



---

# WHAT'S AILING MY TREE?

A Few ideas to consider  
for

---

DIAGNOSIS AND [HOPEFULLY]  
REMEDY

---

# But First.....

## *#1: Are you sure there is a problem?*



*What is my tree supposed to look like?*

*Find out.*

*Start with the basics?*

*“What is this plant??”*

---

# Black haw, *Viburnum prunifolium*



MISSOURI BOTANICAL GARDEN

Visit Things To Do Learn & Discover Gardens & Gardening Sustainability Plant Conservation Plant Science

Gardens & Gardening > Your Garden > Plant Finder

## Gardening Help

Plant Finder

Lawn, Landscape & Garden Design

Edible Gardening

Advice, Tips & Resources

Plants of Merit

Sustainable Gardening

Gardening Education & Classes

Visit the Center for Home Gardening

Gardening Help Site Map

Gardening Help Search

Search

Become a Master Gardener

Determine Your Growing Zone

Plant Finder

## *Viburnum prunifolium*

Li  
in

[Back to Previous Page](#)



★★★★★, [See Comments](#)

[More Images](#)

[Plant of Merit](#)

[Tried and Trouble-free](#)

[Recommended by 3 Professionals](#)

[Species Native to Missouri](#)

Common Name: blackhaw viburnum

Type: Deciduous shrub

Family: Adoxaceae

Native Range: Eastern and central North America

Zone: 3 to 9

Height: 12.00 to 15.00 feet

Spread: 6.00 to 12.00 feet

Bloom Time: May to June

Bloom Description: White

Sun: Full sun to part shade

Water: Dry to medium

Maintenance: Low

Suggested Use: Hedge

Flower: Showy

Leaf: Good Fall

Attracts: Birds, Butterflies

Fruit: Showy, Edible

Tolerate: Drought, Clay Soil, Black Walnut, Air Pollution

[Garden locations](#)

### Culture

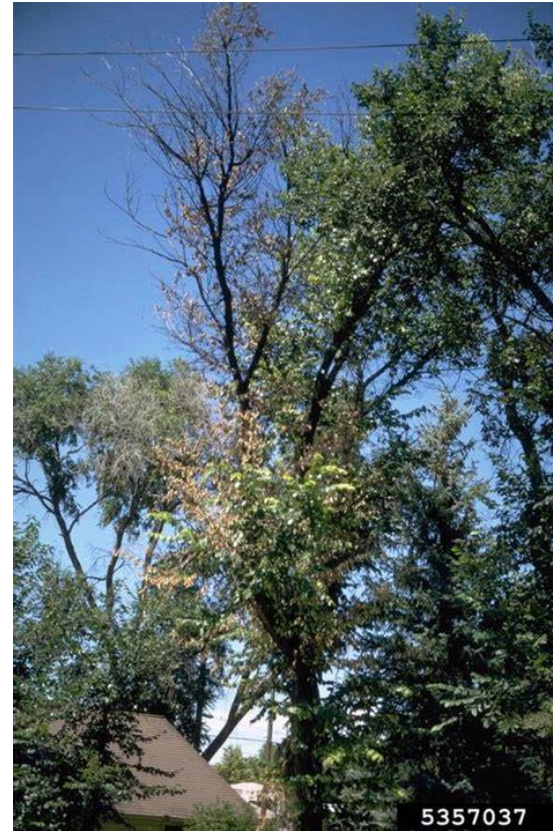
Easily grown in average, dry to medium, well-drained soil in full sun to part shade. Tolerates drought. Prune immediately after flowering since flower buds form in summer for the following year.



# Example:

**Not normal for summer**

**Normal for summer**





# Bald cypress

*Taxodium distichum*




---

# Diagnosing Plant Disorders

**Pay close attention to detail when collecting information**

## Five Steps to Diagnosis

1. Accurately identify the host plant
  2. Determine what is normal for the plant
  3. Learn common problems for the plant
  -  4. Distinguish between biotic and abiotic causal factors
  5. Examine the plant for symptoms and signs
-



# Causes of tree damage and death:

- **Abiotic causes**

  - weather

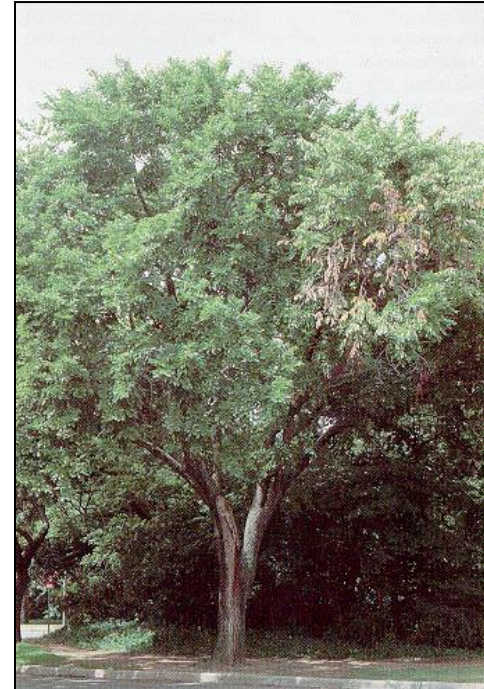
  - injury

  - cultural practices

- **Biotic causes**

  - insects

  - disease



# Abiotic Causes of Plant Disorders (non-living factors)

- | extremes in temperature or moisture
- | nutrient imbalance
- | improper soil pH
- | chemical injury
- | site or cultural factors





# Distinguish biotic from abiotic



ABIOTIC

**WINTER DESICCATION  
POOR PLACEMENT NEAR HOT STEAM**

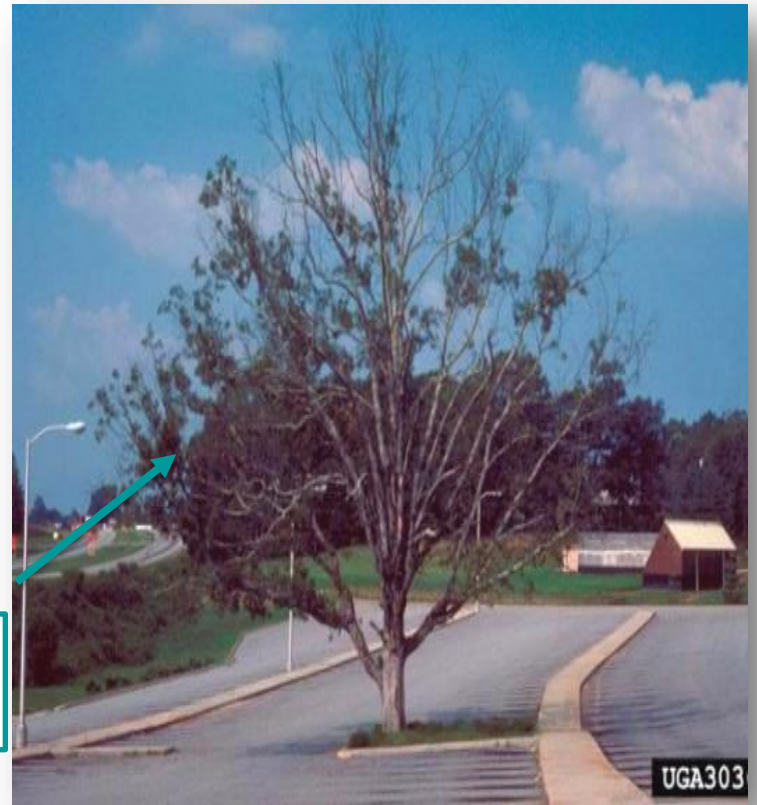
**DIFFERENCE IN SOIL  
TOP SLOPE VS BOTTOM**

