The Bugs that Bug You

Plymouth County Extension

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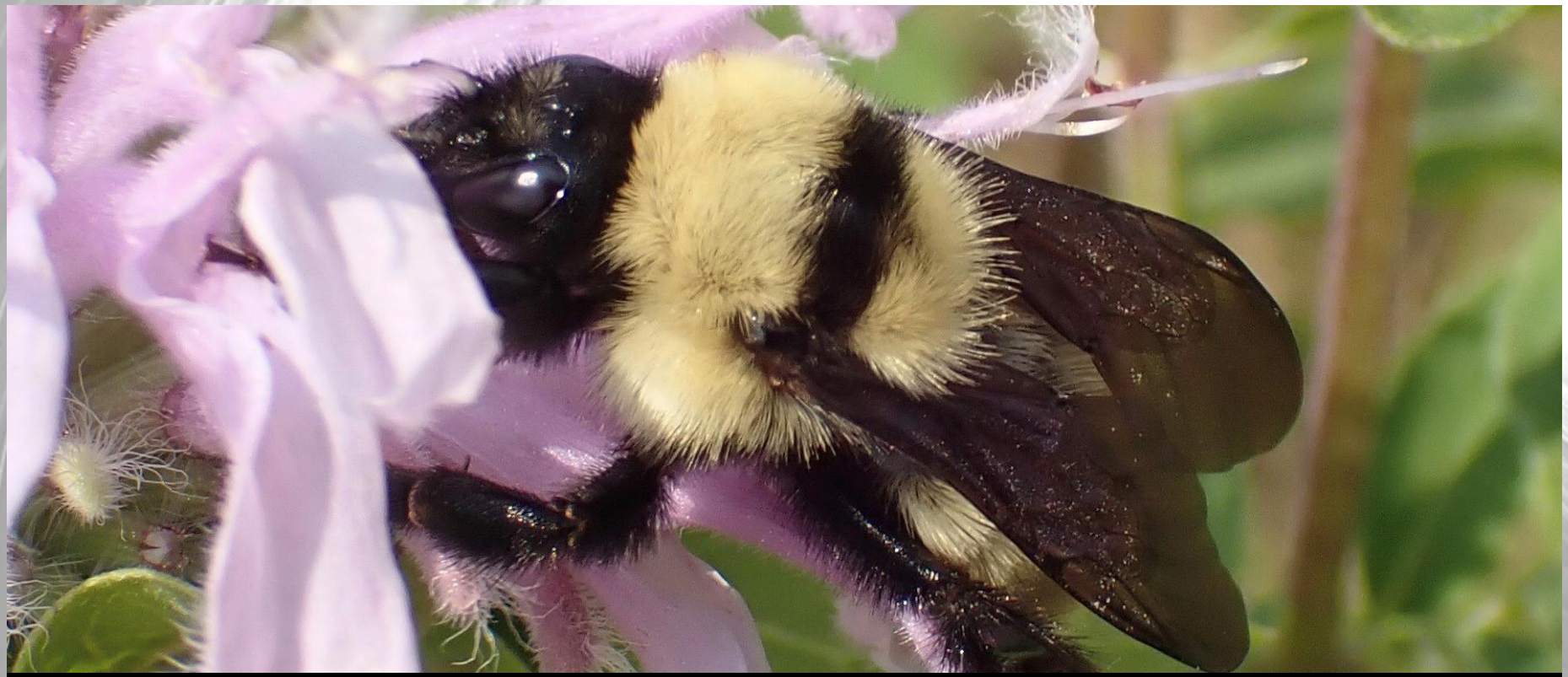
KILL IT
WITH
FIRE

Not All Bugs Deserve to Die



OVER 3 OF 4 FLOWERS NEED INSECTS

Ollerton et al. 2011

1 OF 3 BITES OF FOOD REQUIRES POLLINATION

Klein et al . 2007

6 OF 10 BIRDS NEED INSECTS FOR FOOD

Morse, D. (2003). The Insectivorous Bird as an Adaptive Strategy. Annual Review of Ecology and Systematics. 2. 177-200.

NEARLY EVERY PLANT IS FED ON BY AN INSECT

Borror and Delong, 2005

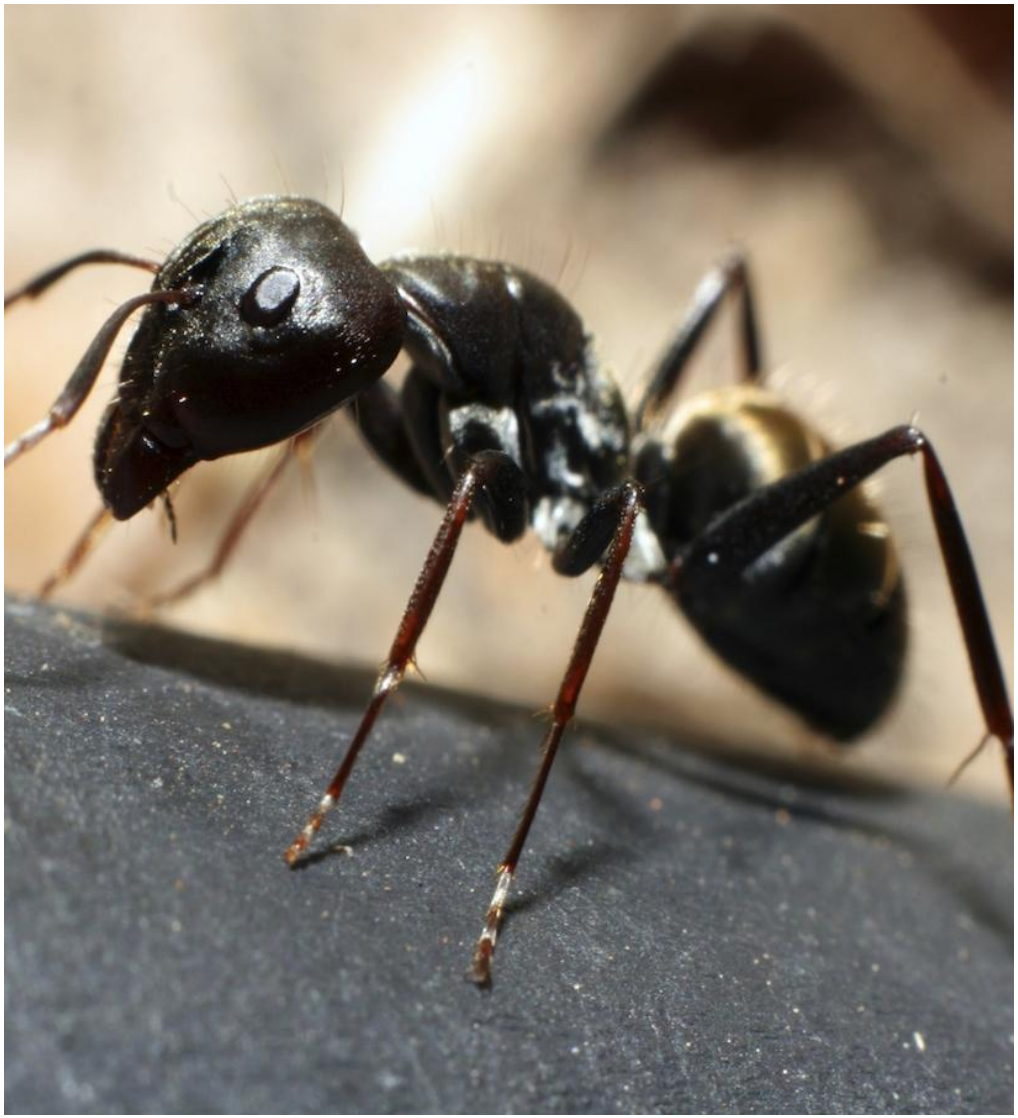
"THE LITTLE THINGS THAT RUN THE WORLD."

-E. O. WILSON

BUT, SOME BUGS BUG YOU

Disease vectors

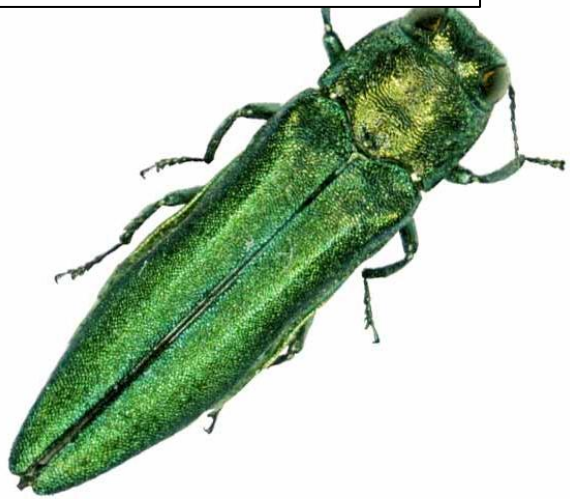
House pests



Agricultural and garden pests

Invasive species

- Ecology
- Human health
- Agriculture
- And so on



What is an invasive species?

