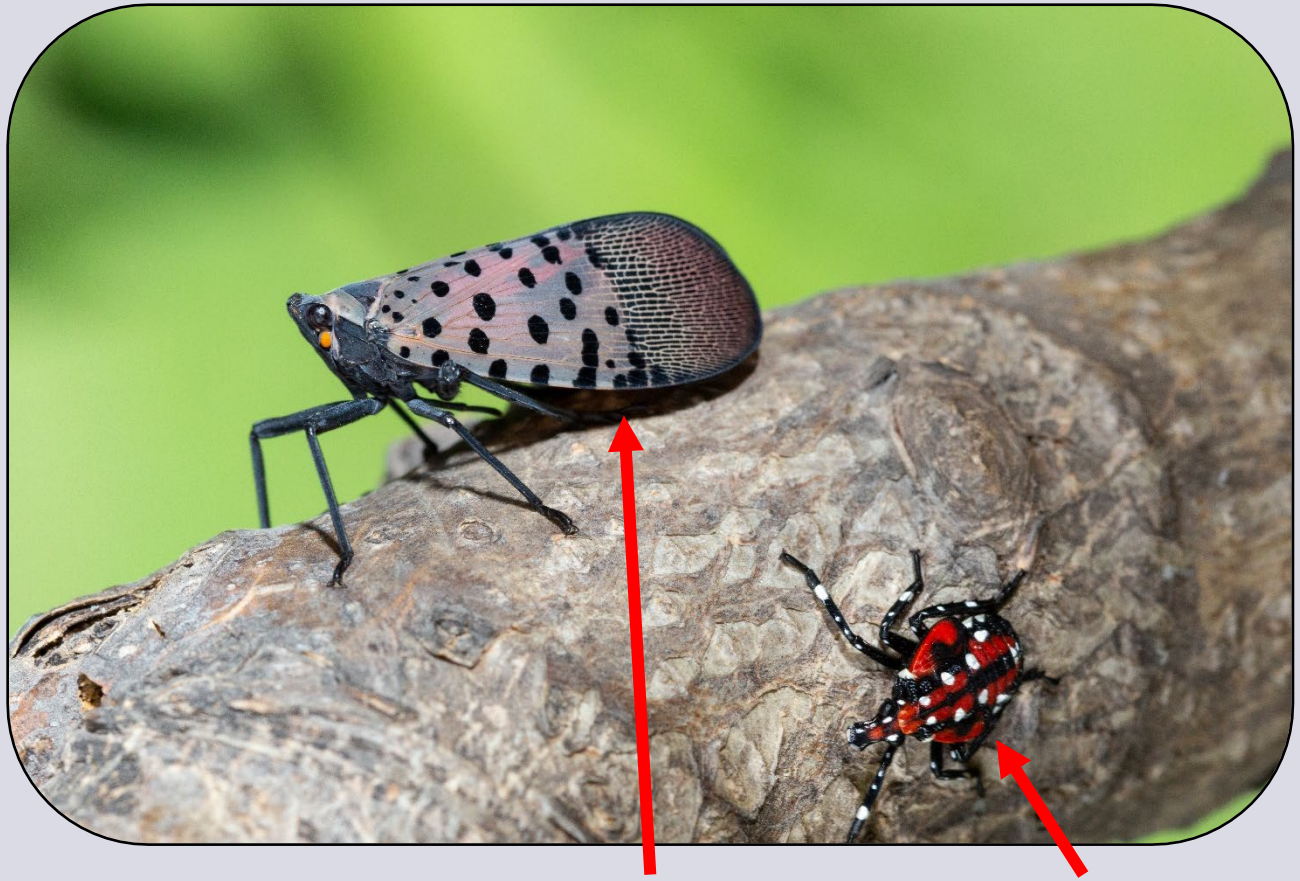
UF | IFAS Extension
UNIVERSITY of FLORIDA

Spotted Lanternfly
(Lycorma delicatula)

FLORIDA FIRST DETECTOR

Spotted Lanternfly

- Native to China, India, and Vietnam
- Order Hemiptera: true bug, not a moth
- First U.S. detection was in Pennsylvania in 2014
  - Berks County
- Invasive species
- Pest of hardwood and fruit trees (Sap feeder)