# LOOK AT PATTERNS

## random vs uniform



Random,  
Probably  
biological



Uniform,  
Likely abiotic

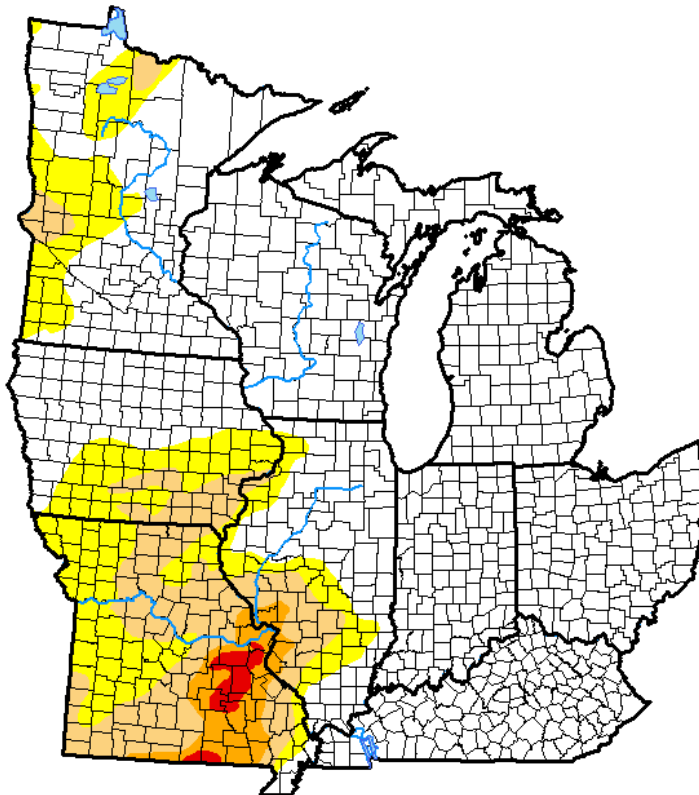


# Abiotic -- damage, weather



# DROUGHT

## U.S. Drought Monitor Midwest



**February 20, 2018**

(Released Thursday, Feb. 22, 2018)

Valid 7 a.m. EST

*Drought Conditions (Percent Area)*

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
<b>Current</b>	72.44	27.56	13.00	3.24	0.72	0.00
<b>Last Week</b> 02-13-2018	66.88	33.12	14.42	4.05	0.78	0.00
<b>3 Months Ago</b> 11-21-2017	82.08	17.92	6.98	2.40	0.00	0.00
<b>Start of Calendar Year</b> 01-02-2018	69.93	30.07	9.46	3.44	0.18	0.00
<b>Start of Water Year</b> 09-26-2017	58.41	41.59	8.86	0.77	0.25	0.00
<b>One Year Ago</b> 02-21-2017	78.42	21.58	7.25	0.00	0.00	0.00

### Intensity:

<span style="background-color: yellow; border: 1px solid black; display: inline-block; width: 15px; height: 10px;"></span> D0 Abnormally Dry	<span style="background-color: red; border: 1px solid black; display: inline-block; width: 15px; height: 10px;"></span> D3 Extreme Drought
<span style="background-color: orange; border: 1px solid black; display: inline-block; width: 15px; height: 10px;"></span> D1 Moderate Drought	<span style="background-color: darkred; border: 1px solid black; display: inline-block; width: 15px; height: 10px;"></span> D4 Exceptional Drought
<span style="background-color: #f4a460; border: 1px solid black; display: inline-block; width: 15px; height: 10px;"></span> D2 Severe Drought	

*The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.*

### Author:

Deborah Bathke  
National Drought Mitigation Center



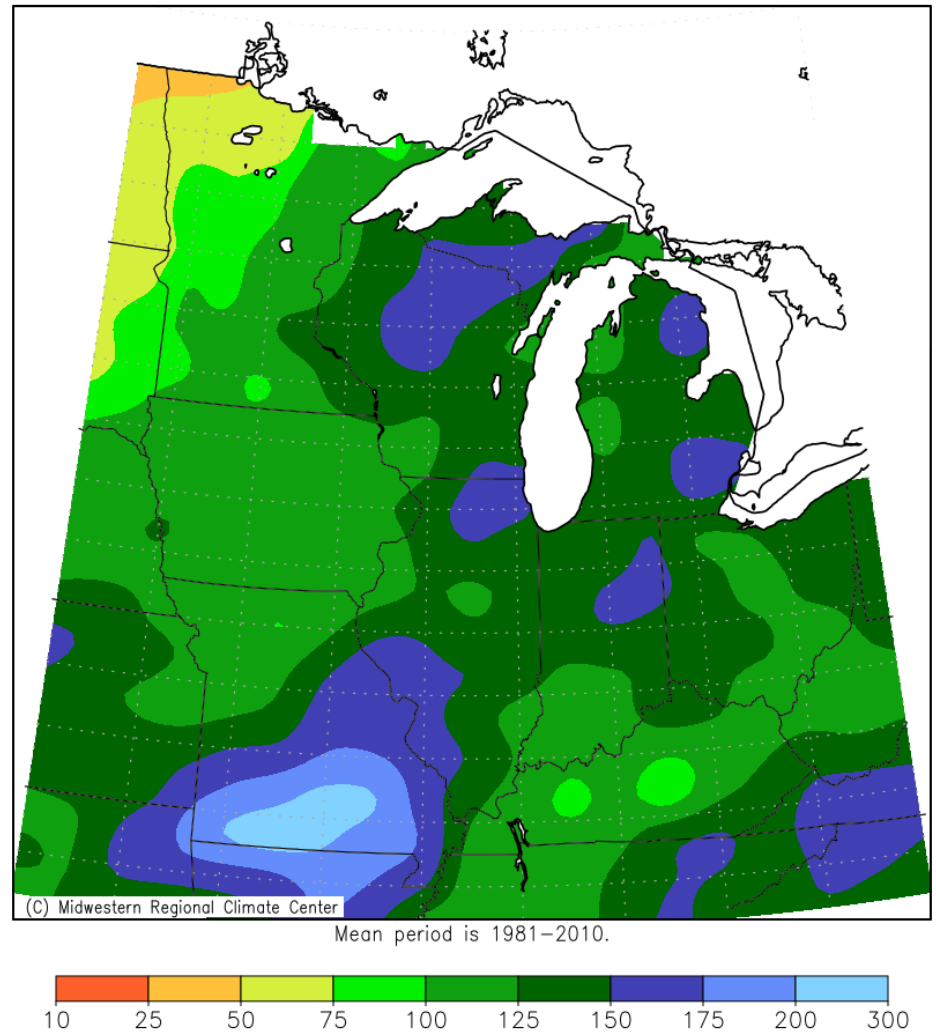
<http://droughtmonitor.unl.edu/>



# AND TOO MUCH RAIN!

Uncertain consequences!

