

Front Line of Defense:

Detecting & Reporting Novel Invasive Plant Pests

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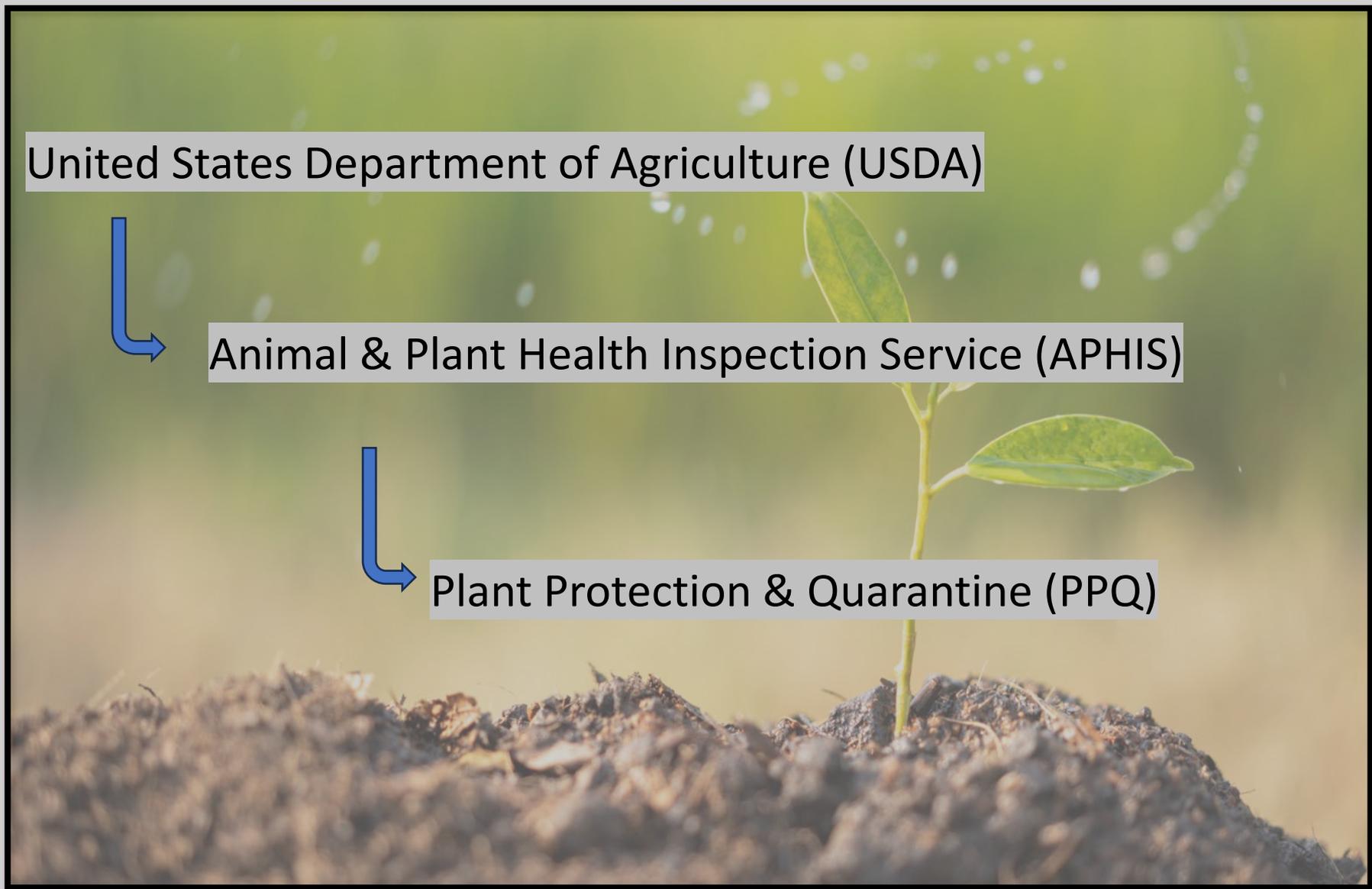
United States Department of Agriculture (USDA)

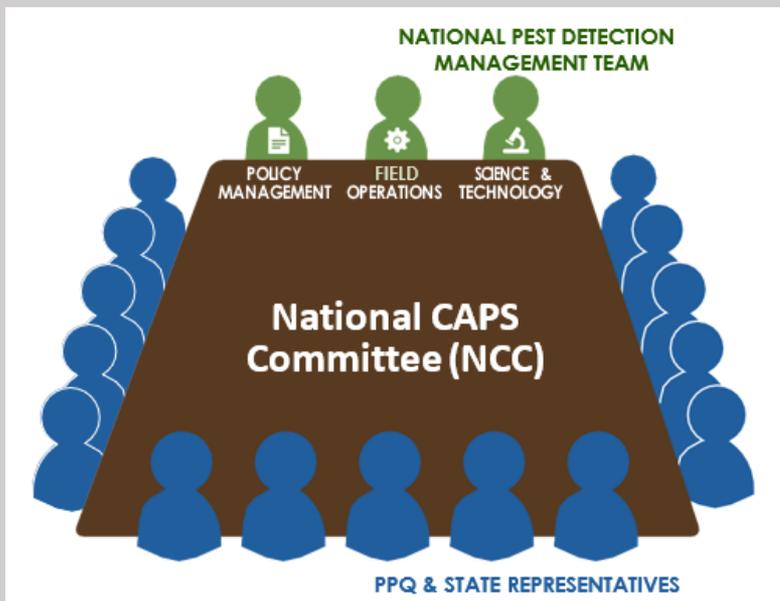


Animal & Plant Health Inspection Service (APHIS)



Plant Protection & Quarantine (PPQ)





Collaborative Agricultural Pest Survey (CAPS)

Objective: novel invasive plant pest early detection rapid response

- Collaborative survey & outreach
- Prioritization based on risk of establishment

Risk Factors

- Introduction pathways
- Habitat suitability



National Priority Pest List



A. glabripennis adult on *Acer saccharinum* (silver maple)
(Image courtesy of Melody Keena, USDA Forest Service,
Bugwood.org).