Spotted Lanternfly – adult and 4th instar nymph

Photo: U.S. Department of Agriculture, Stephen Ausmus, Flickr.com, Flickr 20180720-ARS-SRA-d4020-09

Host Plants

- Common Hosts:
  - More than 70 host plant species
    - **Tree of heaven** (*Ailanthus altissima*) – **invasive tree**
      - Adult spotted lanternfly accumulates cytotoxins from the tree of heaven. It is used as chemical defense against predators.
      - Can grow 70-100 feet tall

Tree of heaven (*Ailanthus altissima*)

Photo: University of Georgia, Chuck Bargeron, Bugwood.org #1150026

Host Plants: Florida

- Florida hosts can include:
  - Ornamentals:
    - maple, oak, pine, poplar, and sycamore trees
  - Agricultural:
    - blueberries, grapes, peaches (and other stone fruits)

Grapes, Genus *Vitis*

Peach, *Prunus persica*

Live Oak, *Quercus virginiana*

Photo:University of Georgia Plant Pathology , University of Georgia, Bugwood.org, #1495065; Peggy Greb, USDA Agricultural Research Service, Bugwood.org, #UGA1355015; Paul A. Mistretta, USDA Forest Service, Bugwood.org, #UGA1501049

Dispersal

- Spotted Lanternfly can be accidentally spread through many routes: eggs, nymphs, and adults
  - **Vehicles**, backs of trucks, outdoor surfaces, **metal bins**, kiddie pools, homes (mobile homes), **building materials**, tars, gardening tools, tractors, sandboxes
  - **Human transporting and activity** can unknowingly spread these insects; **wind** can transport nymphs
  - When traveling to other states, be sure to check equipment of hitchhiking insects like the spotted lanternfly

Spotted lanternfly 4th instar nymph on tire - Pennsylvania

Rusted barrel with spotted lanternfly egg masses

Photo: Lawrence Barringer, Pennsylvania Department of Agriculture, Bugwood.org, #5537187; Lawrence Barringer, Pennsylvania Department of Agriculture, Bugwood.org, #5544763

Signs, Symptoms and Damage

- Sap that oozes or weeps
- Honeydew builds up:
  - On plants
  - On the ground (underneath infested plants)
- Sooty mold on infested plants
- Wilting
- Defoliation and dieback