Not native to this area

Most insects coming in will not survive

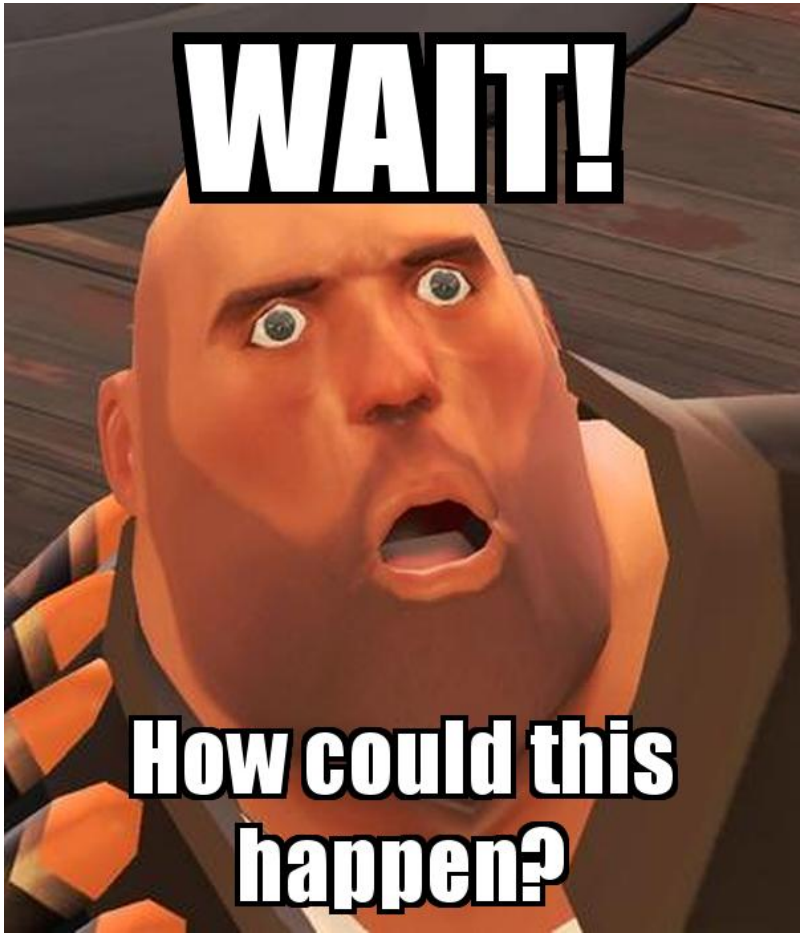
But, some will

Simberloff D , Gibbons L . 2004 . Now you see them, now you don't!—population crashes of established introduced species . Biol. Invasions 6 : 161 – 72.

Williamson M , Fitter A . 1996 . The varying success of invaders . Ecology 77 : 1661 – 66.

Over 4 years, 2,000 phytophagous insect species introduced

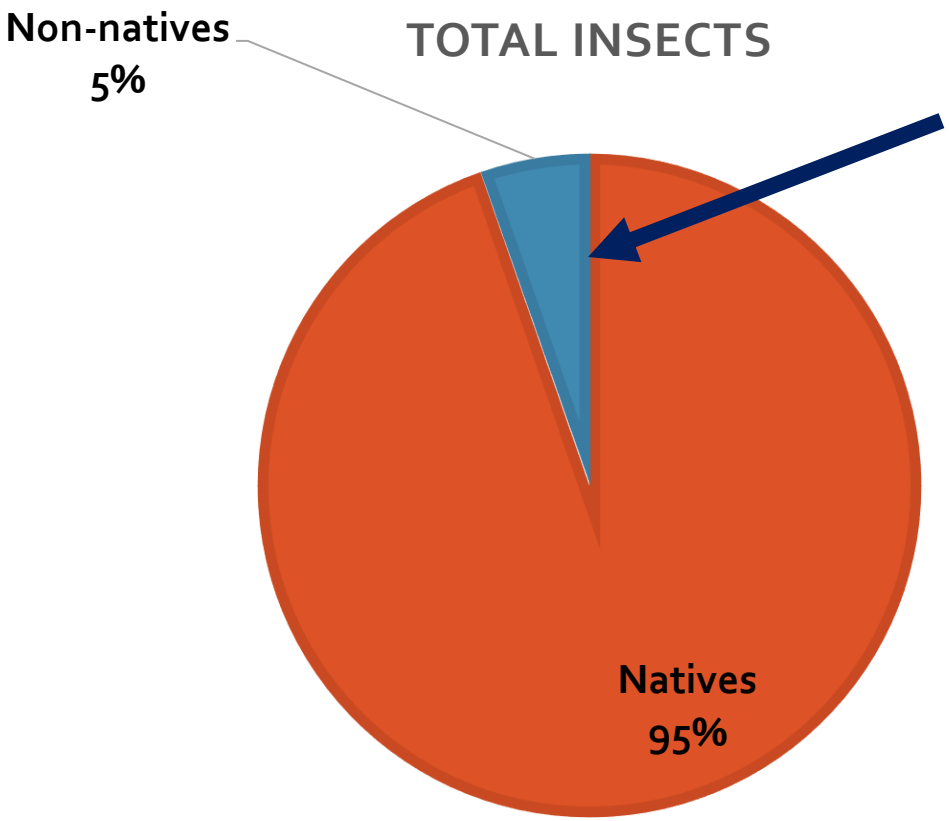
2% (42 species) established



Work TT, McCullough DG, Cavey JF, Komsa R. 2005. Arrival rate of nonindigenous insect species into the United States through foreign trade. Biological Invasions 7: 323–332.

In the U.S.A:

- Total insects: 115,503 species
- Non-natives: 6,500 species (<5%), as of 2021

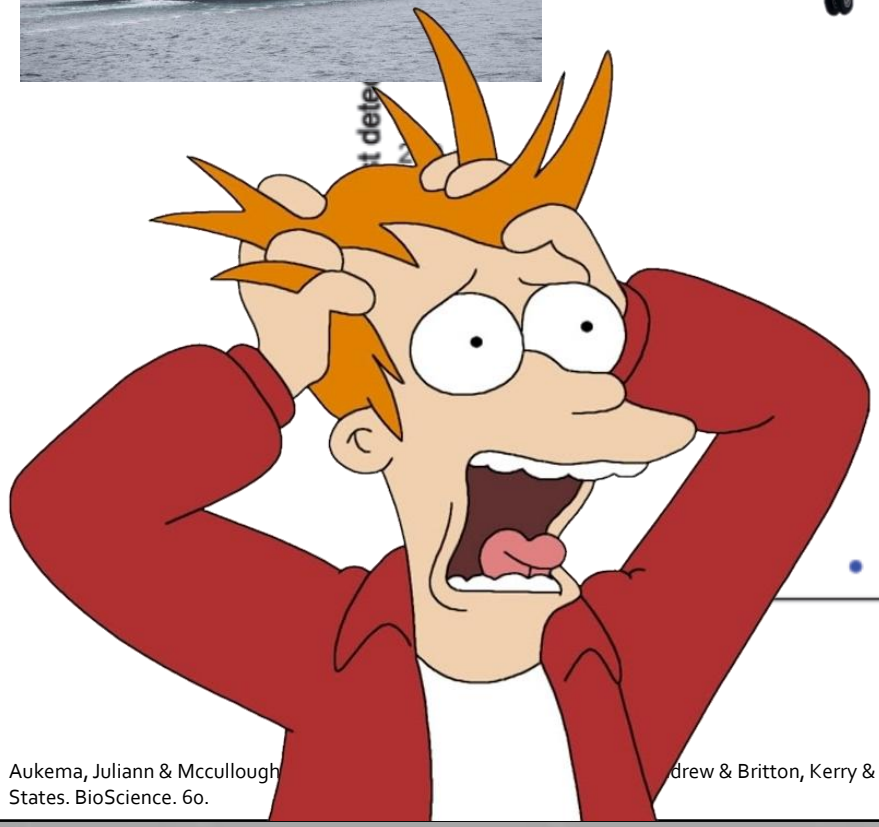


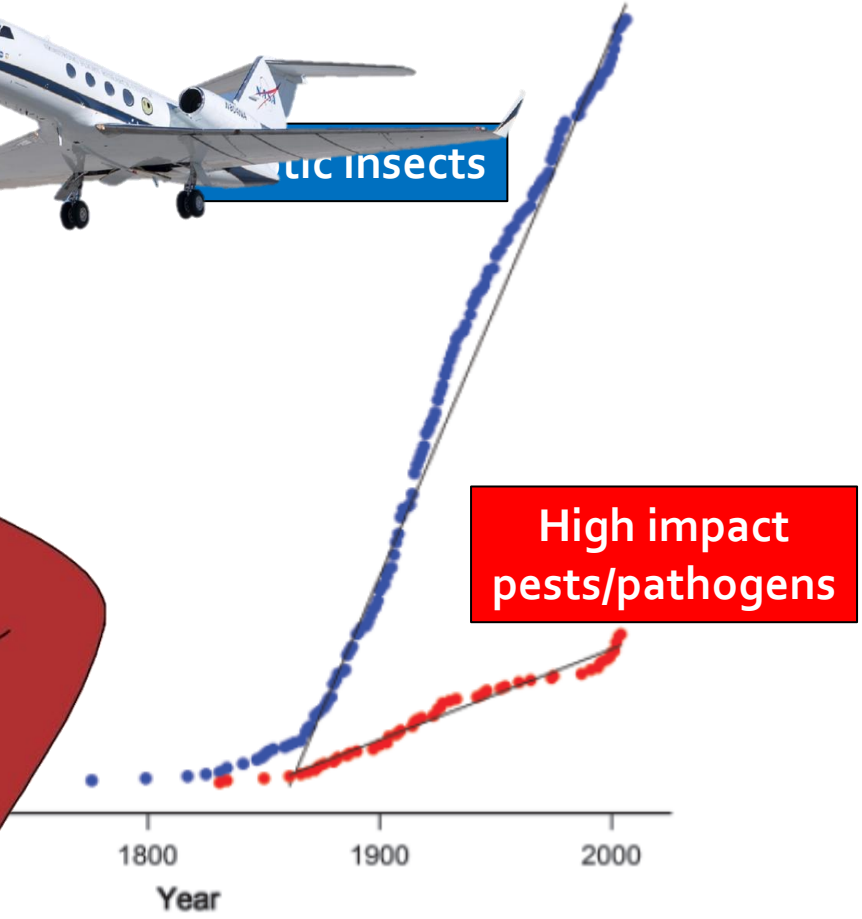
Stork, N. E. (2018). How many species of insects and other terrestrial arthropods are there on Earth?. *Annual review of entomology*, *63*, 31-45.

Tam, C. K., Daniel, W. M., Campbell, E., English, J. J., & Soileau, S. C. (2021). US Geological Survey invasive species research—Improving detection, awareness, decision support, and control (No. 1485). US Geological Survey.