Stakeholder recommends target

- OPEP Risk Assessment
- S&D Methods Assessment
- Stakeholder review (APHIS & NPB)
- NPP List is updated
- Approved Methods for survey are published on the CAPS website

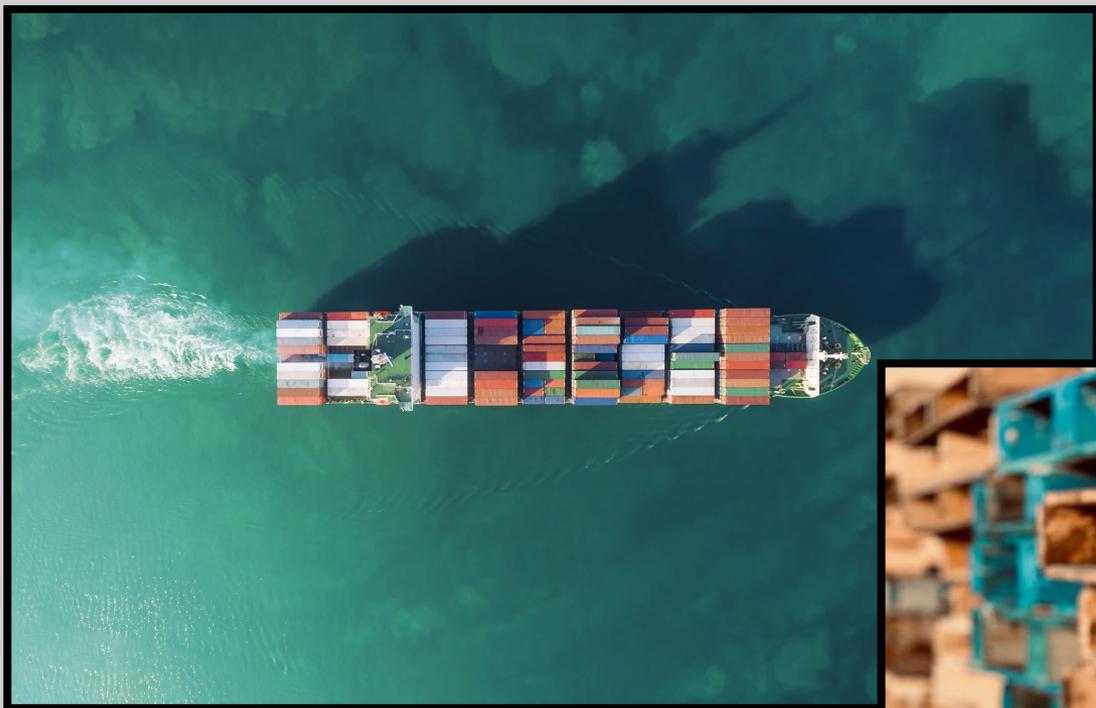


National Priority Pests: Oregon Survey

Pest Type	Oregon Survey Target(s)
Exotic Wood Boring & Bark Beetles (EWBB)	<ul style="list-style-type: none">- Asian & citrus longhorned beetle- Six toothed & European spruce bark beetle
Defoliating Moths	<ul style="list-style-type: none">- Flighted spongy moth complex- Box tree moth
Commodity Pest	<ul style="list-style-type: none">- Spotted lanternfly
Forest Pathogens	<ul style="list-style-type: none">- Phytophthoras



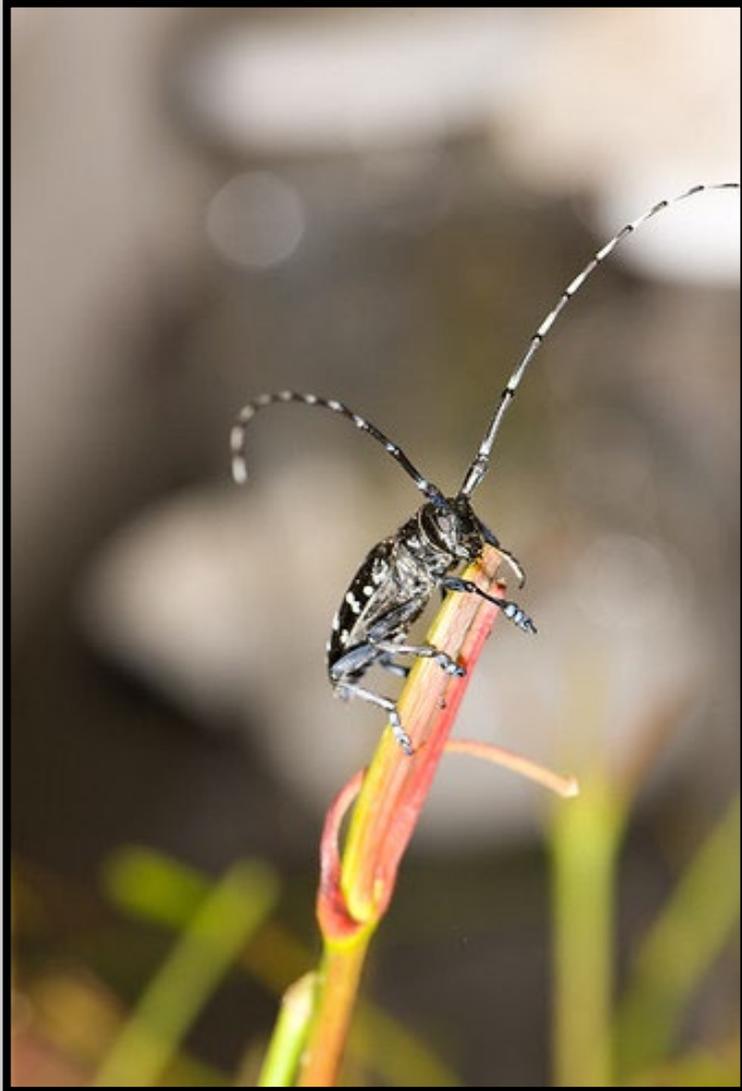
Solid Wood Packing Material Pathway: Exotic Wood Boring & Bark Beetles



Suspected pathway for current problematic pests (EAB)

Hundreds of infestation shipments intercepted





Asian longhorned beetle

Anoplophora glabripennis

Native range: NE Asia

Host: Maple, Poplar, and other hardwoods

Dispersal: solid wood packing materials, international trade, capable of flight

Impact: Hazard trees, loss of Maple trees

US Quarantines: MA, NY, OH & SC

Asian longhorned beetle

Anoplophora glabripennis

Cerambycidae (long horned beetles)

Adult Identification:

- Shiny black elytra
- Approximately 1 in. (M) to 1.5 in. (F) length
- Irregular white spots
- Antennae longer than body, 11 segments with bluish white bases



Asian longhorned beetle

Anoplophora glabripennis



Photo Credit: Pennsylvania Department of Conservation and Natural Resources - Forestry , Bugwood.org

Photo Credit: Melody Keena, USDA Forest Service, Bugwood.org



Photo Credit: Thomas B. Denholm, New Jersey Department of Agriculture, Bugwood.org