Accumulated Precipitation: Percent of Mean  
March 1, 2017 to May 31, 2017



---

There will be year-to-year variation



# What to do about a bad winter!

## Ice -- rescue damaged trees

- Prune damaged branches
- Remove broken limbs
- Be careful with the bark
- Prune before budburst






# Diagnosing Plant Disorders

**Pay close attention to detail when collecting information**

## Five Steps to Diagnosis

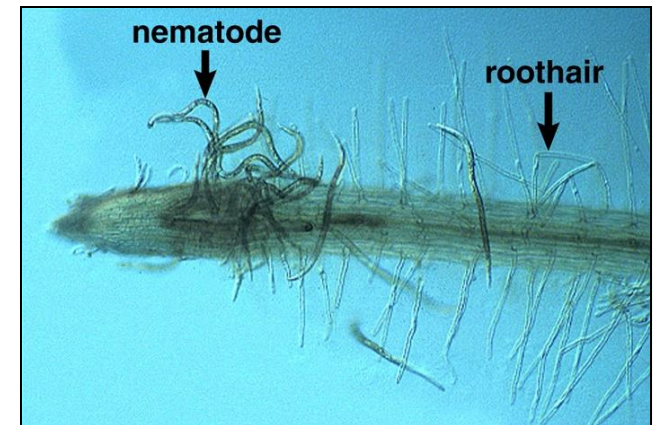
1. Accurately identify the host plant
2. Determine what is normal for the plant
3. Learn common problems for the plant
4. Distinguish between biotic and abiotic causal factors
-  5. Examine the plant for symptoms and signs

# Signs & Symptoms

**Symptoms** Plant's response  
Signals the plant is not  
functioning normally.



**Signs** Visible structures made by the  
pathogen or the disease agent that  
caused the symptoms



.

---

# Signs & Symptoms

## Signs

- Insects or mites
- Cast skins, excrement
- Spore-bearing structures
- Mycelium, mold
- Bacterial ooze
- Nematodes

## Symptoms

- Abnormal growth
  - Leaf Spots
  - Chlorosis (yellowing)
  - Wilt
  - Stunting
  - Blackened roots
  - Resinosis
-



# Signs & Symptoms

## SIGN

- GALL FROM CEDAR  
APPLE  
GALL RUST DISEASE



## SYMPTOM

- WILTING OF LEAF  
FROM MANY POSSIBLE  
CAUSES



# Galls - (both a sign and a symptom)



Look for them early in the year



# Galls



Horned  
Oak  
Gall



Gouty oak gall





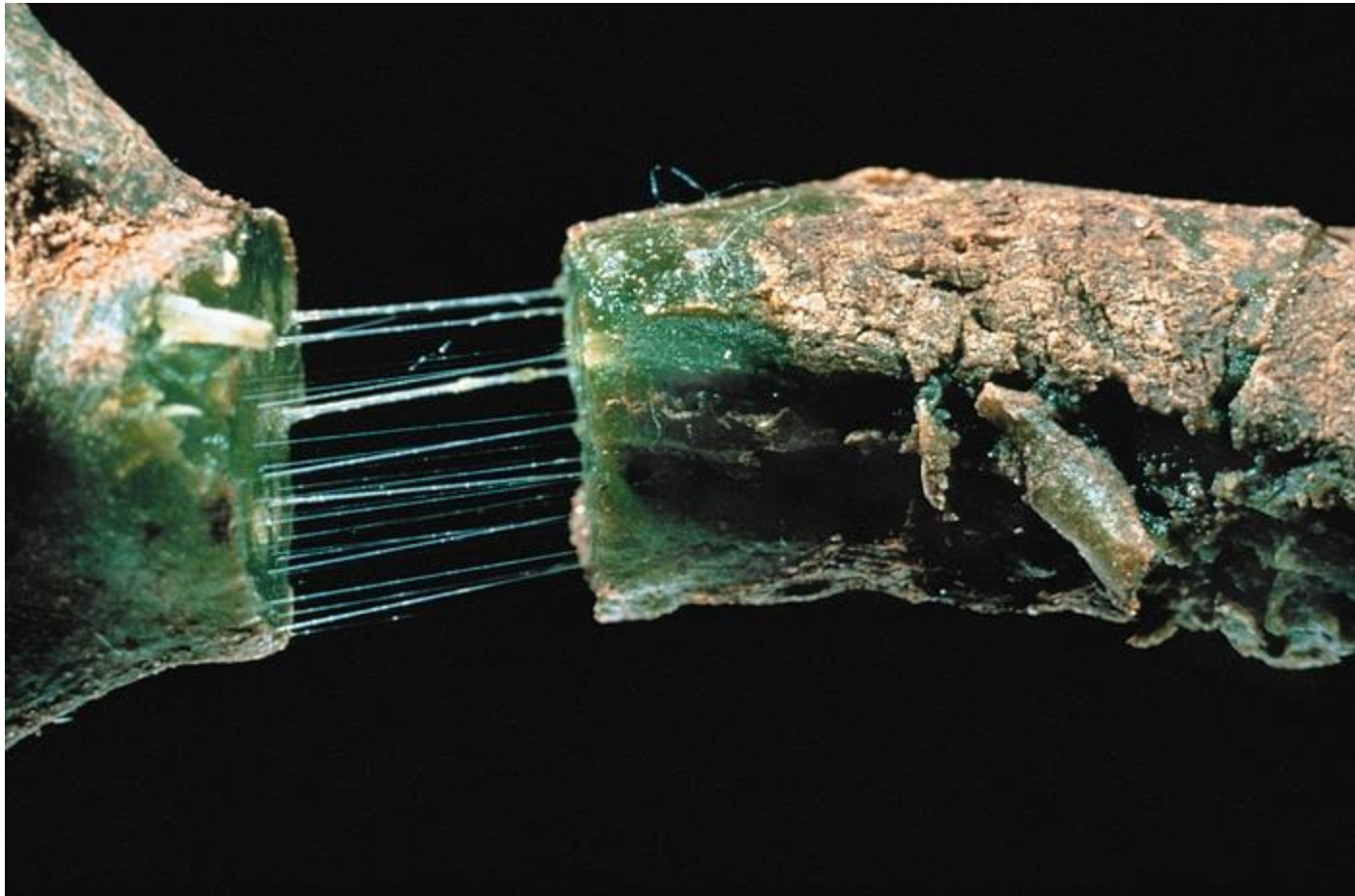
# Oak bullet gall caused by a gall wasp



# Sign



# Common signs of pathogens: bacterial ooze





# Slime flux

- Smells nasty as yeasts or bacteria, and attractive to insects
- No death or major problem for the tree only looks bad