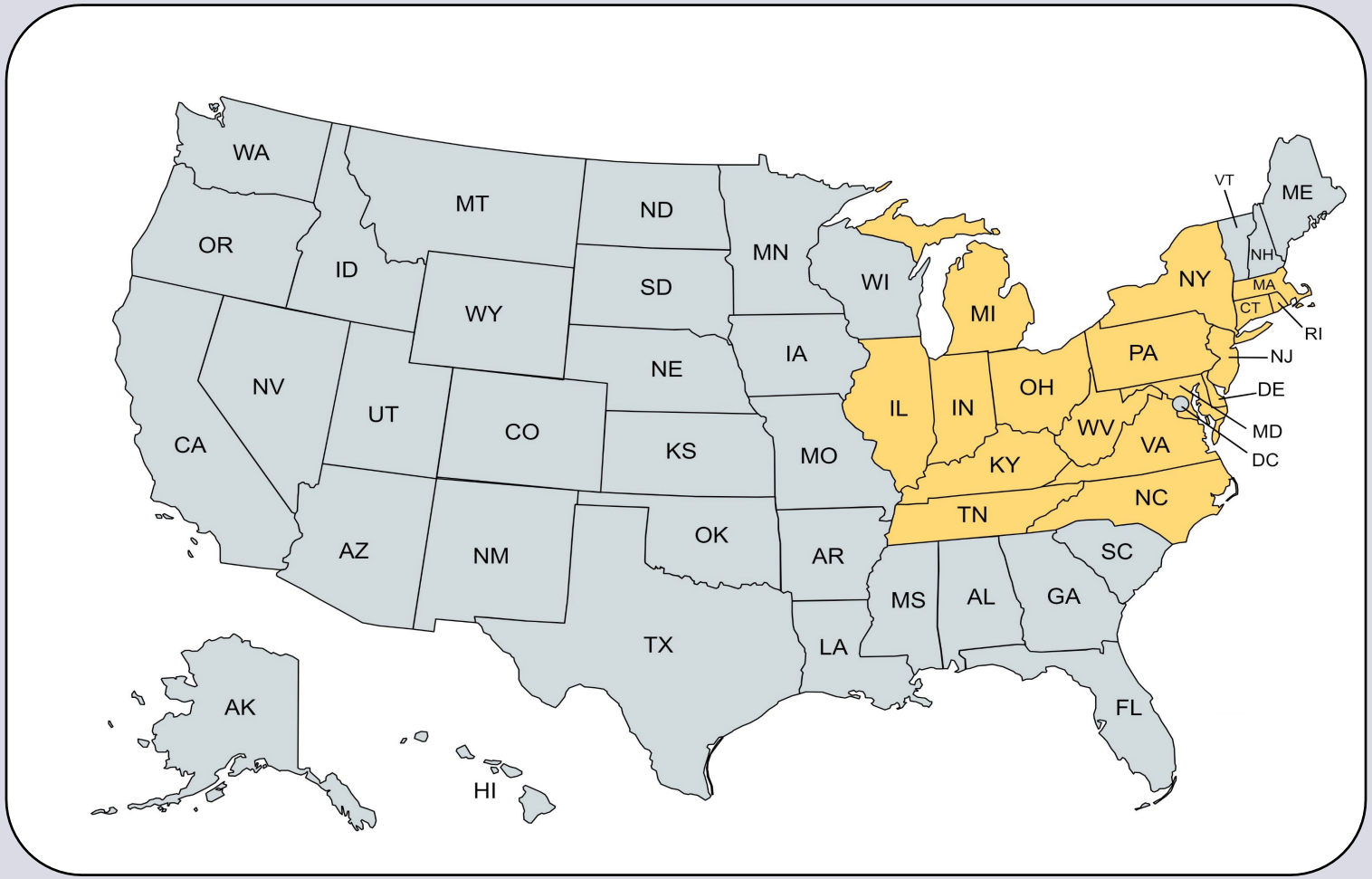
Photos: Pennsylvania Department of Agriculture, Lawrence Barringer, Bugwood.org #5522645; #5385954

Distribution

- Not established in Florida, however our state is home to the invasive plant host, the tree of heaven.

☐ Not reported

☐ Reported populations by USDA APHIS in parts of the state



Life cycle

Adults begin to appear in July

Red nymphs seen from July to September

Black nymphs seen between April and July

Eggs laid in the fall

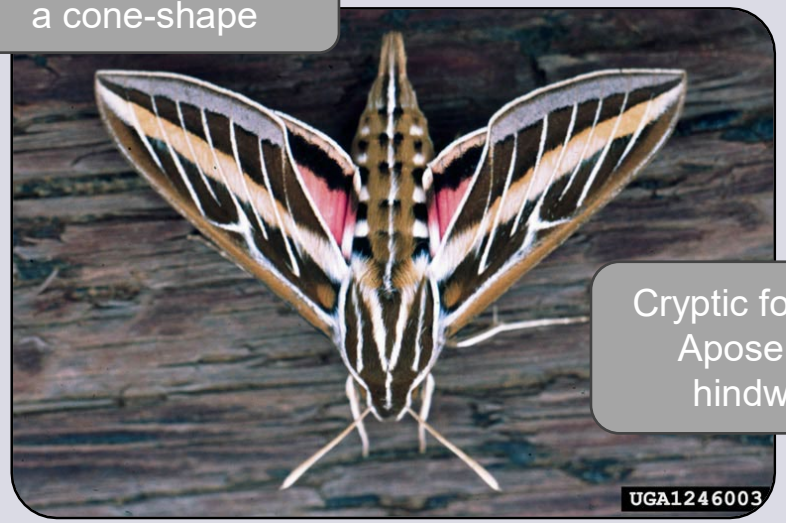
Photos: Pennsylvania department of Agriculture,, Bugwood.org #552451 (*adult*); #5522647 (*eggs left*); #5535776 (immature black); U.S. Department of Agriculture, Stephen Ausmus, flickr.com 20180716-ARS-SRA-d4021-02 (immature black); 20180716-ARS-SRA-d4021-02 (eggs right)