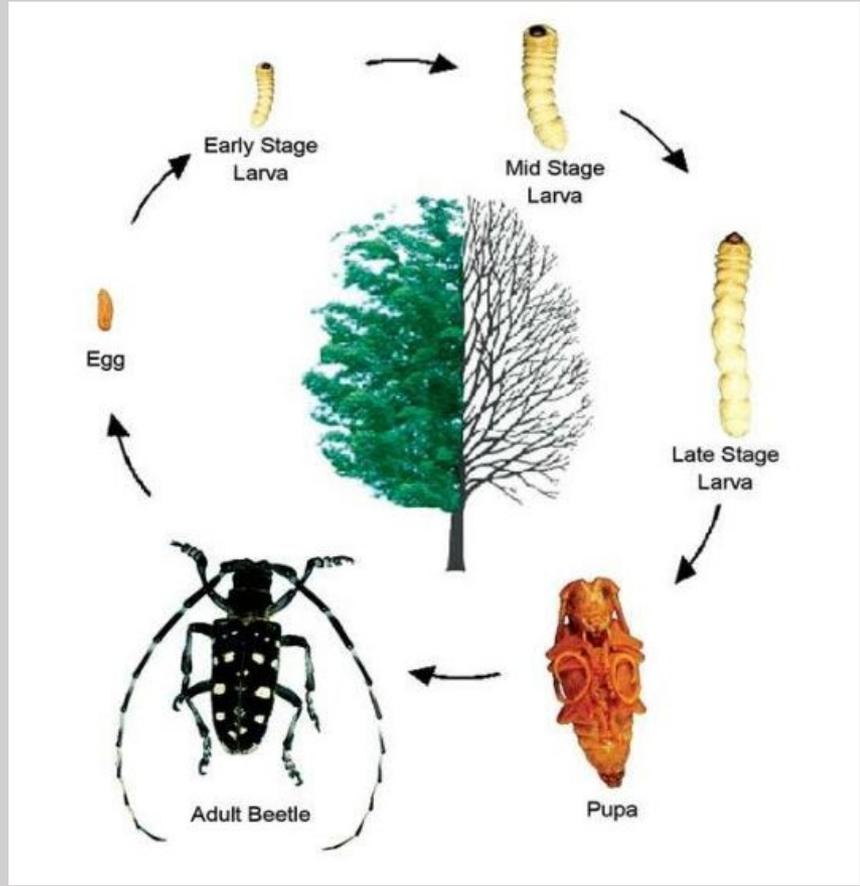
Asian longhorned beetle

Anoplophora glabripennis

Life Cycle

Fall
Larvae feed on the phloem tissues under the bark

Summer
Adult activity period



Winter/Spring
ALB may overwinter as eggs, larvae or pupae

Credit: Melody Keena, USDA Forest Service, Bugwood.org



Asian longhorned beetle

Anoplophora glabripennis

Preferred Host: Maple

Secondary Hosts: Birch
Willow
Elm
Poplar
Sycamore

Time of Year: Year round
Summer (adults)

What to Look For



Photo Credit: Dennis Haugen, USDA Forest Service, Bugwood.org

Asian longhorned beetle

Anoplophora glabripennis

What to Look For Broken Branches

Tunneling

ALB feeding weakens host branches that may break



Asian longhorned beetle *Anoplophora glabripennis*



Photo Credit: Robert A. Haack, USDA Forest Service, Bugwood.org



Photo Credit: Dennis Haugen, USDA Forest Service, Bugwood.org

What to Look For Oviposition Pits

Female adults chew small pits and lay single eggs in each



Photo Credit: Gillian Allard, FAO of United Nations, Bugwood.org

Asian longhorned beetle *Anoplophora glabripennis*

What to Look For Exit Holes



Round Exit Holes

Exit holes are roughly dime sized



Photo Credit: Joe Boggs, Ohio State University, Bugwood.org

“Pencil Test”

Can a #2 pencil be inserted into the hole? (This suggests tunneling under the bark)

Asian longhorned beetle *Anoplophora glabripennis*



Photo Credit: Kenneth R. Law, USDA APHIS PPQ, Bugwood.org

What to Look For Frass



Photo Credit: Robert A. Haack, USDA Forest Service, Bugwood.org

Sawdust like debris may accumulate on or around infested host trees.

Asian longhorned beetle

Anoplophora glabripennis

Adults are the most likely life stage to observe outside of the host tree.

They are the most active

- During warmer months (June-Sept.)
- Mid morning – early afternoon

What to Look For

Adult beetles





Citrus longhorned beetle

Anoplophora chinensis

Native range: NE Asia

Host: Citrus, Maple, Alder, Birch, Hazelnut, Oak, Pear, & Laurel

Dispersal: Wood products & packing materials, capable of flight

Impacts: hazard trees, Maple decline, major pest for citrus.

Not known to be present in the US.



Six-toothed Bark Beetle

Ips sexdentatus

Native range: Eurasia

Primary Host: Pine

Secondary Hosts: Fir,
spuce

Dispersal: wood
products or packing
materials, long range
flight

Impact: timber, habitat
degradation



Photo Credit: Yiyi Dong and Jiri Hulcr, University of Florida EDIS 808



Six-toothed Bark Beetle

Ips sexdentatus

Life Cycle

Egg > Larva > Pupa > Adult

- 2-3 generations per year
- Up to 100 eggs per female
- Adults swarm to neighboring trees

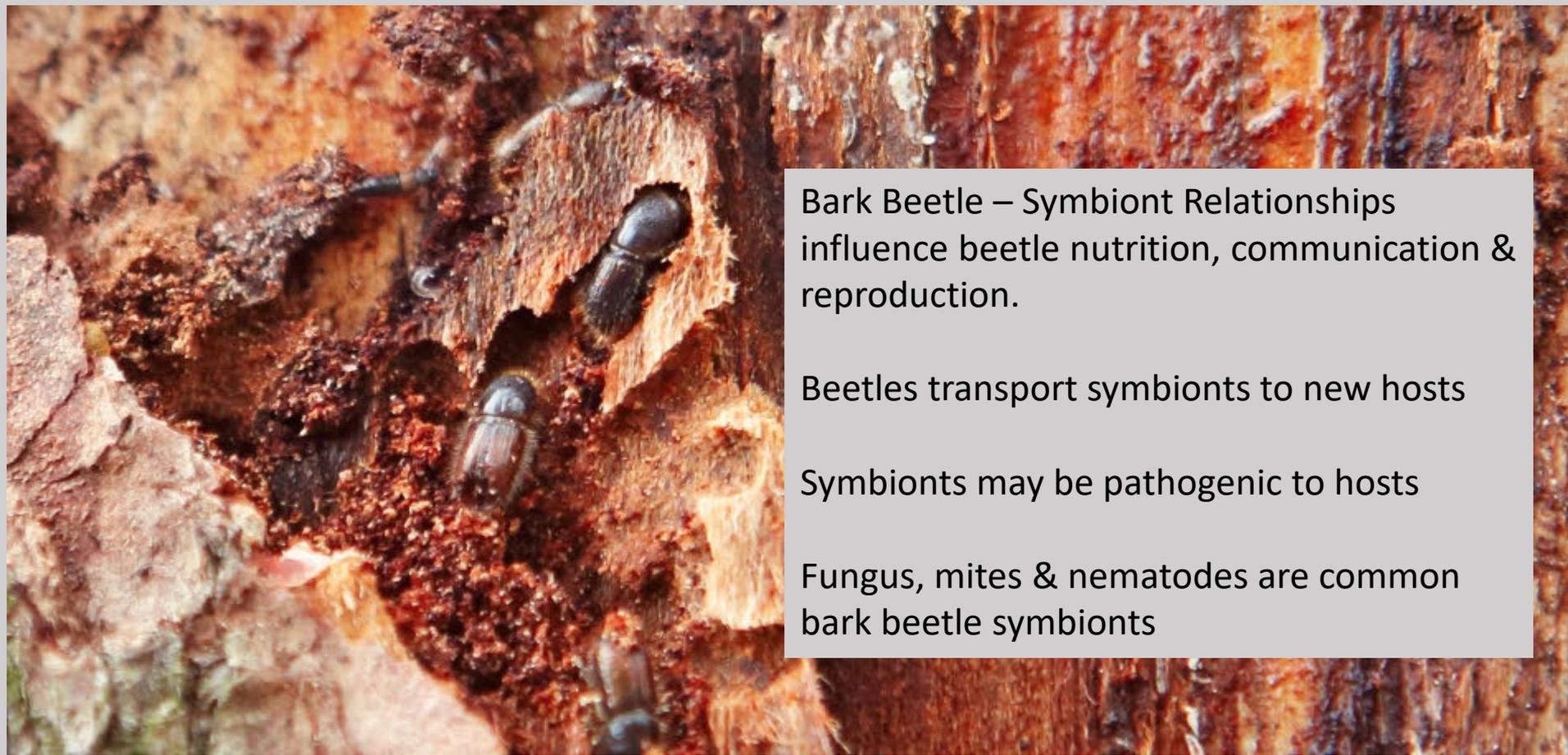
Outbreaks follow major disturbance events