Frothy oozing sap of bacterial slime flux



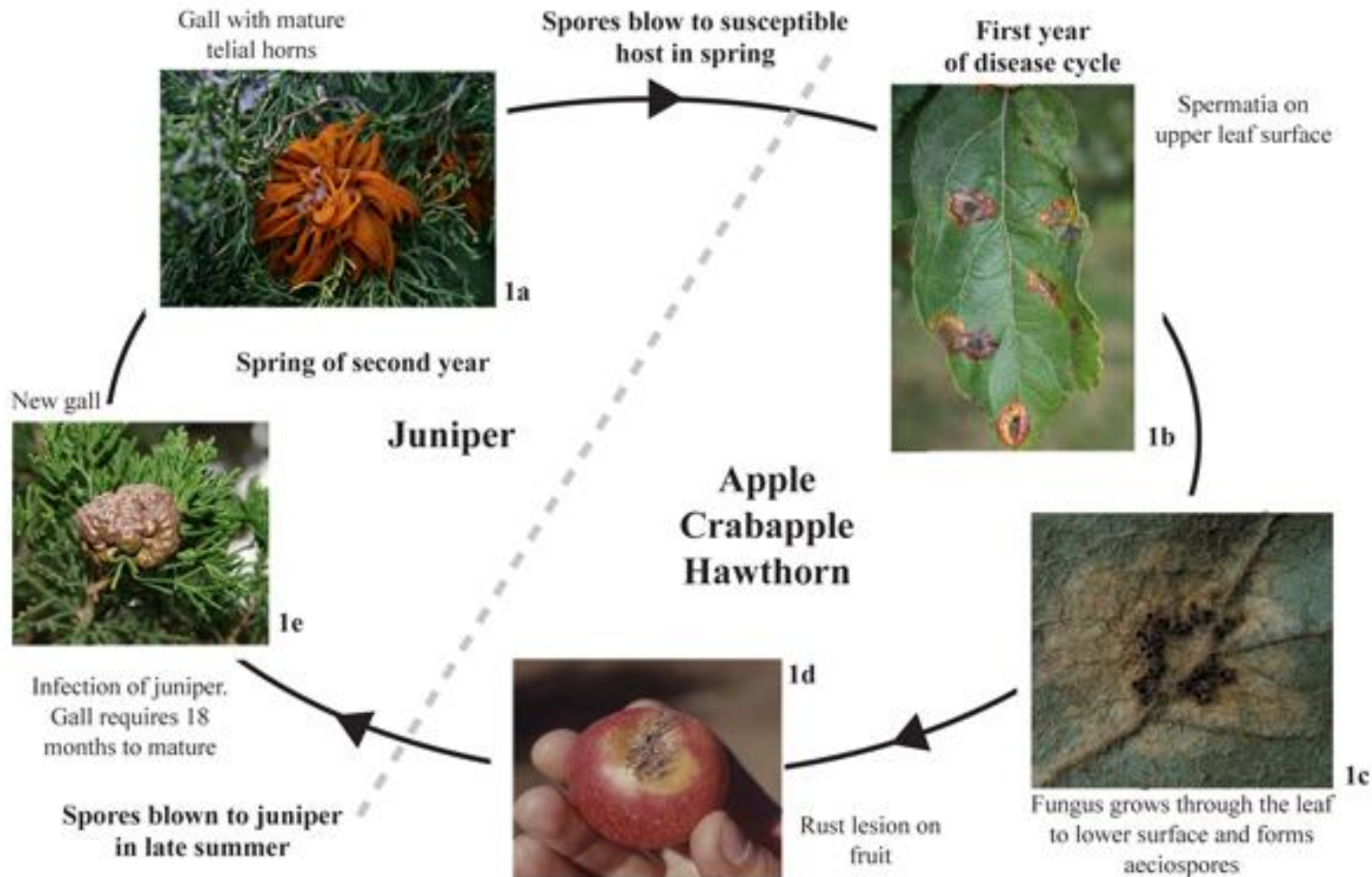
# Diseases to look for

- Cedar apple rust
- Oak wilt
- Dutch elm disease
- Anthracnose
- Pine wilt disease
- Apple scab
- Verticillium wilt – maple, catalpa, redbud
- Fire blight



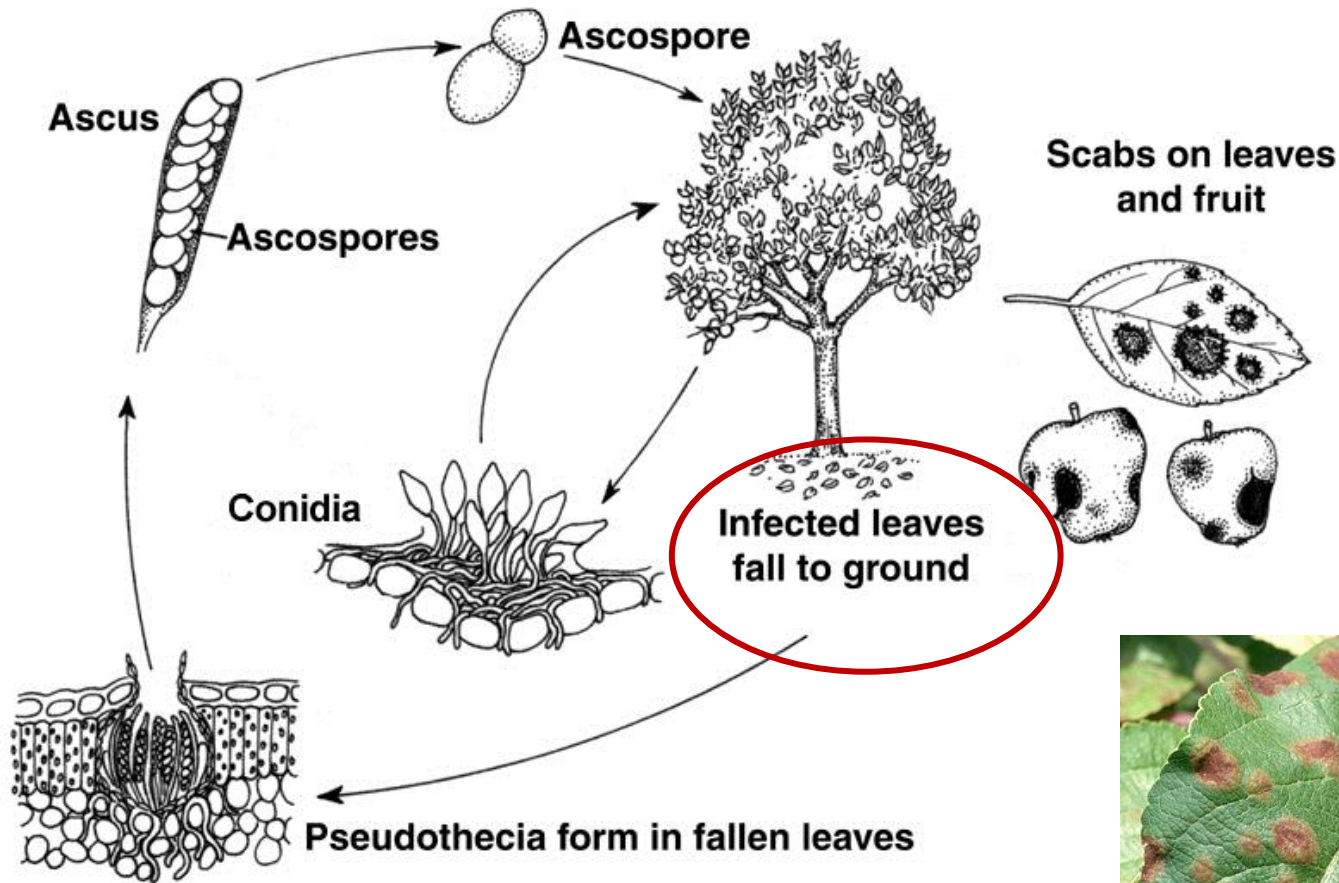
# Cedar apple rust

(what we see might not be the problem)