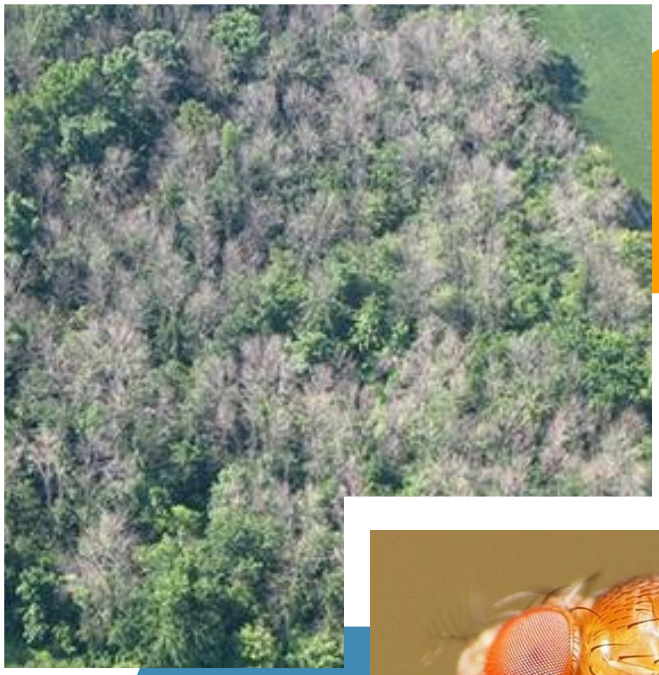
Past 150 years:

- ~2.5 insect species/year
- 0.43/year (or ~1 species/2.3 years)

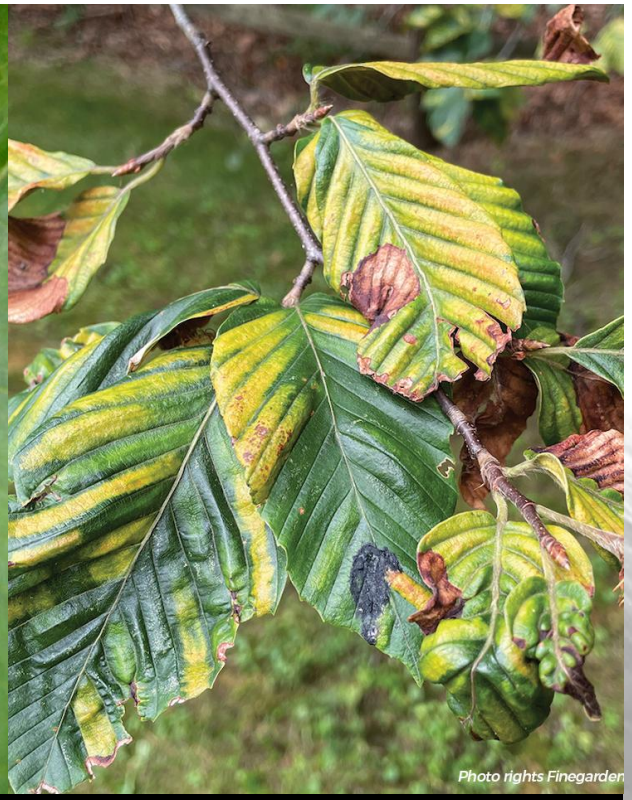




Aukema, Juliann & Mccullough drew & Britton, Kerry & Frankel, Susan. (2010). Historical Accumulation of Nonindigenous Forest Pests in the Continental United States. BioScience. 60.



HAS TO HAVE A NEGATIVE IMPACT



ALSO, SEVERITY

Photo: William M. Ciesla (left), Pudding4Brains (center), FineGardening.com (right)

CHACHALLENGER APPROCHING

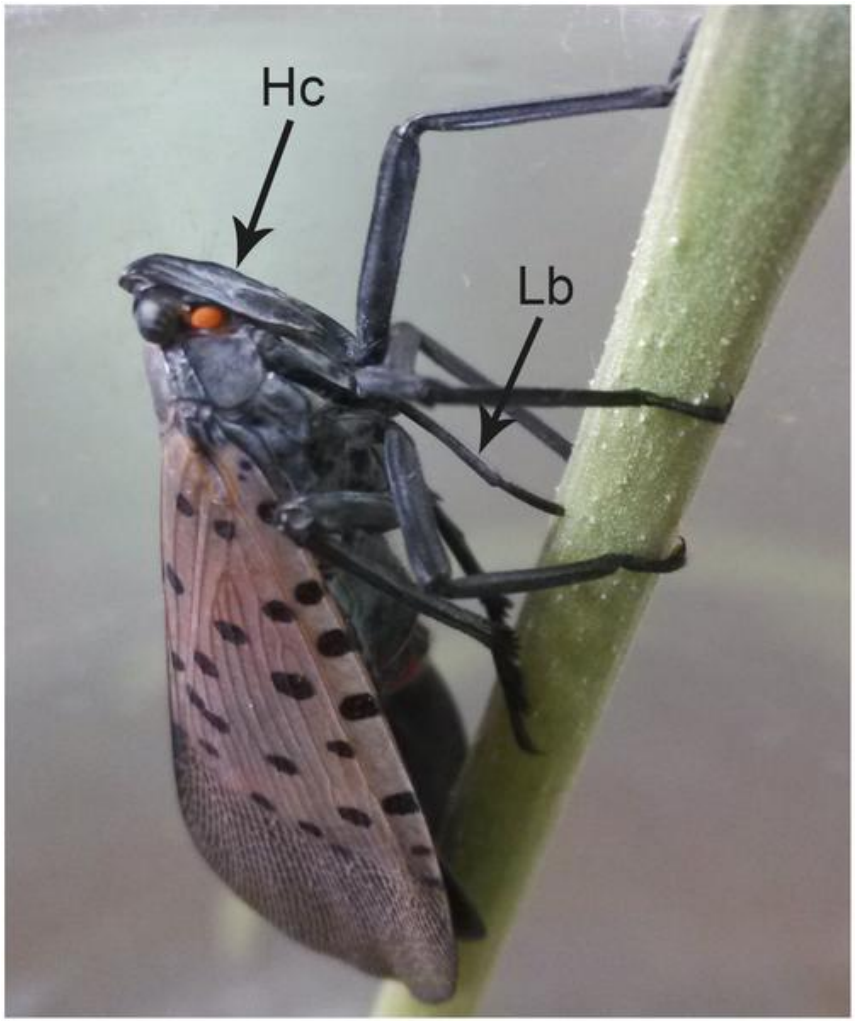
A new foe has appeared!

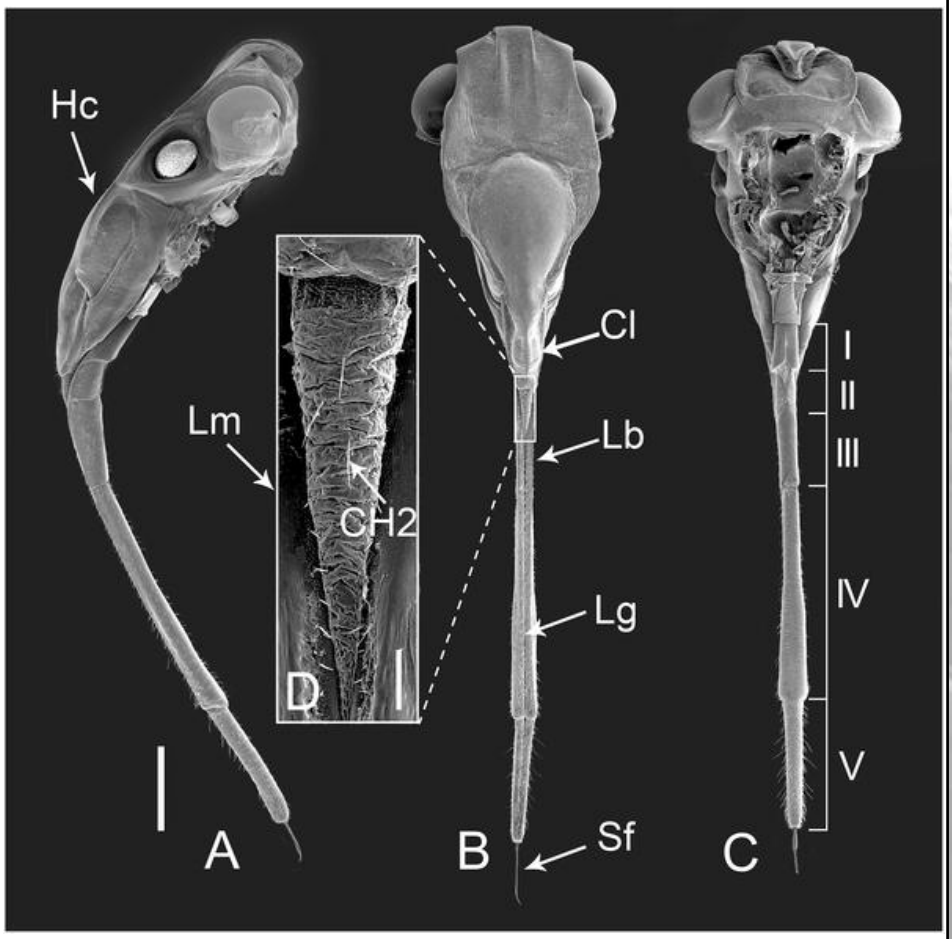
WHAT IS SPOTTED LANTERNFLY?