Six-toothed Bark Beetle

Ips sexdentatus

Bark Beetles as Vectors



Bark Beetle – Symbiont Relationships influence beetle nutrition, communication & reproduction.

Beetles transport symbionts to new hosts

Symbionts may be pathogenic to hosts

Fungus, mites & nematodes are common bark beetle symbionts



Six-toothed Bark Beetle

Ips sexdentatus



I. sexdentatus is associated with a blue staining fungal pathogen.



Six-toothed Bark Beetle

Ips sexdentatus

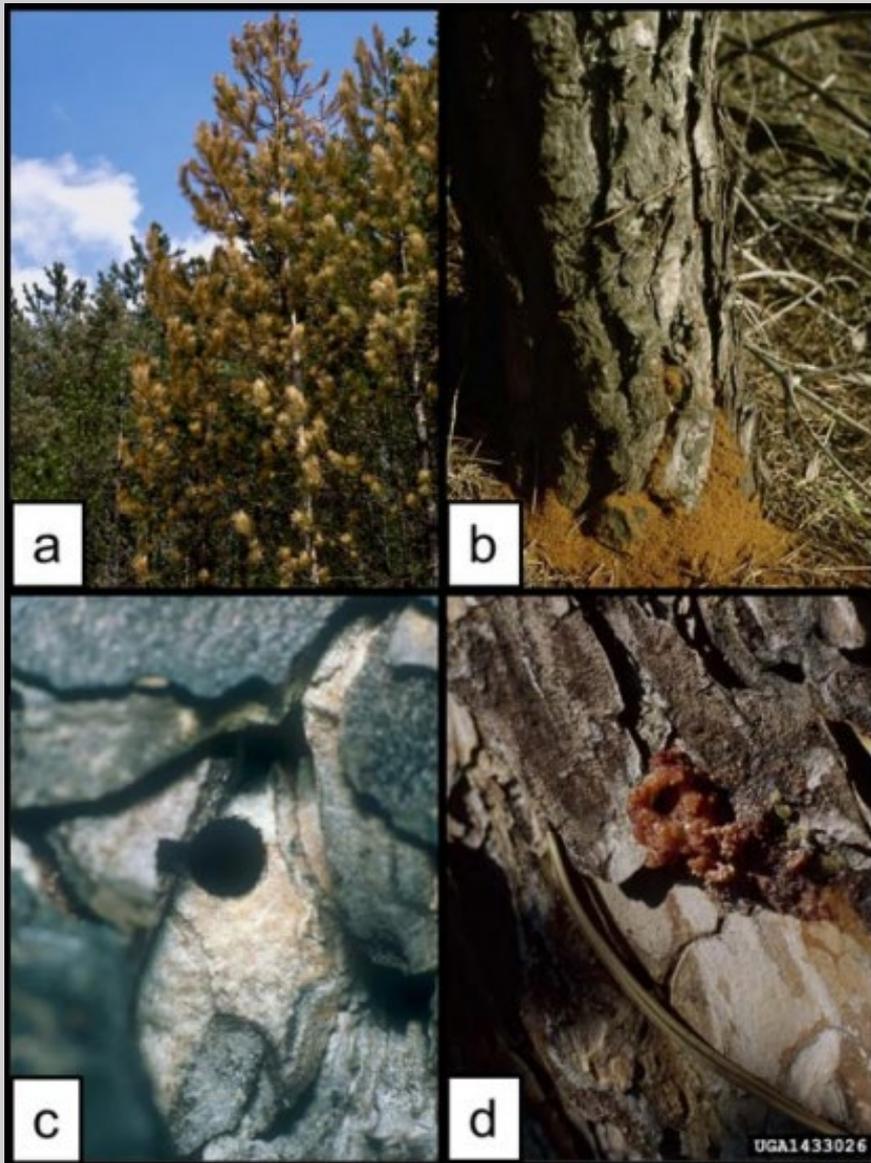
Impacts

Outbreaks lead to patchy distribution of host damage.

- Loss of timber value
- Decreased biodiversity
- Increased fire risks

Vector for Pathogenic Fungus





Six-toothed Bark Beetle

Ips sexdentatus

What to Look For

- A: Yellowing branches
- B: Saw dust like debris
- C: Exit holes
- D: Resin exudate



Six-toothed Bark Beetle

Ips sexdentatus

What to Look For

A: Galleries on trunk

B: Galleries on bark

C: Blue stained wood





Spongy Moth & Flighted Spongy Moth Complex



Male & Female Adult SM: Photo credit John Ghent, John Ghent, Bugwood.org



SM larva: photo credit Ferenc Lakatos, University of Sopron, Bugwood.org



SM delta trap
Photo credit:
Chris Evans,
University of
Illinois,
Bugwood.org



SM egg mass:
photo credit
Ferenc Lakatos,
University of
Sopron,
Bugwood.org



Cydalima perspectalis, Box Tree Moth (BTM)

