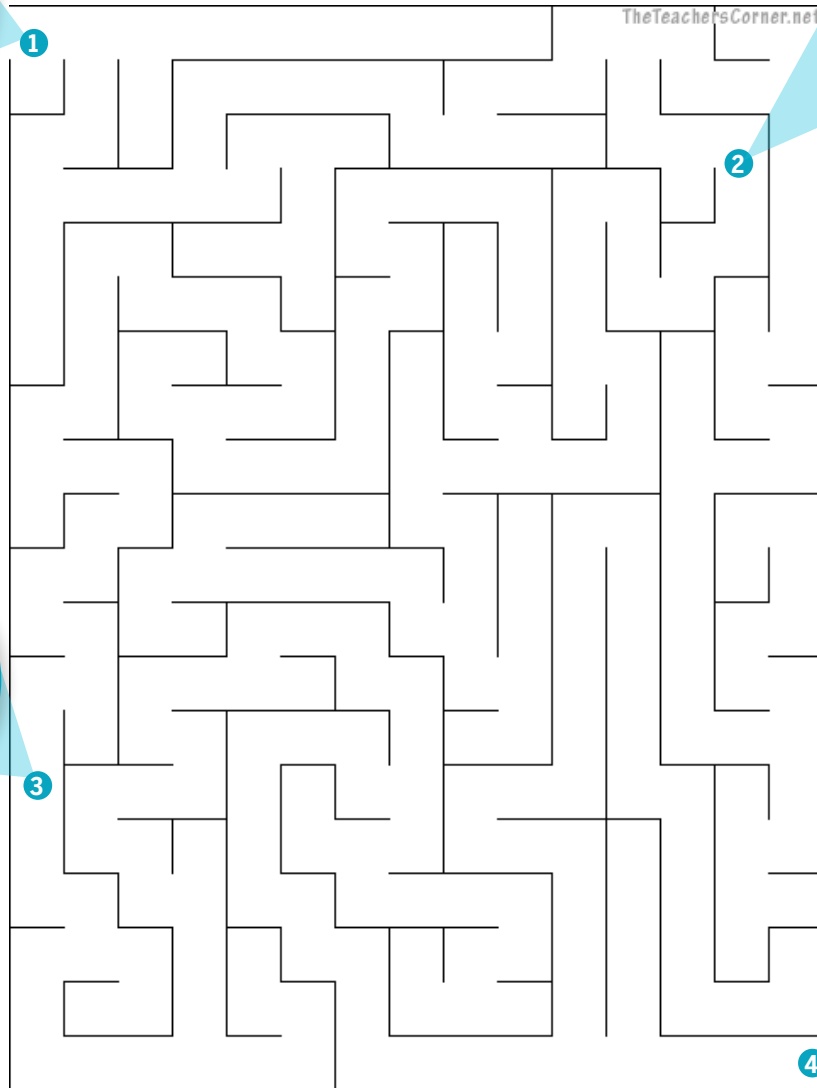
The larvae change into pupae.



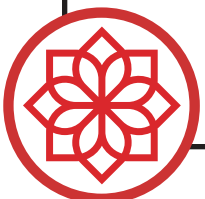
4

4. ADULT

The adult beetle chews its way out of the tree and flies away in search of a mate.



Egg, pupa, larva, adult illustration credit: Ben Powell, *Identifying the Southern Pine Beetle*, Clemson University Cooperative Extension.



A Beetle Feast!

Southern pine beetles only feed on pine trees. Pine trees have thin, shiny leaves called needles and spiky pine cones that carry the tree's seeds. Below are some tasty treats for the southern pine beetle. Can you match the names of these pine trees with the drawings?

Shortleaf Pine

Loblolly Pine

Virginia Pine



I am named after my small needles and I have spiky cones and needles in bundles of two. What is my name?

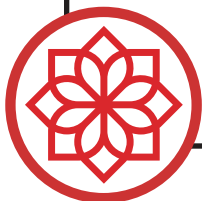


I am named after a state and I have needles in bundles of two. What is my name?



I have a silly sounding name, long needles, and cones with sharp spines! What is my name?

Now search for some pine trees near you. Remember to look for their long, shiny needles that are held in bundles together, and the cones that hold the seeds. If you can't see any cones on the trees, look for fallen cones on the ground underneath the trees.



Tree drawings by François André Michaux from The North American Sylva, flickr.com, CC BY 2.0

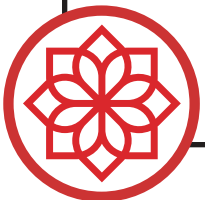
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Time to Draw

Did you find any pine trees? What do the needles look like? Did you find any pine cones? Draw a picture of a pine tree below!



Lots of Beetles

Can you think of some things you need to survive? List some below.

The same things that you need—water, food, oxygen, shelter—the southern pine beetle needs to live too! Southern pine beetles like to stay cozy and warm through the winter; cold temperatures can kill them. The beetles are also killed by predators (other insects and birds). The beetles love pine trees, especially when the trees are unhealthy, because they are easier to attack. Circle the correct arrow in the worksheet below to show if the number of beetles will go up or down in each situation.



Warm weather



No pine trees



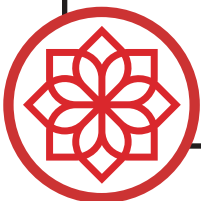
Lots of predators



Unhealthy trees



Sun and tree graphics credit: Kidaha.com; bluejay credit: classroomclipart.com; beetle illustration credit: Ben Powell, *Identifying the Southern Pine Beetle*, Clemson University Cooperative Extension.



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.



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