It’s a type of planthopper

1. xpda
2. Sreypov Heng

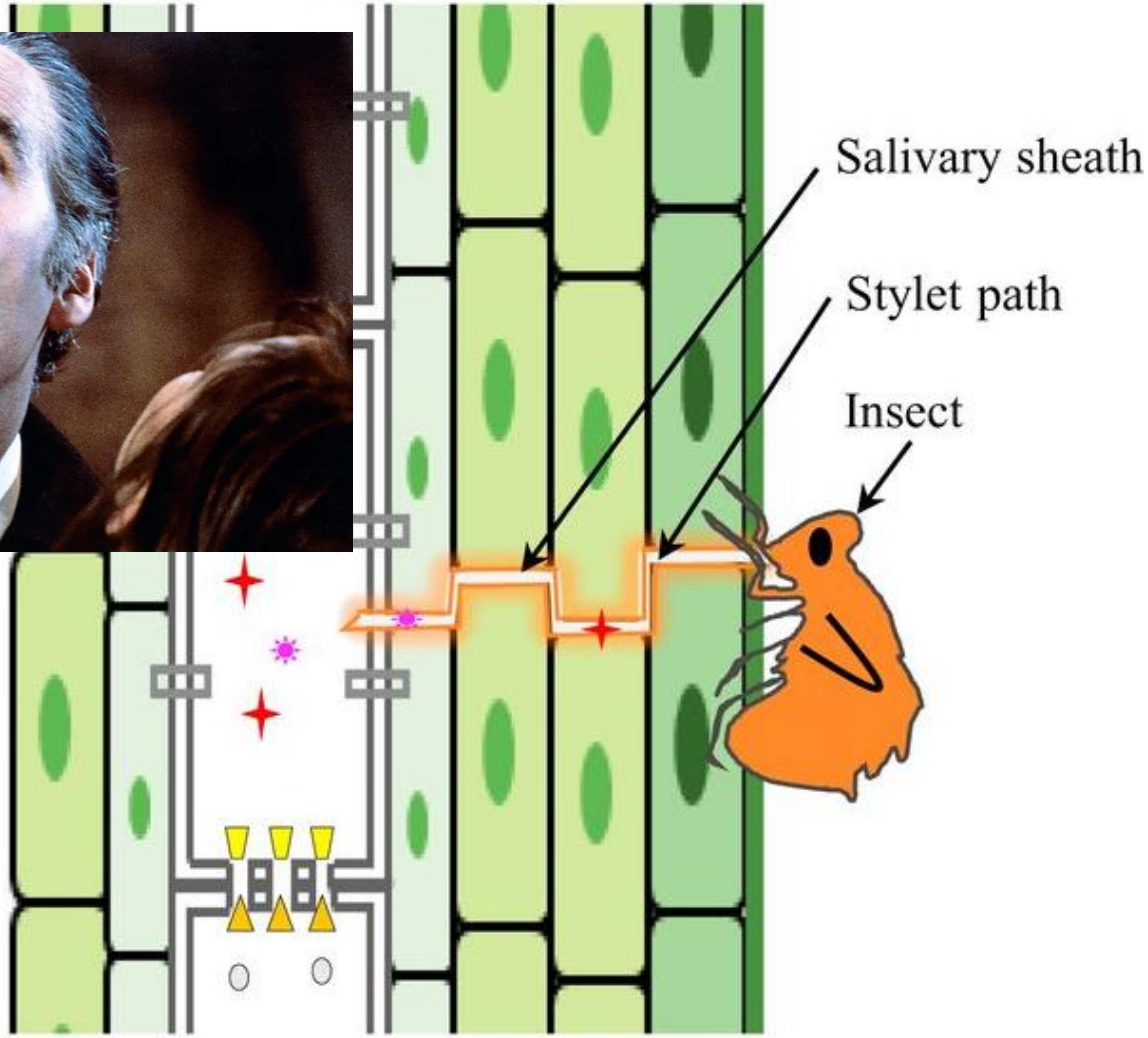
Piercing-sucking mouthparts





Hao Y, Dietrich CH, Dai W. Structure and sensilla of the mouthparts of the spotted lanternfly Lycorma delicatula (Hemiptera: Fulgoromorpha: Fulgoridae), a polyphagous invasive planthopper. PloS one. 2016 Jun 2;11(6):e0156640.

- Stylet pierces and probes through tissue
- Eventually, reaches phloem of plant



Jiang Y, Zhang CX, Chen R, He SY. Challenging battles of plants with phloem-feeding insects and prokaryotic pathogens. Proceedings of the National Academy of Sciences. 2019 Nov 19;116(47):23390-7.

SPOTTED LANTERNFLY IS ACTUALLY KIND OF BIG

LARGE GROUPS

Weeping wounds left behind
Can attract stinging insects

Black sooty mold
Can block photo synthesis

Loss of aesthetic value

Barbara Bower, Homeowner

Damage to Pennsylvania agriculture:

- $42.6 million statewide (as of 2019, based on a 2017 survey)

Table 3. Estimated annual losses from SLF for slightly susceptible, moderately susceptible, and highly susceptible crops.

Crop or enterprise	Slightly susceptible	Moderately susceptible	Highly susceptible
Field crops	1%	2%	3%
Vegetable crops	1%	2%	3%
Pome fruits, stone fruit	1%	2%	3%
Berries and nuts	2.5%	5%	7.5%
Grapes	16.7%	33.3%	50%
Nursery, Christmas trees, and maple syrup	6.7%	13.3%	20%
Timber	0.25%	0.50%	0.75%

Potential Economic Impact of the Spotted Lanternfly on Agriculture and Forestry in Pennsylvania
Jayson K. Harper, Ph.D., William Stone, DBA, Timothy W. Kelsey, Ph.D., and Lynn F. Kime
Pennsylvania State University
December 2019

Feeds on over 100 plants:

- apple/crabapple (Malus spp.)
- Asiatic bittersweet (Celastrus orbiculatus)
- **birch (Betula spp.)**
- **black walnut (Juglans nigra)**
- **grapes (Vitis spp.)**
- highbush blueberry (Vaccinium angustifolium)
- hops (Humulus lupulus)
- lilac (Syringa spp.)
- **maple (Acer spp.)**
- mulberry (Morus spp.)
- poplar (Populus spp.)
- **rose (Rosa spp.)**
- **staghorn sumac (Rhus typhina)**
- stone fruit (cherry, peach, plum, etc.) (Prunus spp.)
- sycamore (Platanus spp.)
- **tree of heaven (Ailanthus altissima)**
- Virginia creeper (Parthenocissus quinquefolia)
- willow (Salix spp.)
- And, more!

Barringer L, Ciafré CM. Worldwide feeding host plants of spotted lanternfly, with significant additions from North America. Environmental Entomology. 2020 Oct;49(5):999-1011.

What is Tree of Heaven?

- Brought to US in 1784
- Native to SLF's home
- Dioecious plant

ALSO INVASIVE!