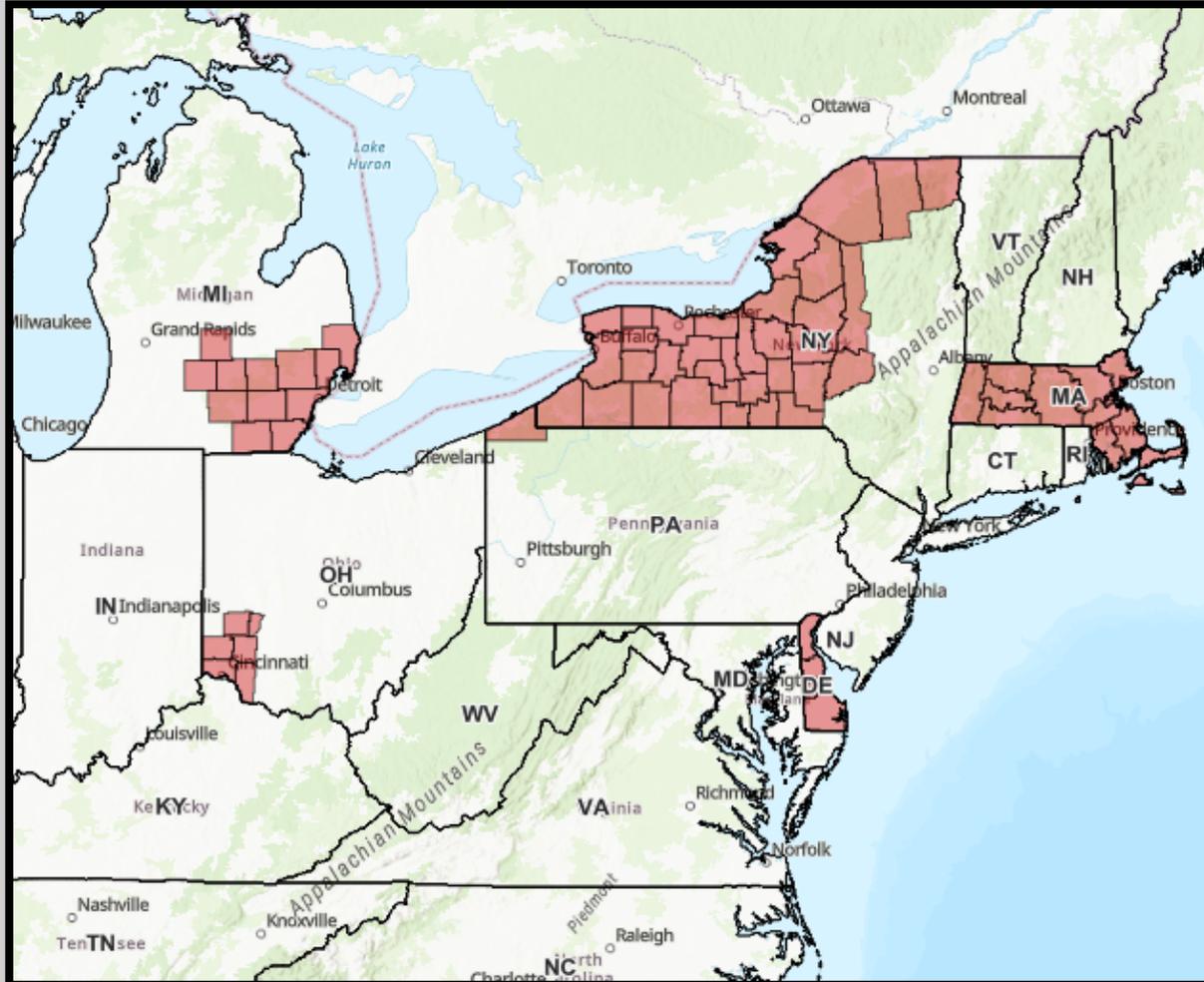


Adult BTM; light morph

Photo credit: Szabolcs Sáfaián, University of West Hungary, Bugwood.org



BTM Overview



Current quarantines in 5 states

Introductions suspected from a known infestation in Canada (2021)

Primarily a pest for boxwood

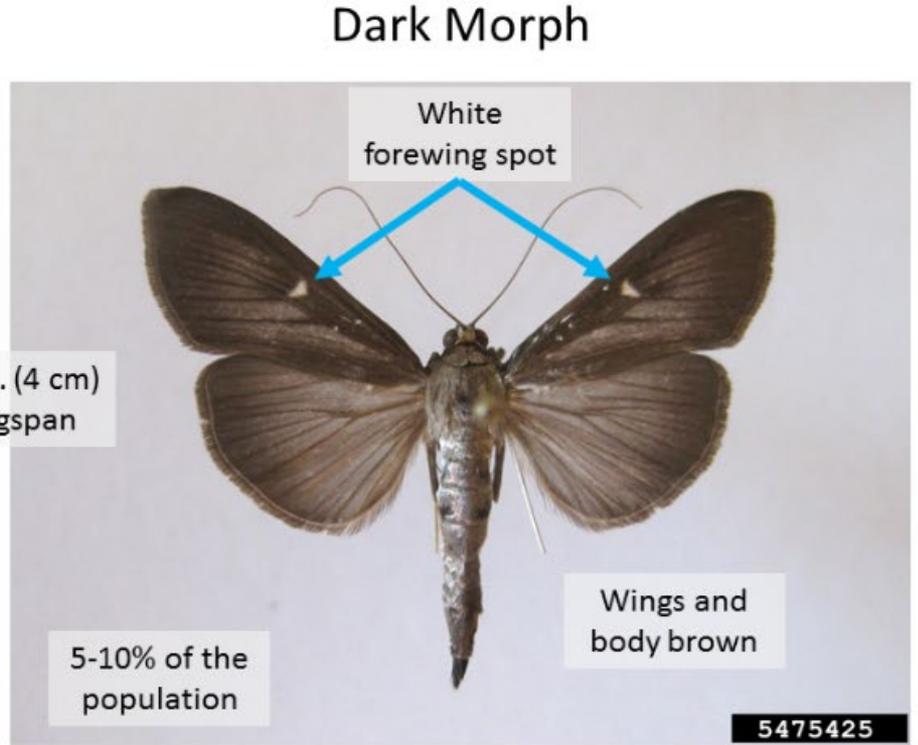
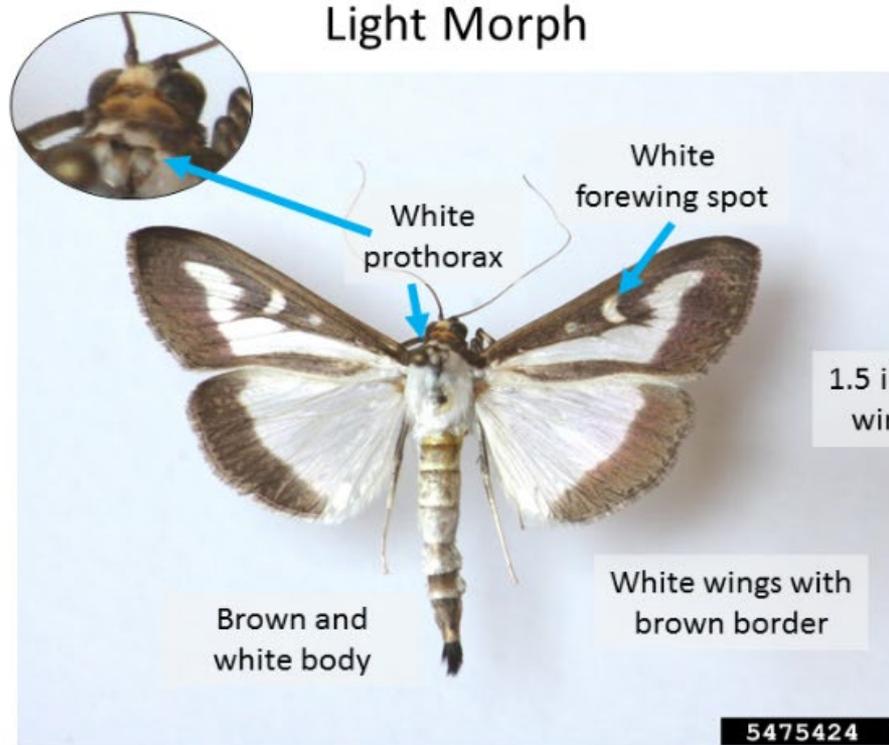
Oregon is the #1 producer of Boxwood in nation



BTM Identification; Larvae



BTM Identification; Adults



1.5 in wingspan



What are Boxwoods?