# Disease cycle of apple scab



---

# Tubakia Leaf Spot on Oak



*common late-season leaf  
disease of oaks*

# Sycamore anthracnose



## ANTHRACNOSE

FUNGI attack :

ash

basswood

birch

catalpa

elm

hickory

horsechestnut

London planetree

maple

oak

sycamore

tuliptree, and walnut



# What to do about anthracnose?

- Clean up and destroy fallen leaves
- Prune
- Maintain tree vigor
- Select species that are resistant
- *Fungicide control is rarely warranted*



# Oak wilt - a tree killer



**Oak wilt**

- ✧ Limit any cutting, pruning activity from April to October.
- ✧ Cover 'suspicious' firewood
- ✧ Don't move firewood



## OAK WILT

Sudden and lethal



# PINE PROBLEMS

## Dothistroma Needle Blight



# Pine Wilt Disease

a VERY common problem in  
Missouri

## Symptoms:

- Tan or brown needles
- Needles do not fall



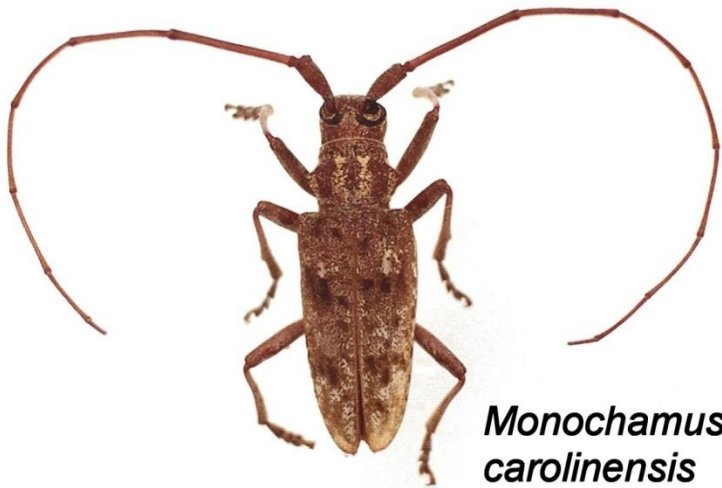
# Wood boring beetles

- Pine sawyer vectors pine wilt disease
- Hardwood boring beetles cause structural damage





*Monochamus carolinensis*  
adult emergence hole



*Monochamus  
carolinensis*



# Cankers – disease of the bark



target canker



Diffuse canker



# Hypoxylon



If over 15% of the canopy is infected, tree  
should be removed

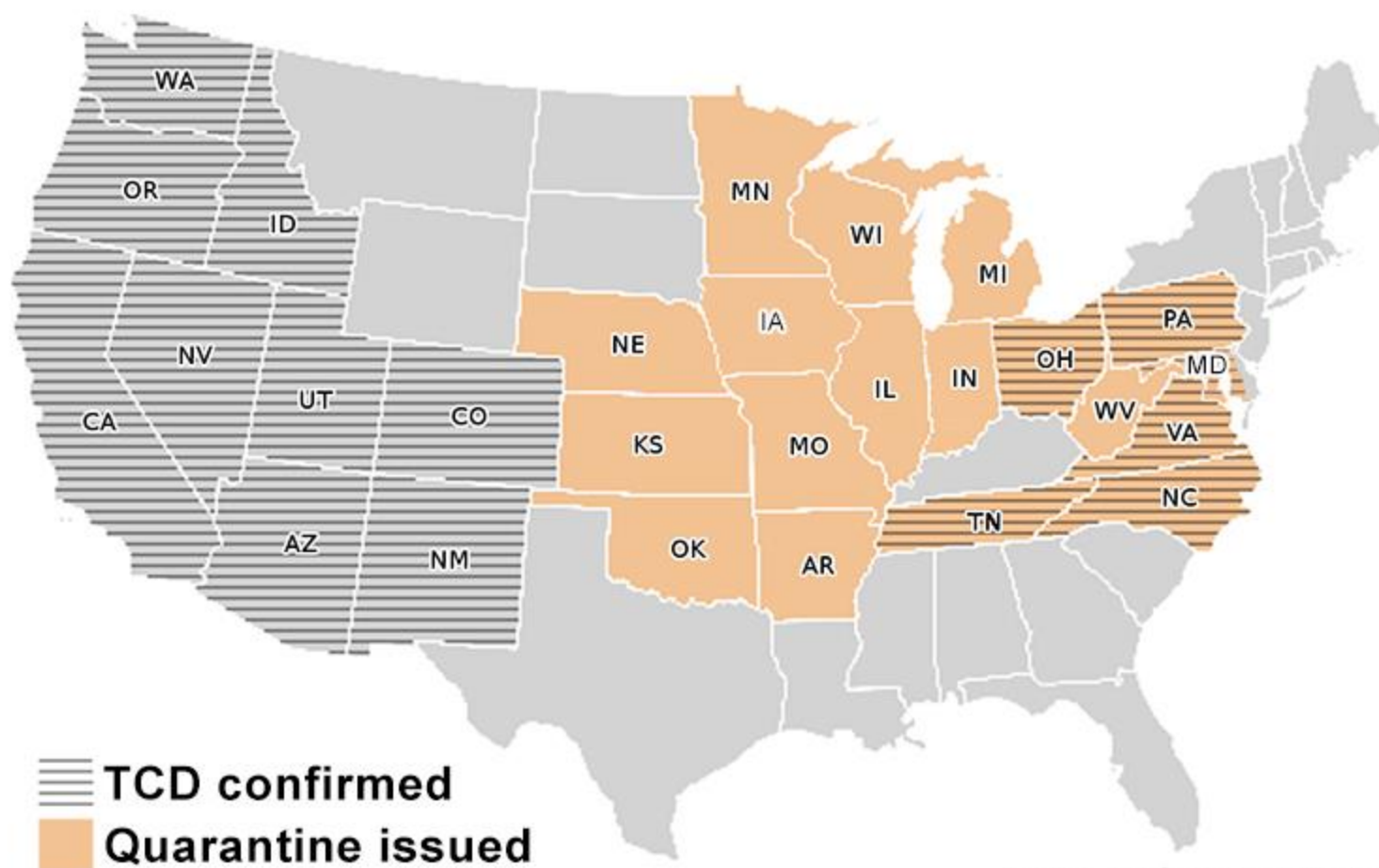


# The next big problem... Thousand Cankers disease

insect-fungal pathogen pest  
complex of walnuts



## Distribution of Thousand Cankers Disease as of August 1, 2017.



Source: [www.thousandcankers.com](http://www.thousandcankers.com)

# Thousand Cankers Disease of Walnut

## *Frequently Asked Questions for Missouri*

Forest Health Program, Missouri Department of Conservation



April 2017

### About Thousand Cankers Disease

#### **What is thousand cankers disease (TCD) of walnut?**

Thousand cankers is a disease complex recognized in 2008 consisting of the tiny walnut twig beetle and the fungus it carries to walnut trees. Beetles tunnel into tree limbs introducing the fungus. The fungus grows, producing cankers, or areas of infected tissue. As thousands of small cankers grow together to girdle branches, tree health declines and the tree finally dies.