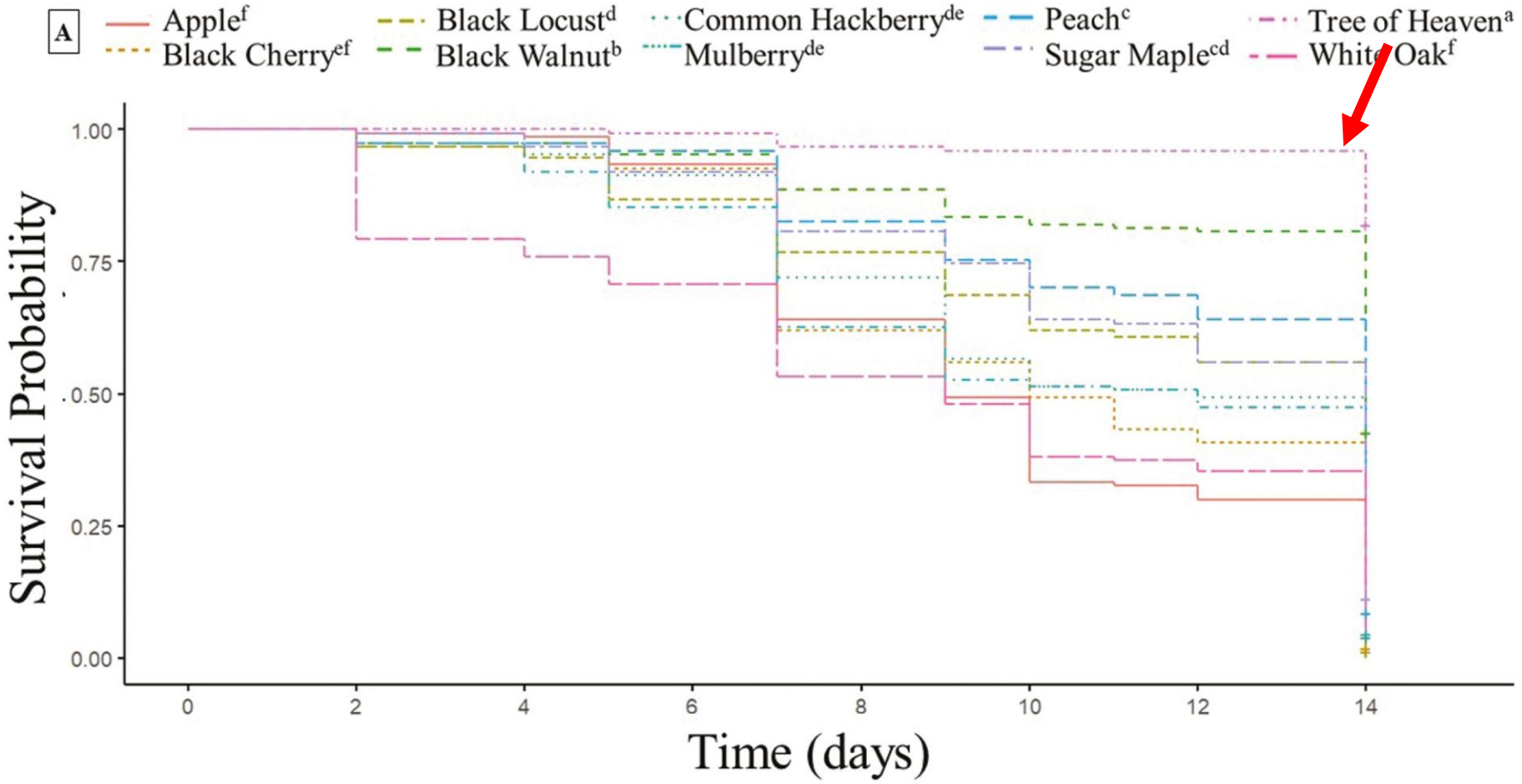
Photo credit: Van Den Berk Nurseries

Grows well in disturbed habitats

- Dioecious plant (male and female plants)
- Can reproduce through suckering

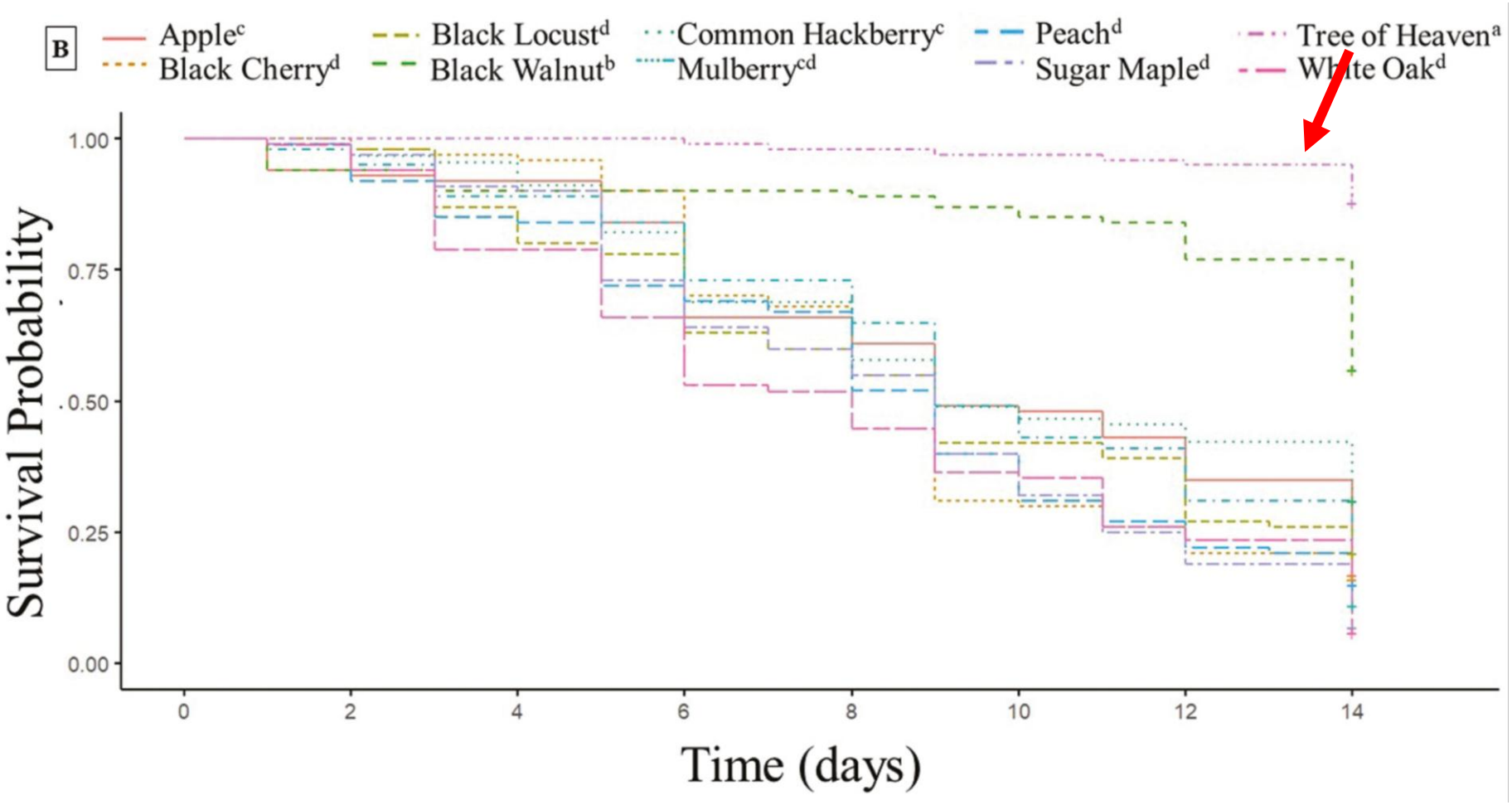

You can see what happens if
you don’t take care of the roots

Survival in Young Juveniles



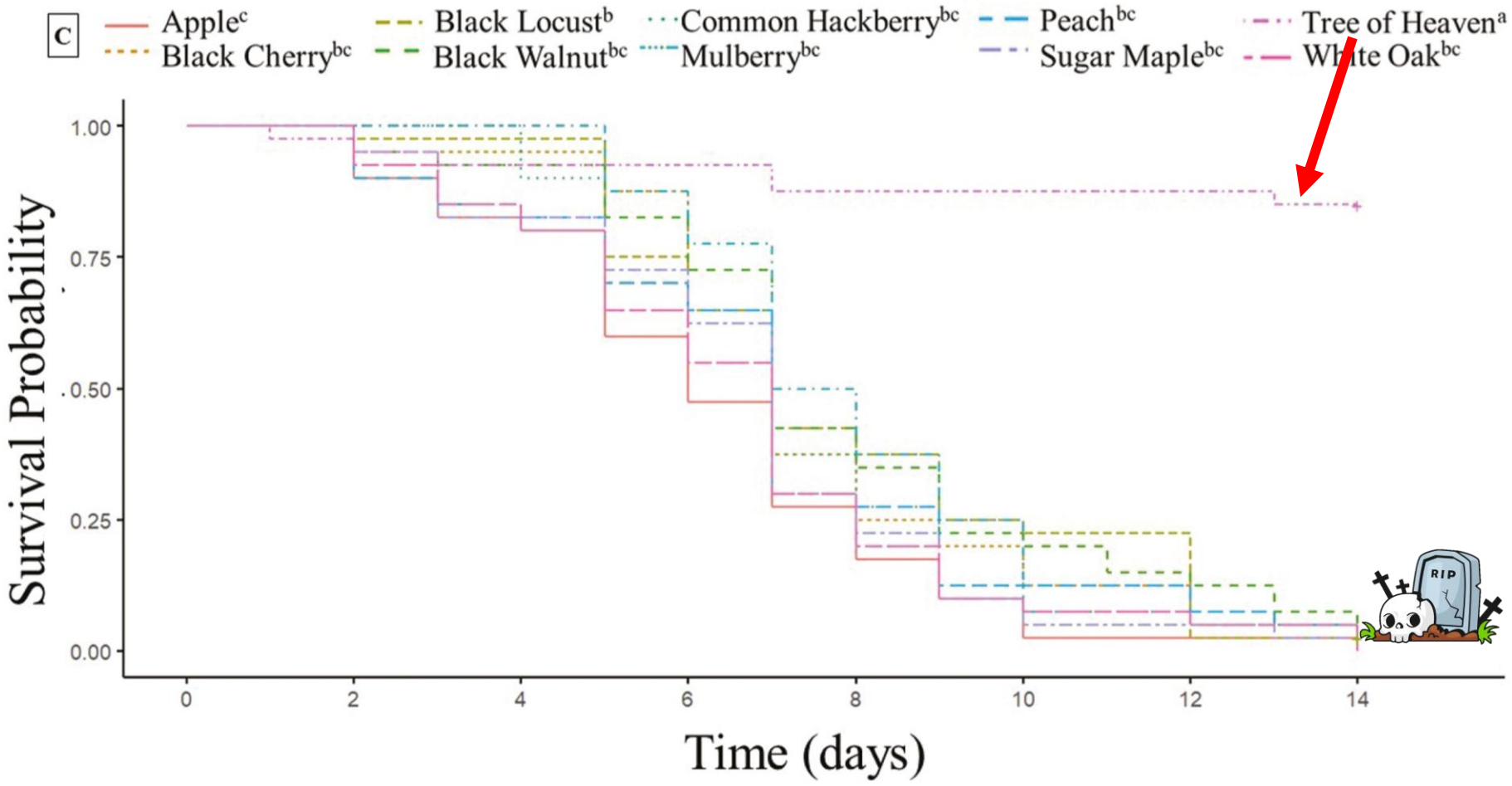
Barringer L, Ciafré CM. Worldwide feeding host plants of spotted lanternfly, with significant additions from North America. Environmental Entomology. 2020 Oct;49(5):999-1011.

Survival in Older Juveniles



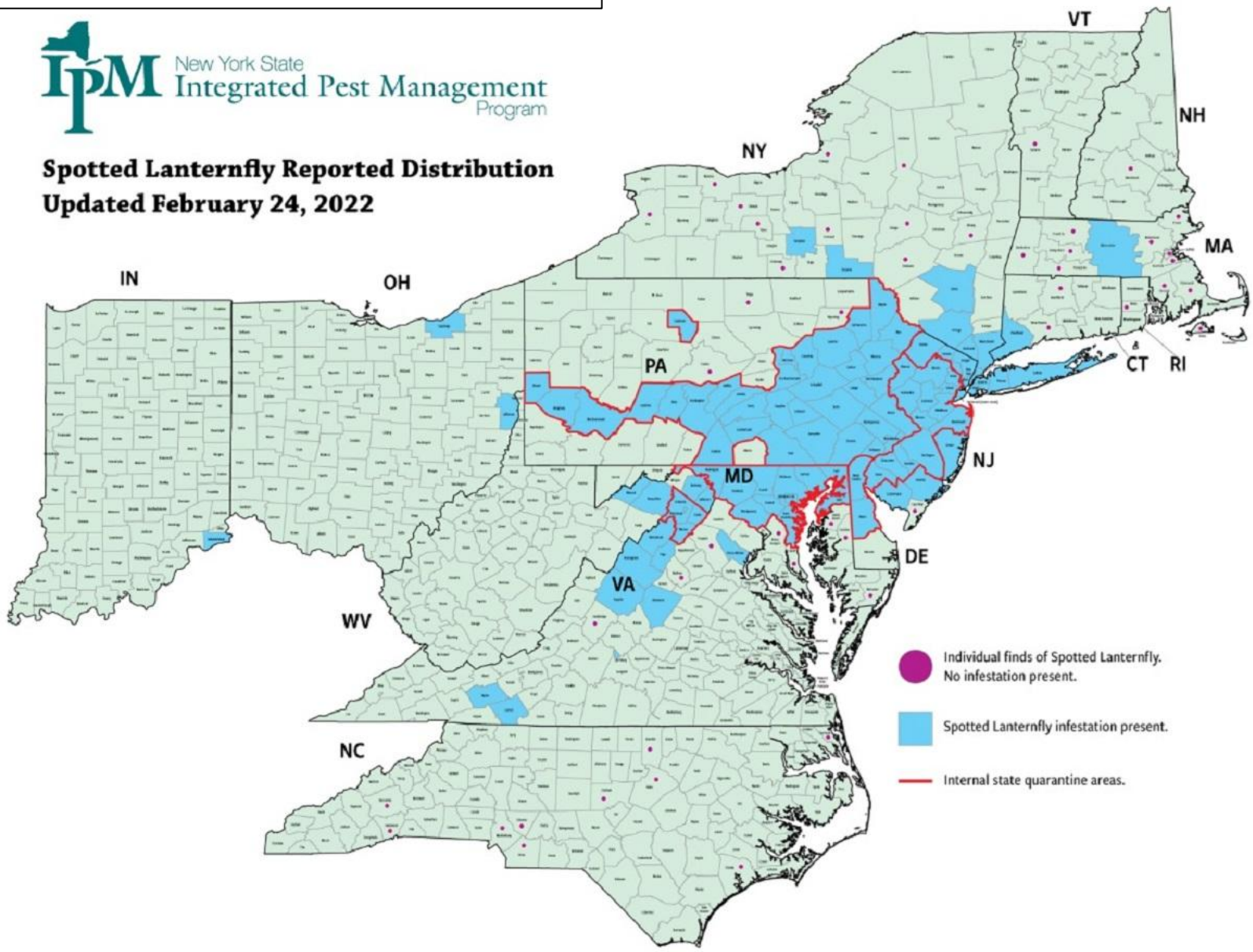
Barringer L, Ciafré CM. Worldwide feeding host plants of spotted lanternfly, with significant additions from North America. Environmental Entomology. 2020 Oct;49(5):999-1011.