- They have small leaves
- Glossy, dark green on top
 - Pronounced mid rib on underside



Boxwood leaflets

Photo credit: Isabel Branstrom, MSU Extension

Boxwood shrubs: unpruned on left; pruned on right

Photo credit: Isabel Branstrom, MSU Extension (left), and Karan A. Rawlins, University of Georgia, Bugwood.org (right)

Popular evergreen shrubs
More than 150 cultivars in the US

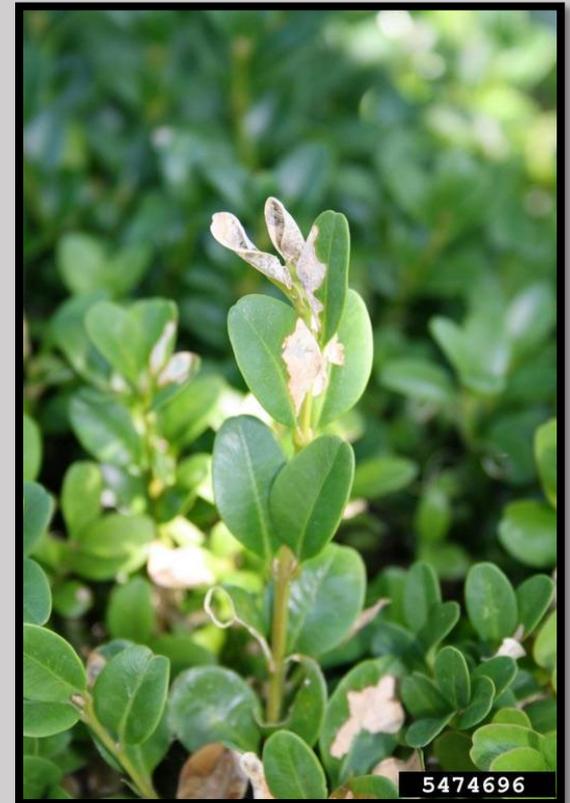


BTM: What to Look For



Boxwoods damaged by BTM feeding

photo credit Ferenc Lakatos, University of Sopron, Bugwood.org



Caterpillar Feeding Damage on Hosts



BTM: What to Look For

Caterpillar
Feeding on
Hosts



**BTM in larval
stage**

photo credit
Ferenc Lakatos,
University of
Sopron,
Bugwood.org

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Phytophthora Disease of Alders

Phytophthora alni

Known Distribution (2022): Europe

- Has been found infrequently in Oregon

Host: Alder

Potential Hosts: Chestnut, walnut & cherry

Dispersal: zoospore contaminated water & soil

Impact: Up to 30% host mortality (Spain)



UGA21100

UGA2110001



Phytophthora Disease of Alders

Phytophthora alni

What to Look For

In mid to late summer

- Crown dieback
- Small, sparse & yellowing leaves
- Premature leaf drop
- “tarry spots” on lower stem



Photo Credit: Thomas Jung, Bugwood.org



Phytophthora Disease of Alders

Phytophthora alni

Symptoms of Phytophthora Infection

- Root & collar necrosis
- Lower stem bark lesions

Bark may appear wet or soft (left)

Inner bark may develop tongue-shaped orange-brown necrosis



What to Look For





Phytophthora Disease of Alders

Phytophthora alni



Phytophthoras in General

Genus of pathogens categorized as water molds

- USFS documented 29 species in Oregon (2012)
- *P. ramorum* quarantine in Curry County
- *P. lateralis* impacting Port-Orford Cedar in SW Oregon
- *P. infestans* credited with causing the Irish potato famine of the 1840s (Kline, 2022)



Phytophthora Disease of Alders

Phytophthora alni

Phytophthoras in General

Steps to Prevent the Spread of Phytophthoras

Identify risk factors & symptoms

Clean & disinfect work boots, tools, etc.

Report symptomatic hosts





Lycorma delicatula, Spotted Lanternfly (SLF)





Spotted Lanternfly: Overview

Populations in 18 states

Impacts to grapes & hops

Public nuisance

Spread by railroad transport





Fresh SLF Egg Masses



Old SLF Egg Masses

SLF: Egg Masses

May be observed on Tree of Heaven

SLF are indiscriminate ovipositors

Can be observed year round

Don't move

Can be hard to spot



Multiple SLF Life Stages; adult, late instar

SLF: Nymphs

Broad host range

4 stages

- Early instar: black (below)
- 4th instar: red (left)



5535777

First instar SLF



SLF: Adults

Preferred Host: Tree of Heaven

Secondary Hosts: walnut, grape, maple, apple, poplar, willow, stone fruit

Swarming behavior

Will hop if startled

Take a photo before approaching!

Adult SLF



SLF: Public Nuisance



Adult SLF, high density population

Photo credit: Lawrence Barringer, Pennsylvania Department of Agriculture, Bugwood.org