#### **Where has thousand cankers disease been detected?**

Thousand cankers has caused widespread death of walnuts in western states (AZ, CA, CO, ID, NM, NV, OR, UT, and WA) over the past decade. TCD, the walnut twig beetle, or the fungus associated with TCD have also been detected in at least seven eastern states (IN, MD, NC, OH, PA, TN, and VA) within the native range of black walnut. TCD survey and detection work is ongoing in Missouri and other eastern states.

#### **Is thousand cankers disease in Missouri?**

As of April 2017, this disease has not been detected in Missouri.

#### **Where did the walnut twig beetle come from?**

The walnut twig beetle is believed to be native throughout the range of Arizona walnut (*Juglans major*), a walnut species found in New Mexico, Arizona, southern California, and northern Mexico (Chihuahua).

#### **What is the fungus that causes the cankers?**

The fungus that causes the cankers was first described in 2008 and named *Geosmithia morbida*. So far, it seems the fungus only causes cankers on walnut trees.

#### **Is the fungus also native?**

Research suggests the fungus is probably native to at least the southwestern US.

#### **Why did the walnut twig beetle start attacking black walnuts?**

Eastern black walnut has been planted as an urban street tree in western states where it is not native, and closer to the native range of the walnut twig beetle. Over the past couple decades, the walnut twig beetle has expanded its range and black walnut has been attacked. Movement of infested walnut materials spreads the walnut twig beetle to new areas.



# Some insects of note:

- Emerald ash borer
- Gypsy moth
- Asian longhorned beetle
- Eastern tent caterpillar
- Fall webworm
- Bagworms



# Insect Signs

- Holes in Leaves
- Holes in bark
- Frass
- Cast skins
- Webbing

or the insect itself!





# Insect Signs





# Fall webworm and eastern tent caterpillar



# Eastern tent caterpillar

one of the first to appear in spring

- *Malacosoma americanum*
- Eastern tent caterpillar
- Hosts:
  - Wild cherry, apple, crabapple, ash, birch, blackgum, willow, maple, oak, poplar....



# Management of eastern tent caterpillar

- Prune and burn twigs with egg masses
- Destroy tents as soon as they are obvious
- Water spray or Bt (Biobit, Dipel, MVP, Steward, Thuricide)



Eastern tent caterpillar larvae

*Early instars leave the tent shelter to feed three times a day; later instars feed at night, and rest during the day*



# Fall webworm (one of the last in the growing season)

- Feeds on nearly all tree species except conifers



- 200 hosts in the US
- Prefers open grown trees
- Places tent at the ends of branches
- Damage primarily aesthetic

---

Braconid eggs on a tobacco hornworm  
-- a good thing!



# Emerald ash borer





# Emerald Ash Borer

The beginning of the end of ash in  
North America?