Survival in Adults

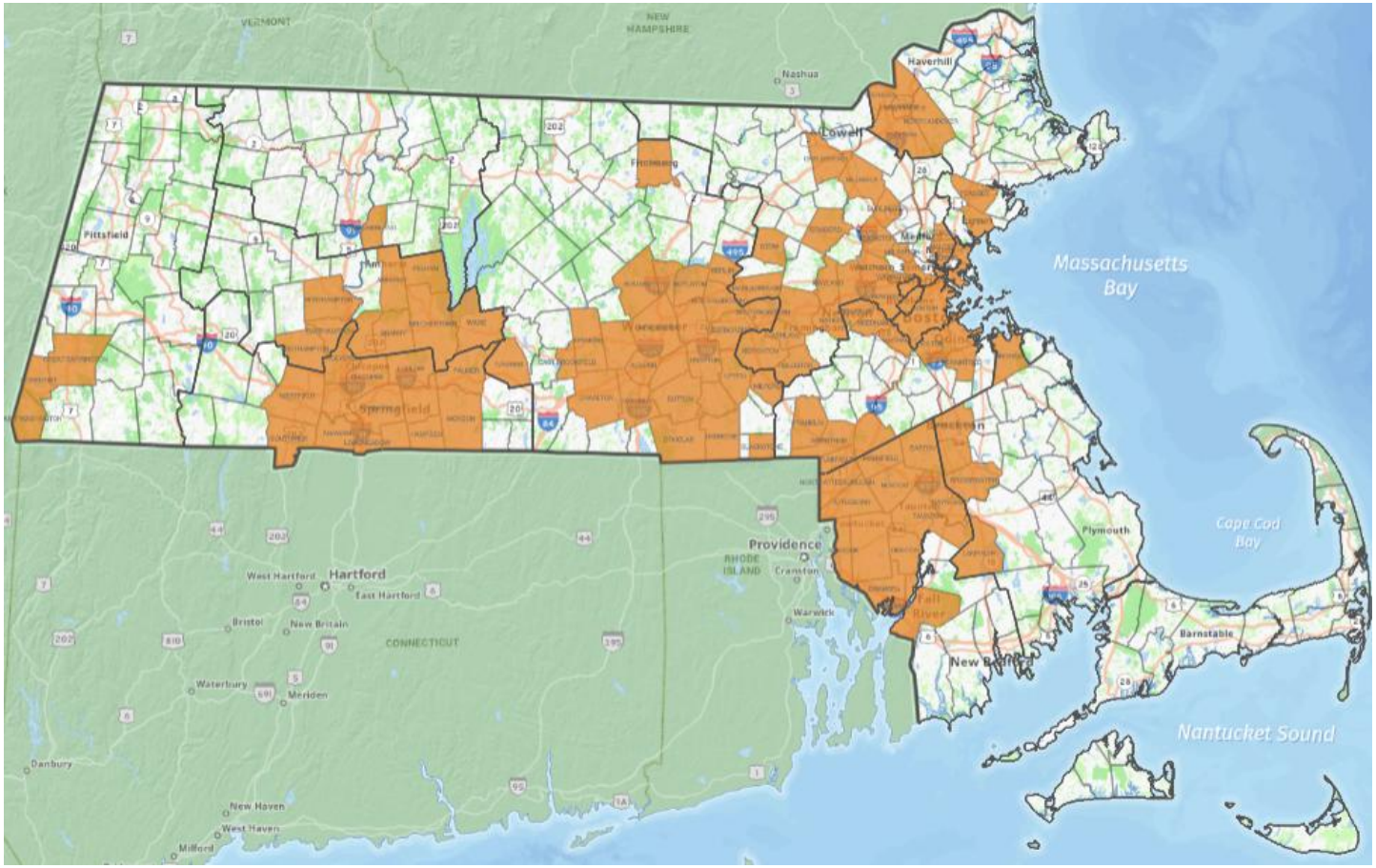


Barringer L, Ciafré CM. Worldwide feeding host plants of spotted lanternfly, with significant additions from North America. Environmental Entomology. 2020 Oct;49(5):999-1011.