Nymphs: Four Instars (Growth Stages)

Photo: Tea-Kesting-Handly, Pennsylvania Department of Agrilculture

Look a Like Species

Abdomen tapers to a cone-shape



Cryptic forewings
Aposematic hindwings

White-lined Sphinx (*Hyles lineata*)

Cryptic forewings and hindwings

Tip of abdomen is red

Buck Moth
(*Hemileuca maia*)

Spotted Lanternfly
Lycorma delicatula

White line on forewing

Orange line on hindwing

Grapevine Epimenis
(*Psychomorpha epimenis*)

Orange coloring dispersed on head and wings

Milkweed bug
(Oncopeltus fasciatus)

Photos: Auburn University, Lacey Hyche, Bugwood.org #1540291 (top left); Louisiana State University, Gerald Lenhard, Bugwood.org #UGA0014195 (top middle); Pennsylvania Department of Agriculture , Bugwood.org, #5524068; Andy Reago & Chrissy McClarren, flickr.com # 9309; University of Georgia, Russ Ottens, Bugwood.org :5367955

Monitoring and Management

- Scouting
  - Nymphs may feed on herbaceous plants
  - Check on adult preferred plants
  - Individuals tend to move around frequently
- Management
  - Remove preferred host plants: **Tree of heaven**
  - Find and destroy eggs
  - **Sticky wraps for trees**
    - **Not needed in FL** because species is not established in our state.

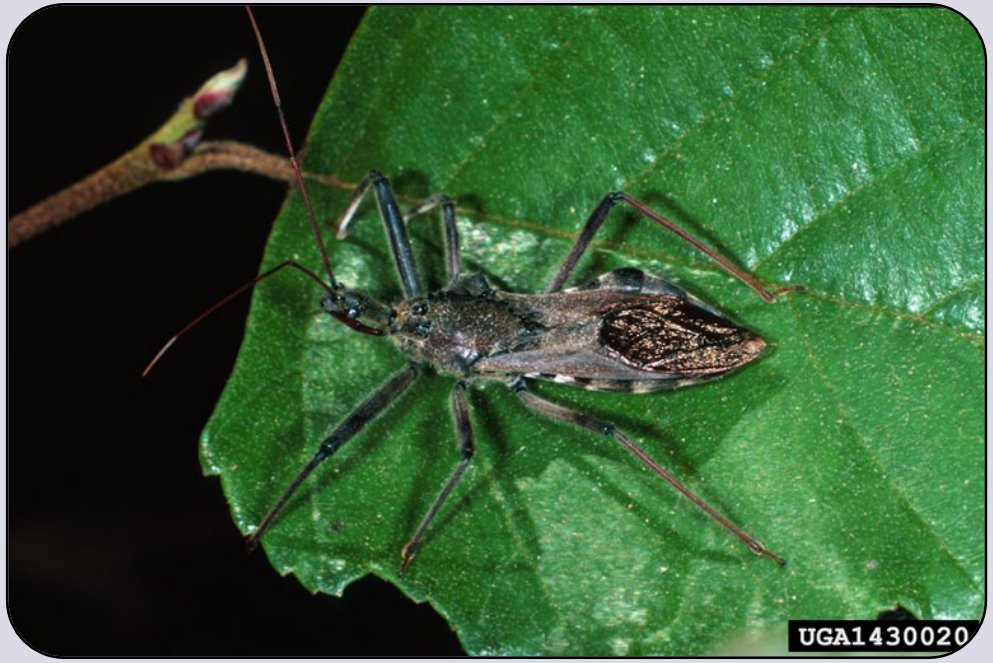
Infestation of spotted lanternfly on sycamore tree (Pennsylvania)

Nymphs trapped on brown adhesive band on tree

Photo: Lawrence Barringer, Pennsylvania Department of Agriculture, Bugwood.org, #5563441; Lawrence Barringer, Pennsylvania Department of Agriculture, Bugwood.org, #5544787; Pennsylvania Department of Agriculture - Commonwealth of Pennsylvania