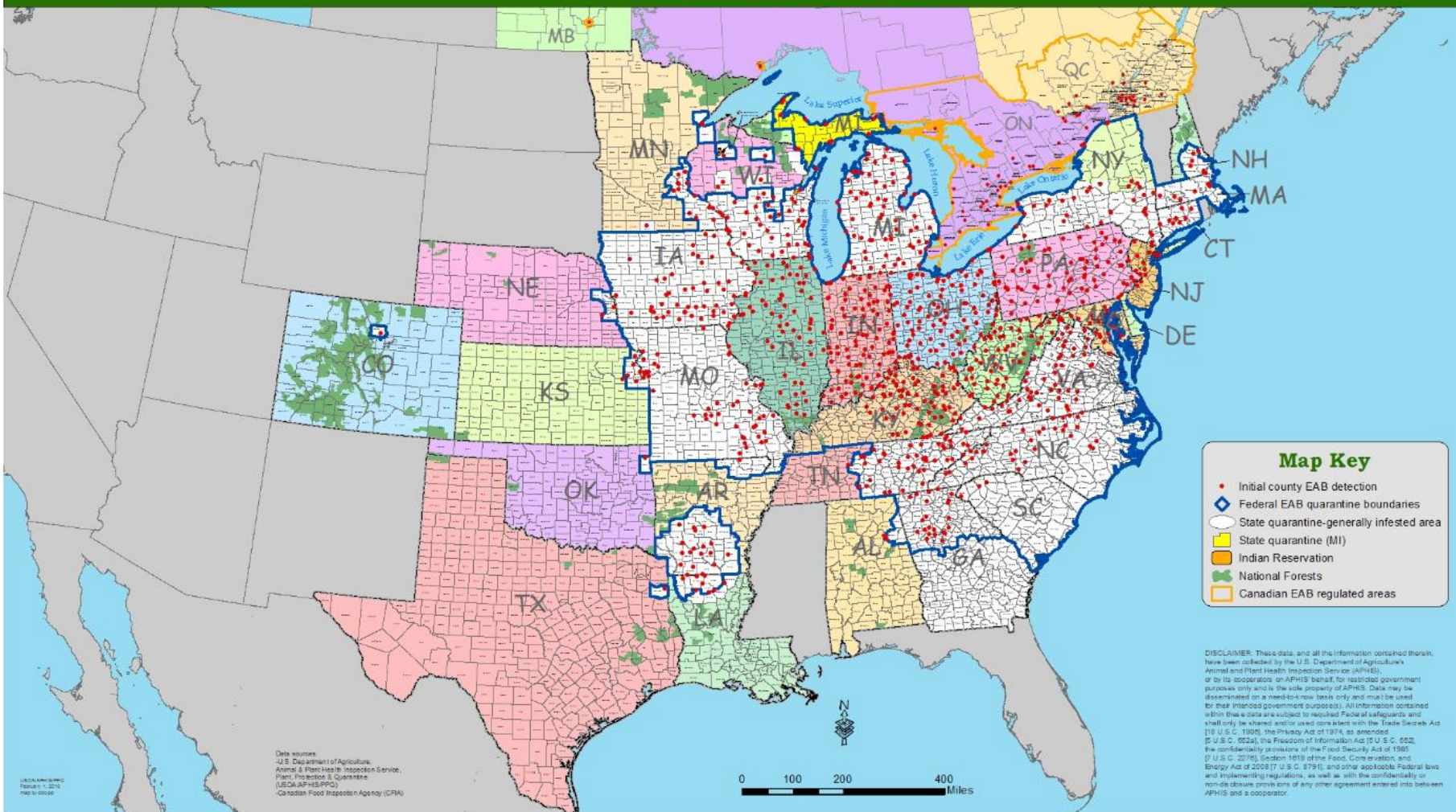


United States  
Department of  
Agriculture

# Cooperative Emerald Ash Borer Project

Initial county EAB detections in North America

February 1, 2018





---

# TREE SYMPTOMS

## emerald ash borer



Sparse leaves



New sprouts



Small, vertical  
openings



Wood pecker  
activity

---



# Life cycle: typically one generation per year



Adults: June - August



Pupa: May – June



Prepupa:  
Oct – April



Larva: July - Sept



# Diagnosing emerald ash borer: 3 key signs



1. Small (1/8") D-shaped exit holes

2. Serpentine galleries just under the bark



3. Flat, tapeworm-like larvae with bell-shaped segments.

# Treatments??





# ***Emerald Ash Borer Management Guide for Missouri Homeowners***



The emerald ash borer (EAB) is a serious threat to ash trees in Missouri. This invasive pest will eventually kill unprotected ash trees. Many trees can be saved with the careful use of systemic insecticides. However, not all ash trees should be treated, and for many locations the start of treatments should be delayed. This guide will assist you in making decisions about protecting your trees from this invasive pest. Find more information at [eab.missouri.edu](http://eab.missouri.edu).

## ***Signs & Symptoms of EAB***



EAB adults are generally seen from mid-May through July.

Howard Russell,  
Bugwood.org



D-shaped exit holes about 1/8" wide

MO Dept. Conservation



Winding, S-shaped tunnels just under the bark

MO Dept. Conservation



New sprouts on the branches and lower trunk

Pennsylvania DCNR,  
Bugwood.org



Increased woodpecker activity on the tree

Kenneth R. Law,  
Bugwood.org



Sparse leaves and/or branches dying in the upper part of the tree

David Cappaert, Michigan State University



## Are your ash trees worth protecting?

*Healthy trees can be treated!*



### Consider treating with insecticides if ash trees are:

- Healthy and vigorously growing with less than 50% dieback (dead branches and missing leaves)
- Showing few outward signs of EAB or other borer infestations
- Valuable to the owner by providing shade, energy savings or aesthetics
- Historically significant

**Maybe?** Contact a certified

will die.

↑  
**No.**

removal, disposal,  
references and  
insurance.



### Remove and replace low-value ash trees.

- Unhealthy trees with more than 50% dieback, severe injuries, or many borer attacks are unlikely to recover—even if treated.
- Small trees or trees located in poor sites (too close to utility lines, buildings, or sidewalks) are often not worth the cost of ongoing treatments.
- If you decide to remove your ash tree, dispose of it locally to prevent the accidental spread of EAB.

# Look alike insects





# Native ash borers are extremely common

## Clearwing borers



## Roundheaded borers

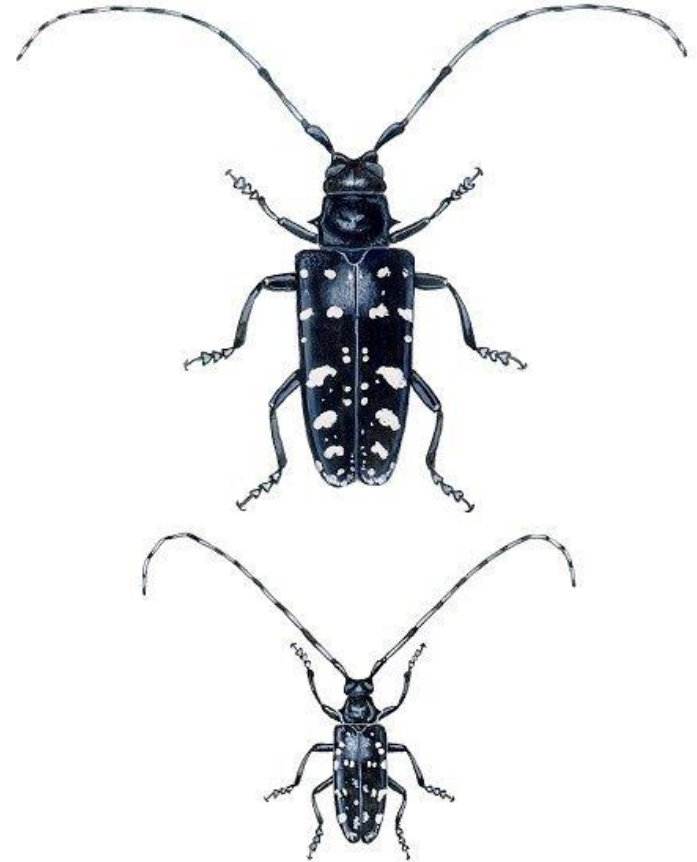


# Asian long-horned beetle



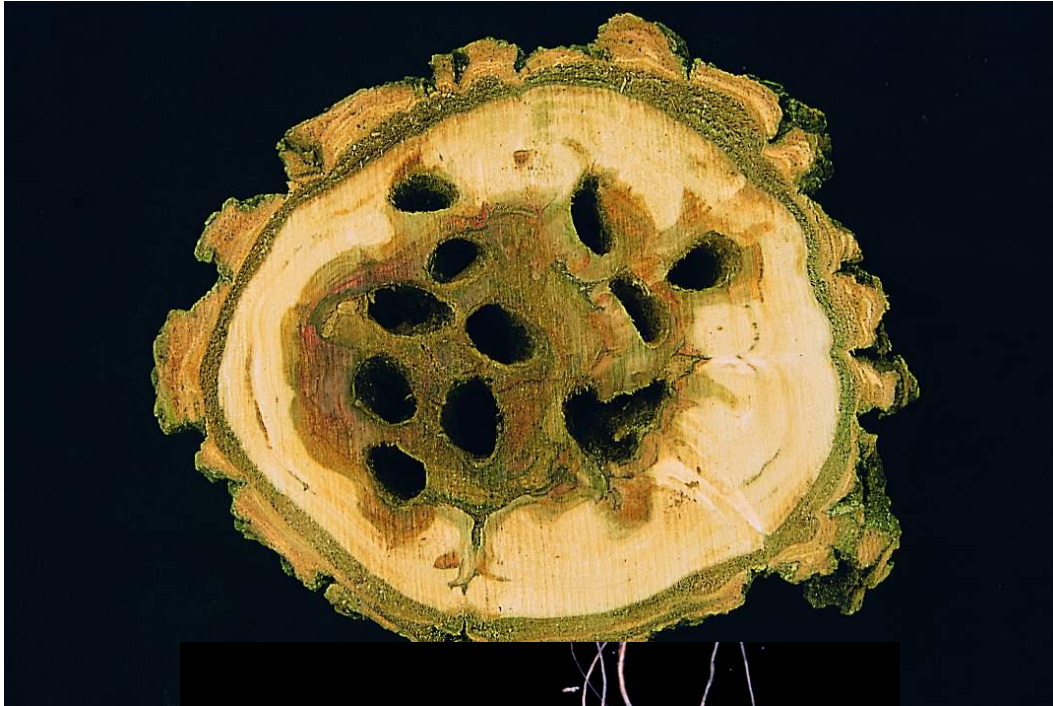
# Asian longhorned beetle

- A success story for a while





# Hardwood boring damage



# Hosts of ALB

- Maples (preferred)