Lanternfly is spreading rapidly



Massachusetts 2021 vs 2026



MDAR Invasive Pest Dashboard. Map last updated March 2026

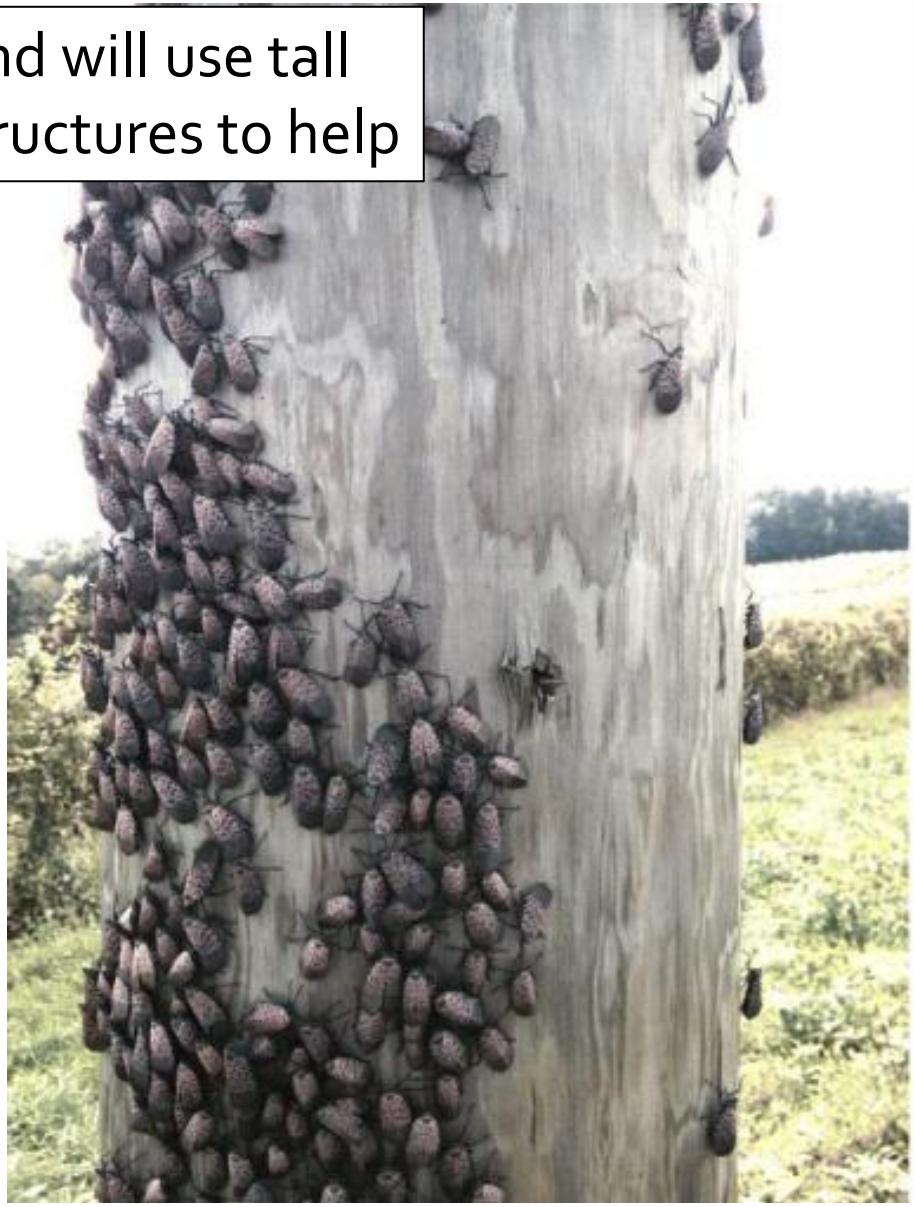
Not great at dispersing on their own

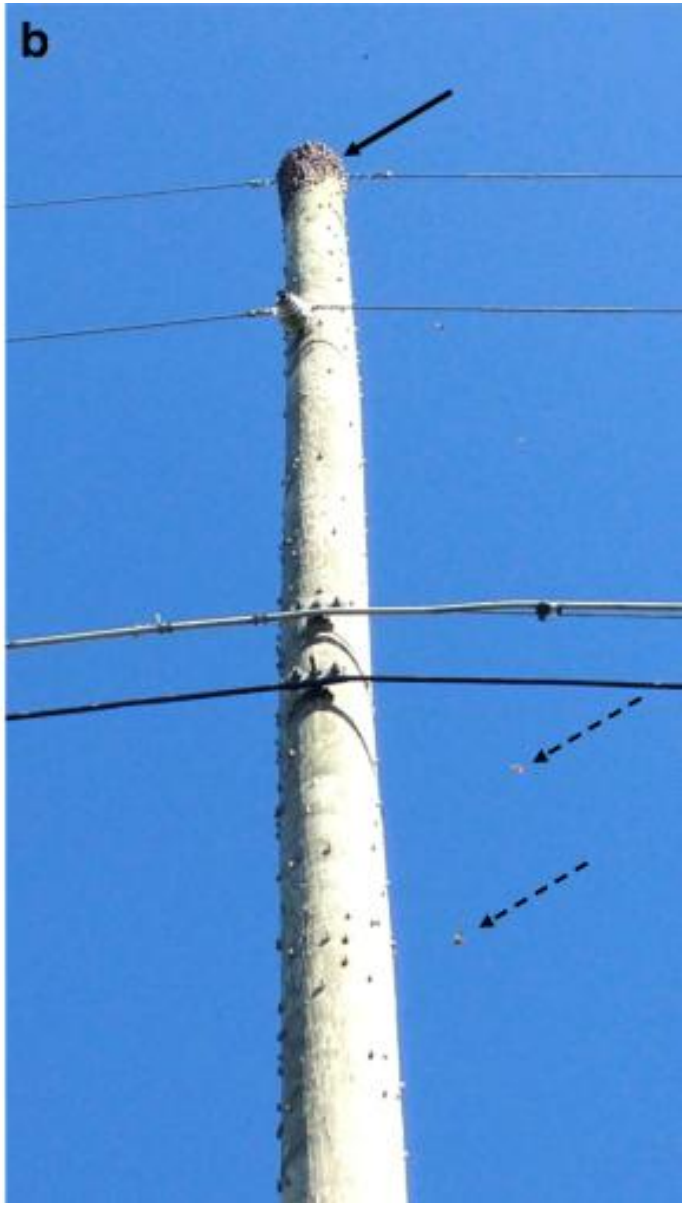
- Adults, generally, **fly 10-50 meters**
- But, can be much further on thermal currents
- Nymphs disperse ~17 meters/week

Keller JA, Johnson AE, Uyi O, Wurzbacher S, Long D, Hoover K. Dispersal of Lycorma delicatula (Hemiptera: Fulgoridae) Nymphs Through Contiguous, Deciduous Forest. Environmental entomology. 2020 Oct;49(5):1012-8.

Wolfin MS, Binyameen M, Wang Y, Urban JM, Roberts DC, Baker TC. Flight dispersal capabilities of female spotted lanternflies (Lycorma delicatula) related to size and mating status. Journal of Insect Behavior. 2019 May;32(3):188-200.

And will use tall structures to help





Baker TC, Myrick AJ, Wolfin MS, Wang Y. Visual Responses of Flight-Dispersing Spotted Lanternflies, Lycorma delicatula toward a Tall Vertical Silhouette in a Vineyard. Journal of Insect Behavior. 2021 Mar;34(1):49-60.

Rapid spread is mainly the cause of humans

Laid on almost ANY surface

On September 25th, 2018 in Allentown:

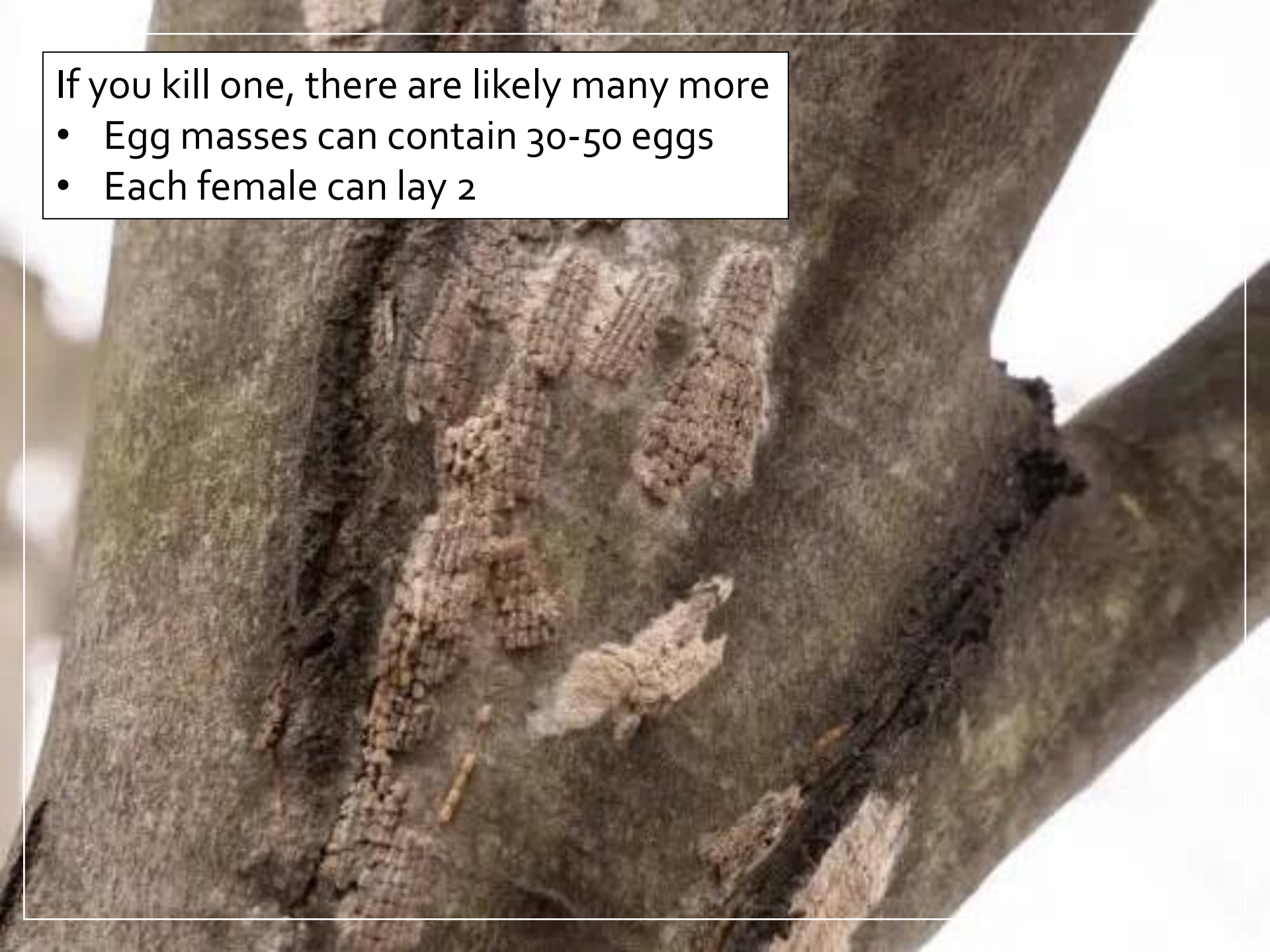
In <10 min, >50 SLF observed flying *en masse* from *A. altissima* trees growing along a set of railroad tracks to slow-moving freight-train cars

Wolfin MS, Binyameen M, Wang Y, Urban JM, Roberts DC, Baker TC. Flight dispersal capabilities of female spotted lanternflies (Lycorma delicatula) related to size and mating status. Journal of Insect Behavior. 2019 May;32(3):188-200.

What can you do?

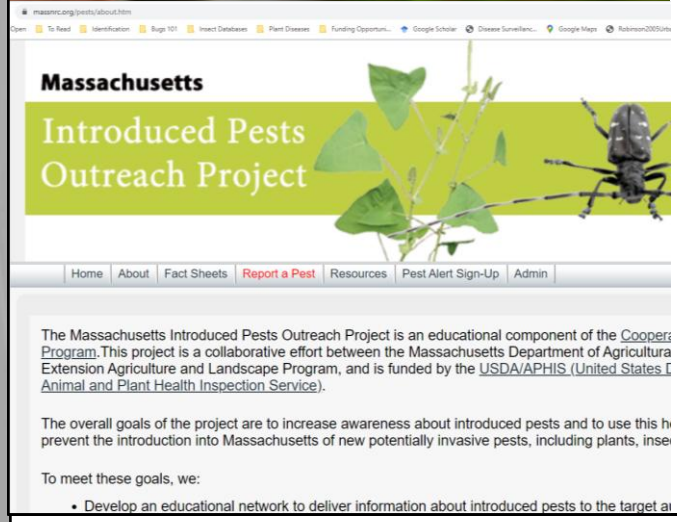
SHOULD YOU STOMP THEM?