SLF feeding damage

Photo credit: Rebekah D. Wallace, University of Georgia, Bugwood.org



SLF egg masses on deck

Photo credit: Emelie Swackhamer, Penn State University, Bugwood.org

SLF Detection Methods: Trapping

Funnel Traps

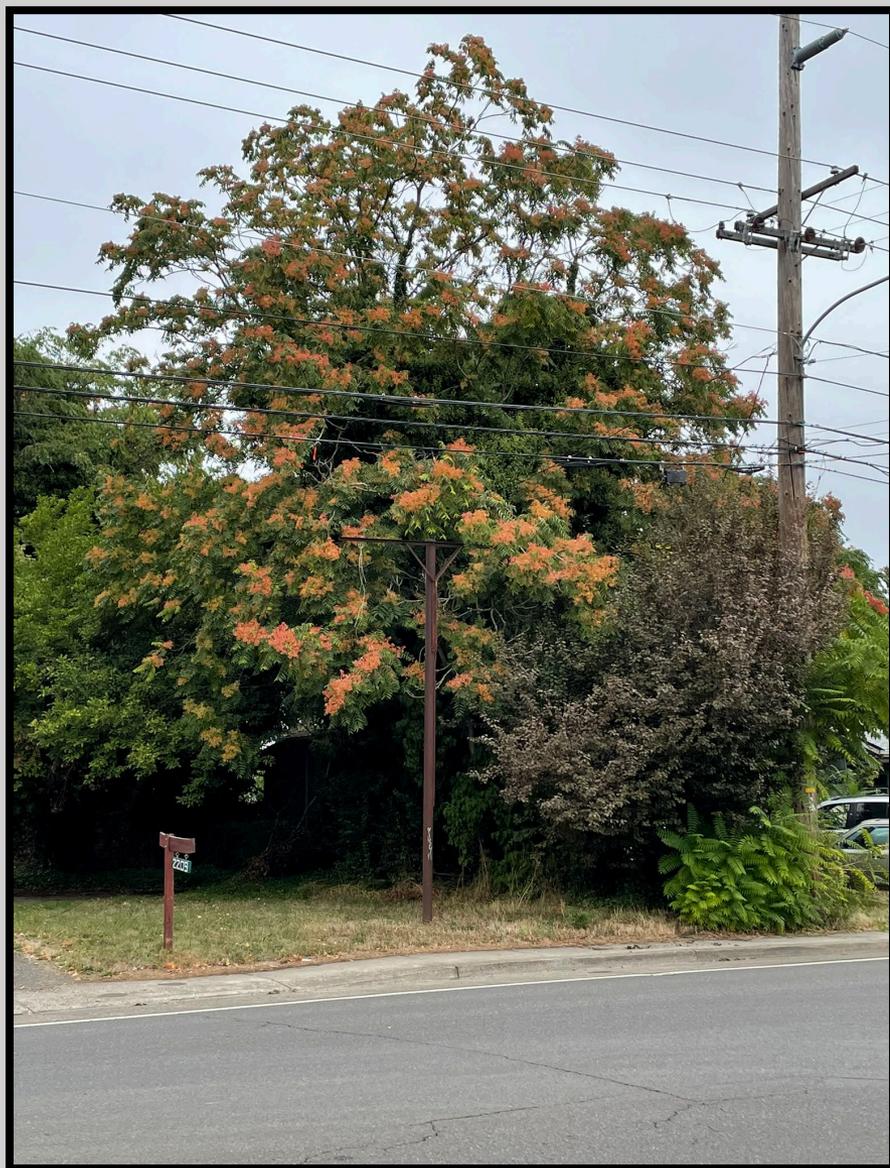
- Mesh screen opens downwards
- Capture bag