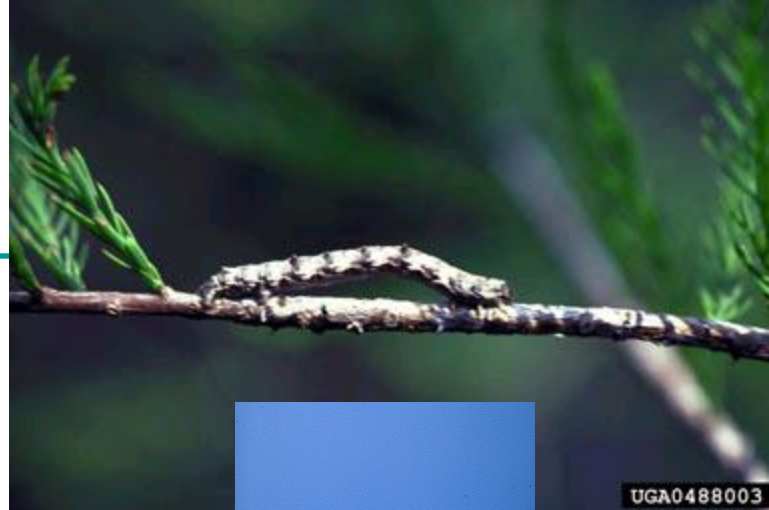
## **Will also infest:**

- Horsechestnut,
- Elms
- Birches
- Willows
- Poplars
- and many others.





# Insects that eat leaves (defoliators)



Usually caterpillars



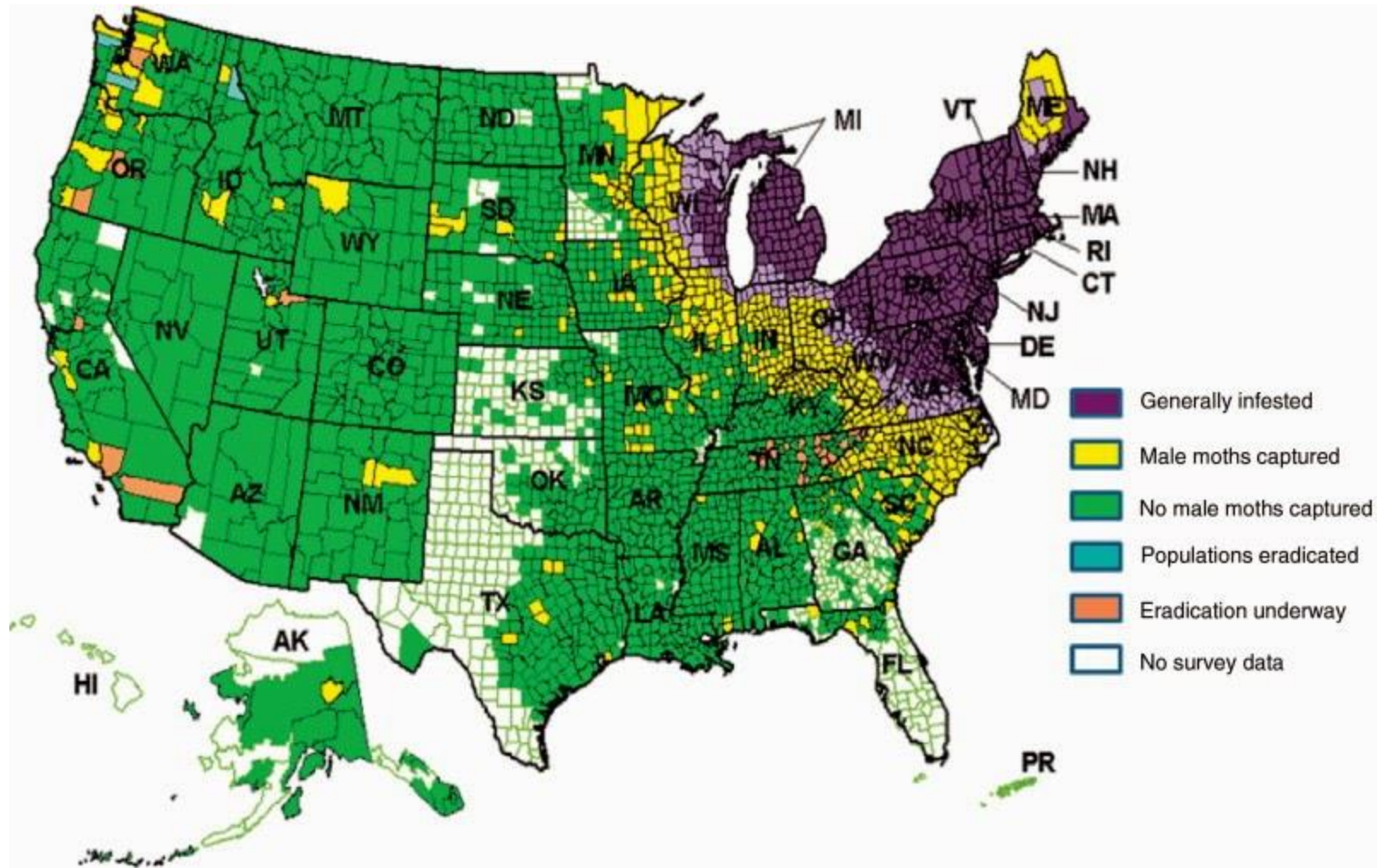


# Preferred Gypsy Moth Host Trees:

oaks, apple, sweetgum, basswood, gray and white birch, poplar, willow, hawthorn



# Current distribution -- gypsy moth



# Bagworms

- Very common
- Feed on many plant species
- Late spring to late summer defoliator, overwinters as a egg in the old female bag
- Complete defoliation and mortality can occur; decreased radial growth is common





# Bagworm cases (containing overwintering eggs)



# Bagworm infested tree

- Can be handpicked from infested host plants during winter and early spring.
- Management applied after eggs hatch and caterpillars are small during early to mid-June.





# Aphids





# Scale insects - <10 mm

Among the most destructive agents on ornamental trees and shrubs



Pine tortoise shell scale

Adult scales are protected by waxy, hard covering.

Dormant oils could be effective in early spring on crawlers.



# Final thoughts



Watch for signs, symptoms, obvious damage.

Plant the right species in the right place.

Maintain plant vigor.

Understand biology of the plant and the insect.

Ask questions!



# Other sources of information



Search for publications, online courses, events and more...

SEARCH

Find your interest ▲

Programs

Online courses

Events

Publications

News and articles

[MU Extension](#) ▶ [Programs](#) ▶ [Tree Pests](#)

## Tree Pests