- You don’t have to
- Only after you’ve taken a picture
- Only after you KNOW its spotted lanternfly



If you kill one, there are likely many more

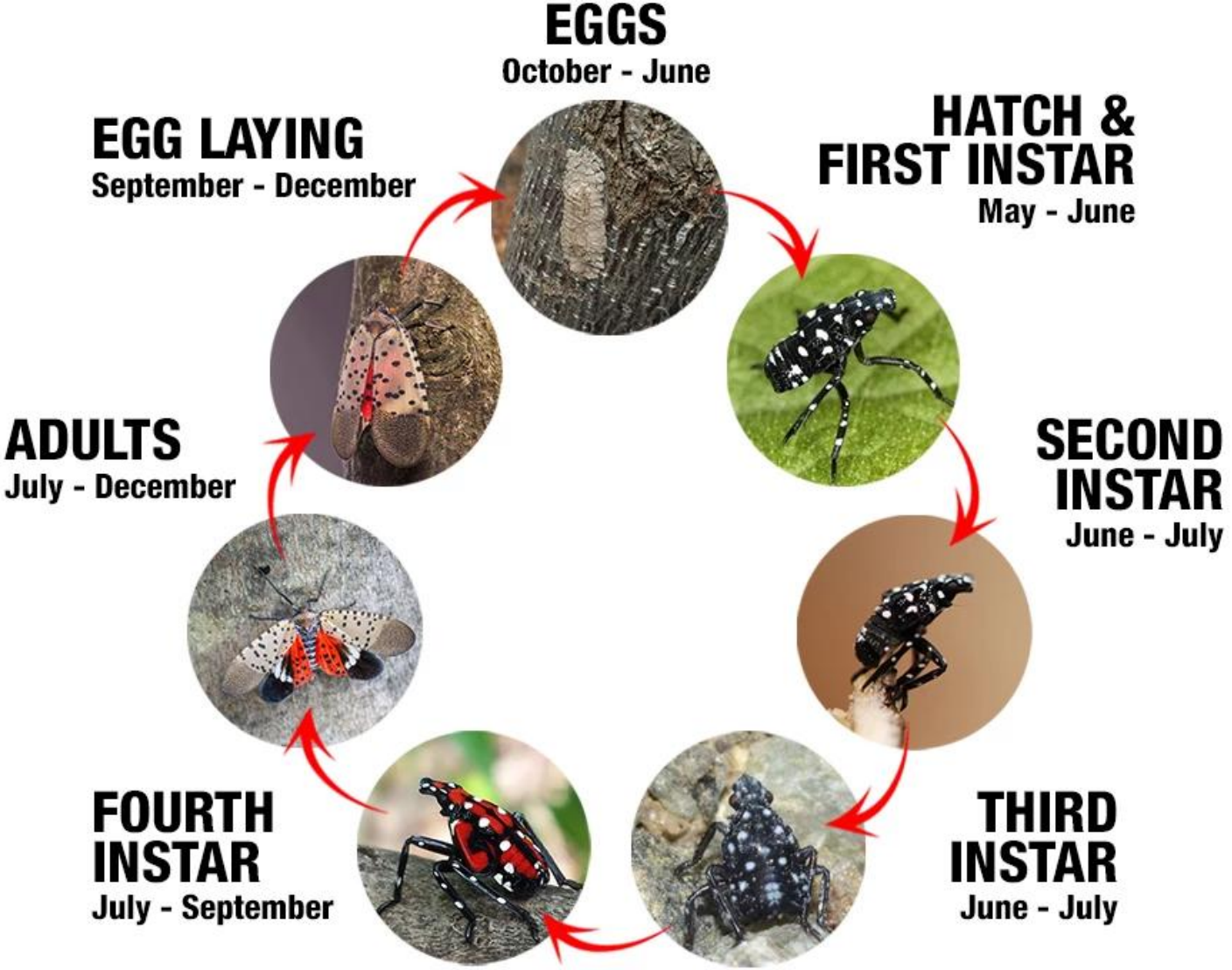
- Egg masses can contain 30-50 eggs
- Each female can lay 2



REPORT IT

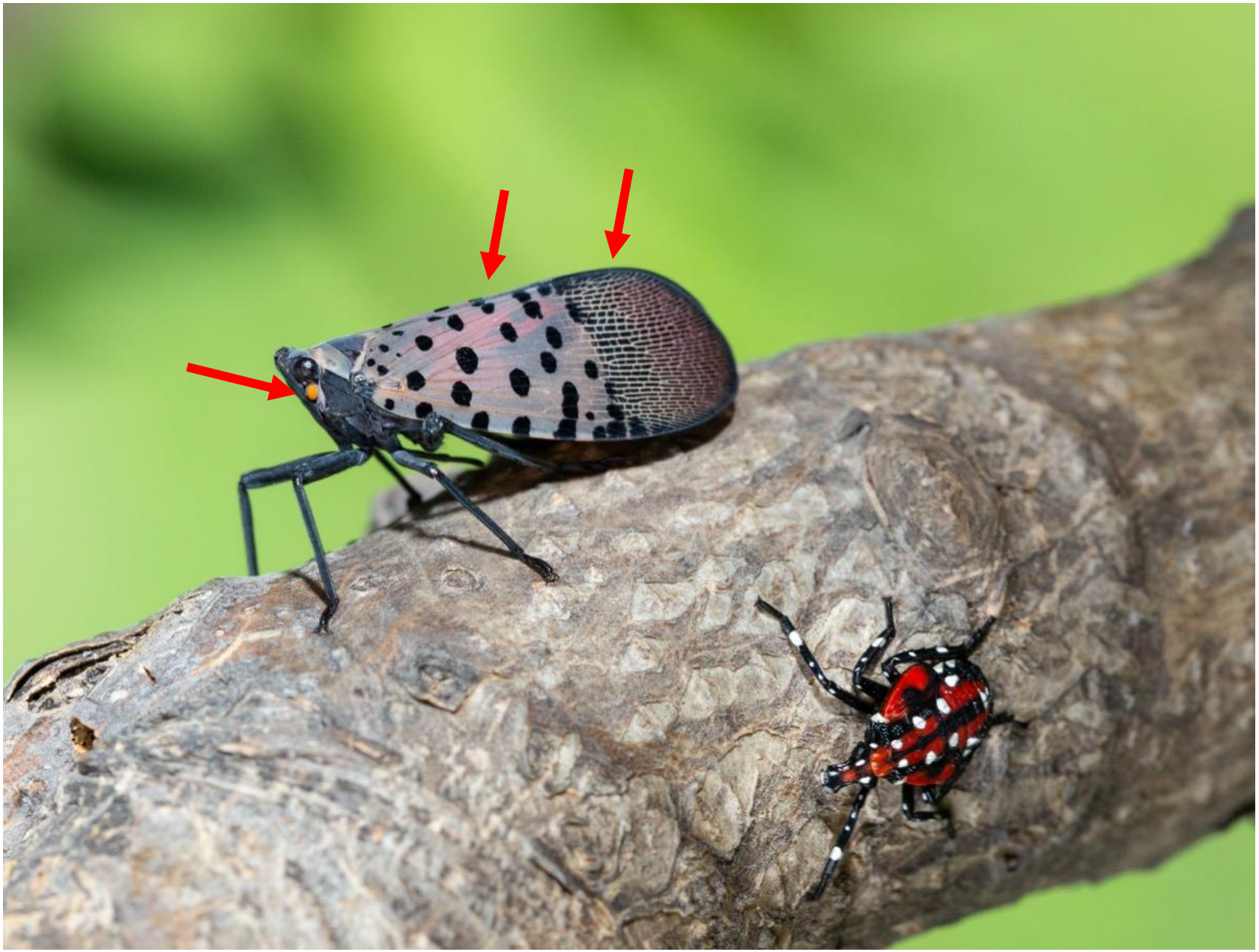
- INATURALIST
- MASS NRC

Lanternfly Changes Appearance Over Time



https://spottedlanternflykillers.com/pages/spotted-lanternfly-lifecycle

Blend in when wings are closed



Spotted Lanternfly Look-alikes
Adults and Nymphs

Spotted Lanternfly (Adult, Early Nymph, Later Nymph)



Lawrence Barringer, Pennsylvania Department of Agriculture, Bugwood.org

Boxelder Bug

William M. Ciesla, Forest Health Management International, Bugwood.org

Milkweed Bugs

Whitney Cranshaw, Colorado State University, Bugwood.org

Twomarked Treehopper

Milkweed Beetle

William M. Ciesla, Forest Health Management International, Bugwood.org

Ladybeetle

Virginia Tech News

Giant Willow Aphid

Gyorgy Csoka, Hungary Forest Research Institute, Bugwood.org

Tiger Moth

Elizabeth Benton, University of Georgia, Bugwood.org

Cicada

Gary Alpert, Harvard University, Bugwood.org

Parson Spider

Joseph Berger, Bugwood.org

Two Lined Spittlebug

Mark Elbrecht, Fredrick Co Maryland

Assassin Bug Nymph

Gerald J. Lenhard, Louisiana State University, Bugwood.org

Ailanthus Webworm

Ian Hathcock, Bugwood.org

If you suspect that you have found spotted lanternfly please contact :
Nebraska Department of Agriculture 402-471-2351 nda.nebraska.gov
Nebraska Forest Service 402-472-2944 nfs.unl.edu


5539457

Spotted Lanternfly Look-alikes

Egg Cases

Spotted Lanternfly Egg Cases

New

Emelie Swackhamer, Penn State University, Bugwood.org

Old

Lawrence Barringer, Pennsylvania Department of Agriculture, Bugwood.org

Praying Mantis Egg Cases

Whitney Cranshaw, Colorado State University, Bugwood.org

Mud Dauber Nests

Lyle Buss, University of Florida

Howard Ensign Evans, Colorado State University, Bugwood.org

Stink Bug Eggs

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

Cankerworm Eggs

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

Eastern Tent Caterpillar

David L. Clement, University of Maryland, Bugwood.org

Lichen on bark

Andrej Kunca, National Forest Centre - Slovakia, Bugwood.org

Karen A. Rawlins, University of Georgia, Bugwood.org

Mud on bark

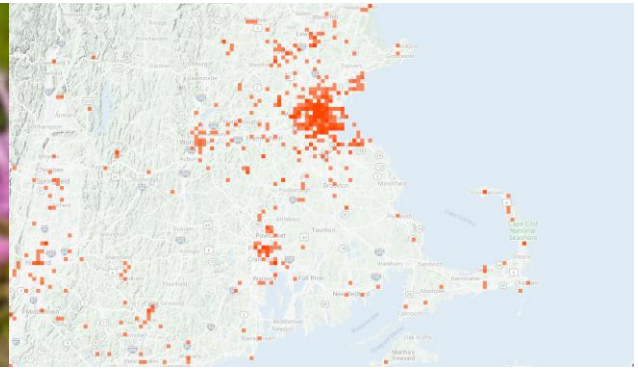
The Nebraska Forest Service: Improving lives by protecting, utilizing and enhancing Nebraska's tree and forest resources.

- Take a photograph
- Then, scrape eggs off

Nancy Bosold

Look for tree of heaven

Track Tree of Heaven on **iNaturalist**



Questions?

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