Passive data collection

Marginally effective

Not currently supported by APHIS





SLF: What to Look For

Visual Survey Method

Preferred host: Tree of Heaven

Timing: late summer – early fall

Reproductive stage for adults

Approved Method



Tree of Heaven Identification



Compound
pinnate leaf pattern



Single
wing samaras



Smooth bark becomes
cantaloupe-like
as trees mature

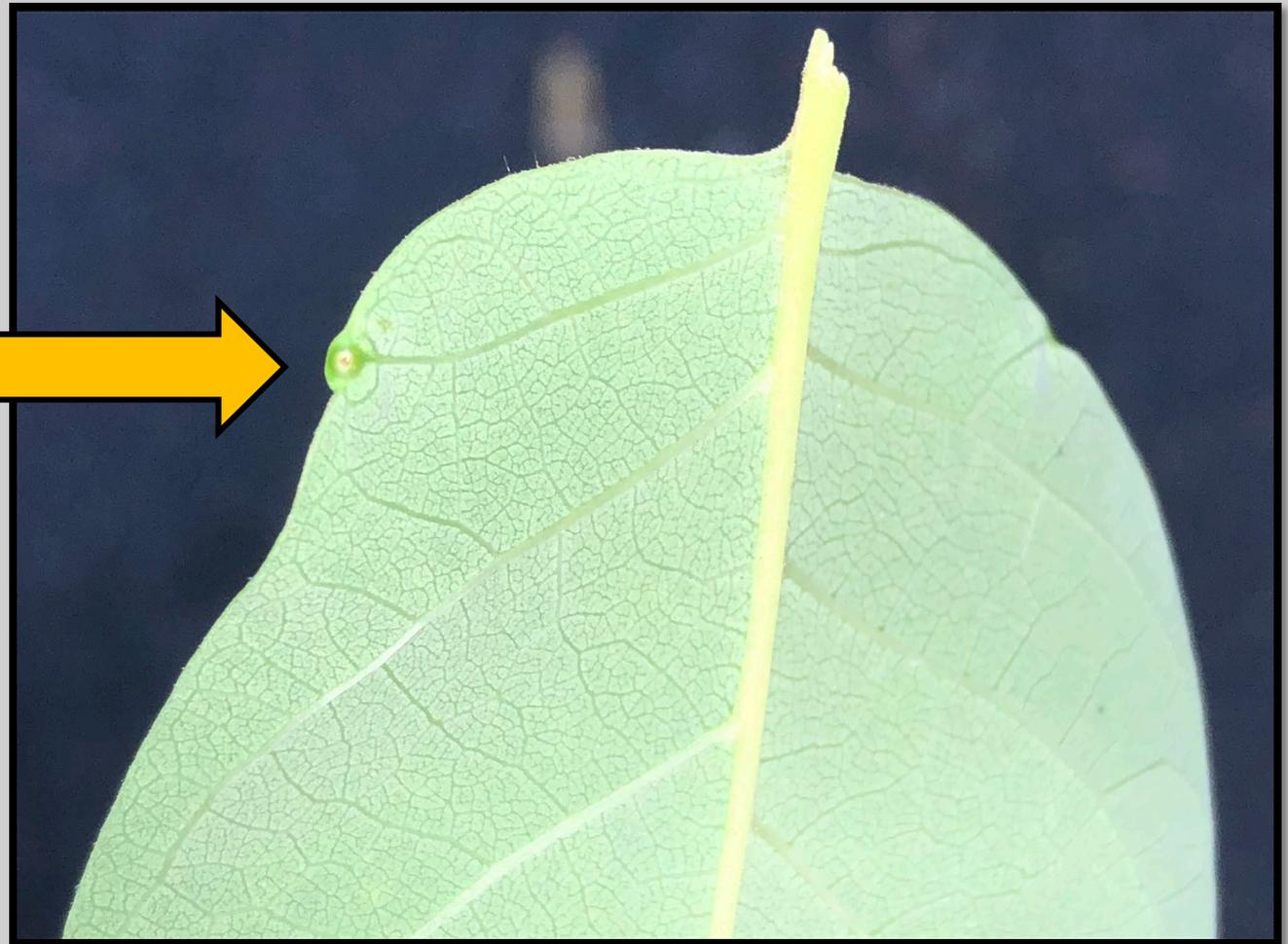


Tree of Heaven Identification

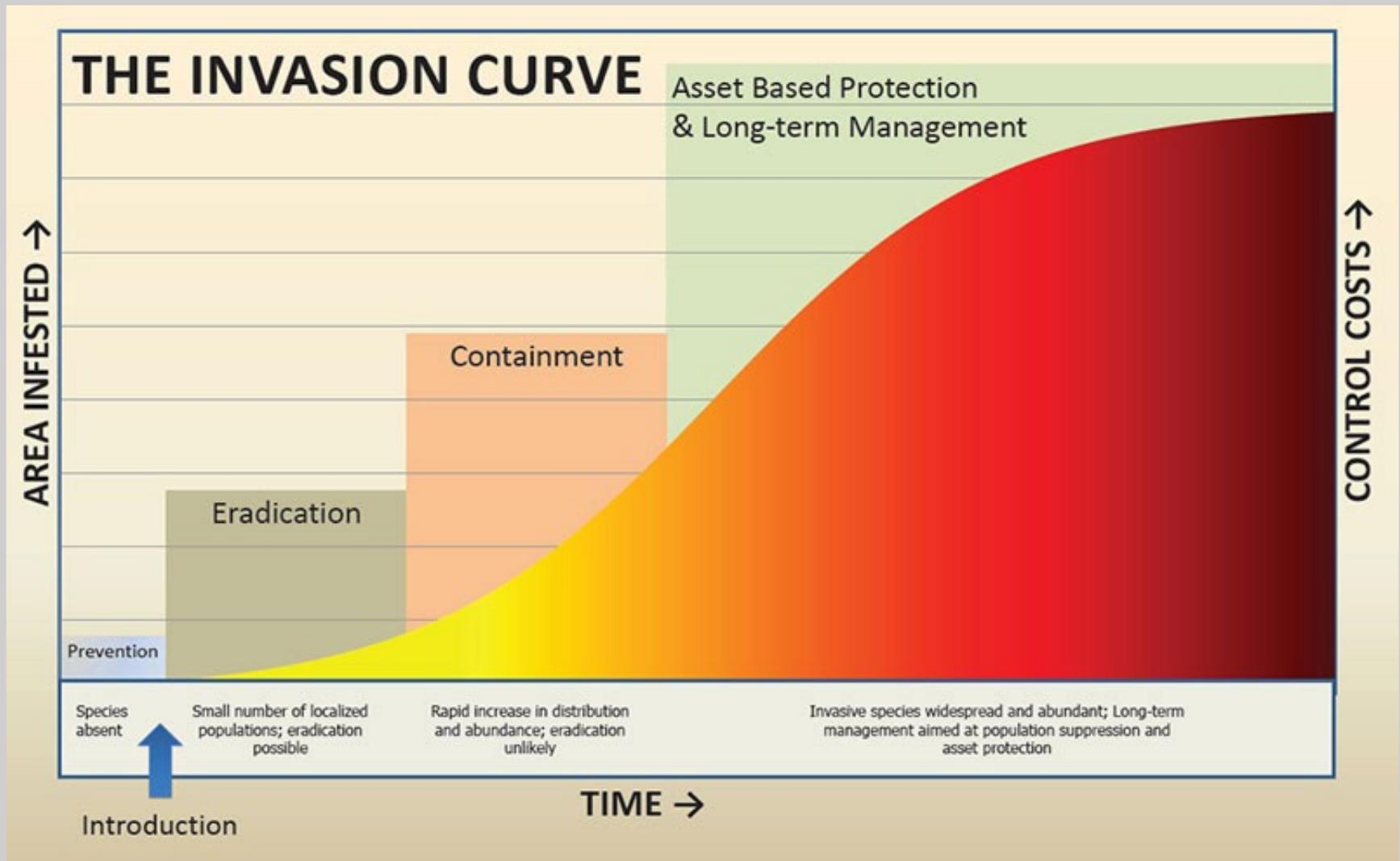
Each leaf will have a
tooth near the base

Contains gland

Responsible for
“peanut butter” like
odor



Importance of Early Detection Rapid Response



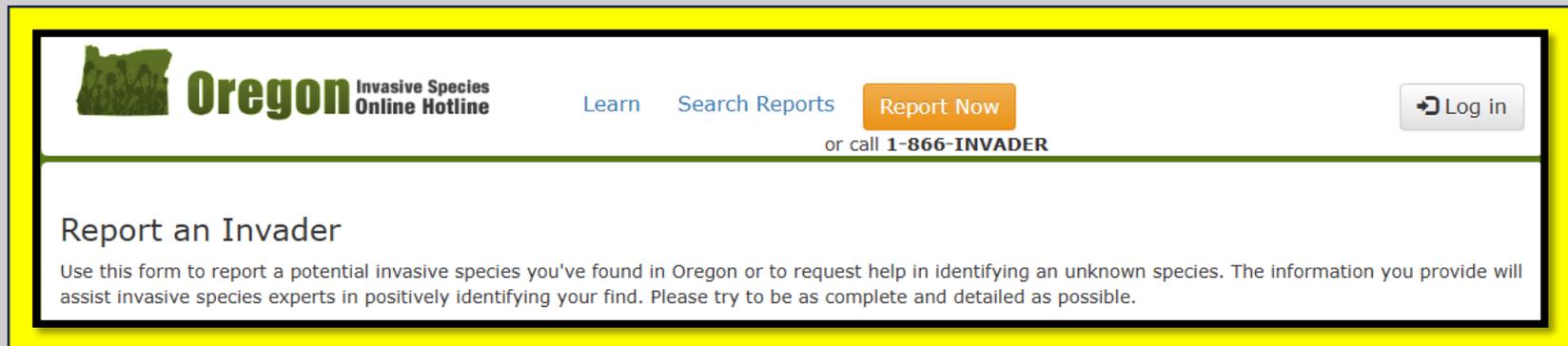


Reporting Suspected Insect Pests

Step 1: Gather evidence

- Collect the pest if you can
- Take photos of the pest, host, or other indications of the pest

Step 2: Submit a Report to the Online Invader Hotline



 **Oregon** Invasive Species
Online Hotline

[Learn](#) [Search Reports](#) [Report Now](#) [Log in](#)

or call **1-866-INVADER**

Report an Invader

Use this form to report a potential invasive species you've found in Oregon or to request help in identifying an unknown species. The information you provide will assist invasive species experts in positively identifying your find. Please try to be as complete and detailed as possible.

Step 3: There isn't one! You may be contacted for more info later



Additional Resources:

OSU Plant Clinic; fee-based plant disease diagnostic services (<https://bpp.oregonstate.edu/plant-clinic>)

Online Oregon Forest Pest Detector Training; learn more about invasive forest insects (<https://extension.oregonstate.edu/ofpd>)

Our website to learn more about PPQ programs (<https://www.aphis.usda.gov/plant-pests-diseases>)



BUY FIREWOOD WHERE YOU BURN IT

Moving firewood can transport tree killing insects and diseases, like the *Emerald Ash Borer*.

**Leave firewood at home.
Buy local firewood
at your destination.**

**Buy only what you will
need and use it up by
the end of your stay.**

**Use your firewood onsite.
Please do not take
it home with you.**

Thank you!

Questions?

Contact me at

mariah.davis@usda.gov

HELP PROTECT OREGON FROM THE EMERALD ASH BORER



OregonEAB.com



**DONTMOVE
FIREWOOD.org**



OR EAB Infested Areas