Biological Control: Predators

Wheel bug, *Arilus cristatus*



- 2015 – first observation of predation of spotted lanternfly by wheel bug
- Common generalist predator (beneficial – assassin true bug)
- Widely distributed in U.S. (in FL)
- Toxic, paralytic substance in saliva kills prey

Predatory stinkbug nymph, *Apoecilus cynicus*

- First observed predation on spotted lanternfly in Berks County, PA
- Common generalist predator
- Can be commonly found on maple trees like Florida Maple or Red Maple

Photo: Lacy L. Hyche, Auburn University, Bugwood.org, #UGA1430020; Mike Quinn – BugGuide, Iowa State University Department of Plant Pathology, Entomology and Microbiology

Biological Control: Parasitoid

- This parasitoid wasp was introduced to the United States in 1908.
  - Was often used to control the spongy moth population through the egg life stage of spongy moths.
  - It has also been found parasitizing the spotted lanternfly, but not a high rate.
    - This occurred in Pennsylvania in 2016

Encyrtid parasitoid wasp
Ooencyrtus kuvanae

Photo: Gyorgy Csoka, Hungary Forest Research Institute, Bugwood.org, #5371176

Biological Control: Entomopathogenic Fungi

- Entomopathogenic fungal pathogens are being researched for their ability to control population of spotted lanternfly.
  - *Beauveria bassiana*
    - First evidence of fungus found to kill adult of spotted lanternfly in 2017 in Berks County, Pennsylvania.
    - Known to infect many sap-sucking pests like aphids, mealybugs, and scales in the Hempiteran order.
    - Still research to see how non-target insects may be affected and how to minimize infection of those non-target insects.

Spotted lanternfly killed by entomopathogenic fungus, *Beauveria bassiana*

Photo: Eric Clifton, 2021 –Dr. Ann Hajek Lab, Cornell University

Chemical Control

- **Label is the law**
  - Be mindful of **beneficial insects** and **non-target insects**.
- Neem oil, insecticidal soap, horticultural spray oil
  - Target egg life stages
- Natural pyrethrins
- Systemic insecticides: Professionals apply
  - Dinotefuran
    - Soil drench
    - Trunk spray
    - Trunk injection – **last resort**
  - Imidacloprid
    - Soil drench
    - Trunk injection

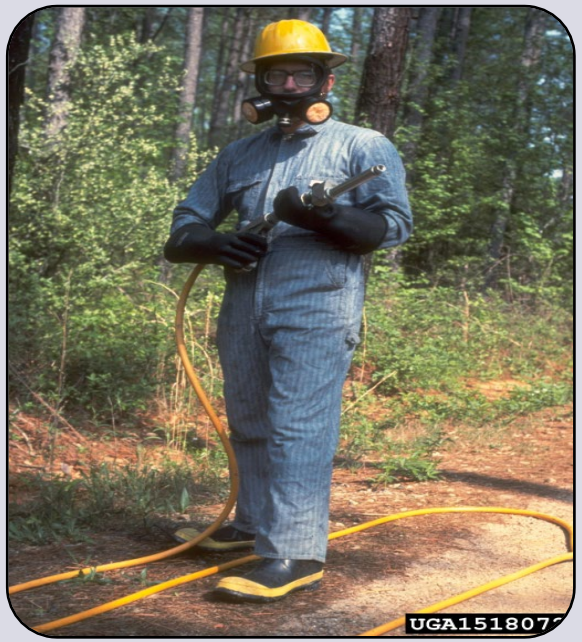
Soil drenching - imidacloprid

Stem injection – systemic insecticide

Photo: Great Smoky Mountains National Park Resource Management , USDI National Park Service, Bugwood.org, #UGA1344057; Great Smoky Mountains National Park Resource Management, USDI National Park Service, Bugwood.org, #UGA1344045

Factors to Consider in Chemical Control

- Risk of hurting **beneficial and pollinating insects**
  - Do not apply during time of blooming/flowering
- **Chemical drift in air** of insecticides to unintended areas
- **Water contamination**
- Use the **right amount according to label**
- Use **a combination of insecticides** and not the same one to **reduce resistance by insects**
- Use least toxic insecticide
- Wearing proper **personal protective equipment**
  - Contact extension office to ask about recommendations for certain chemicals to apply



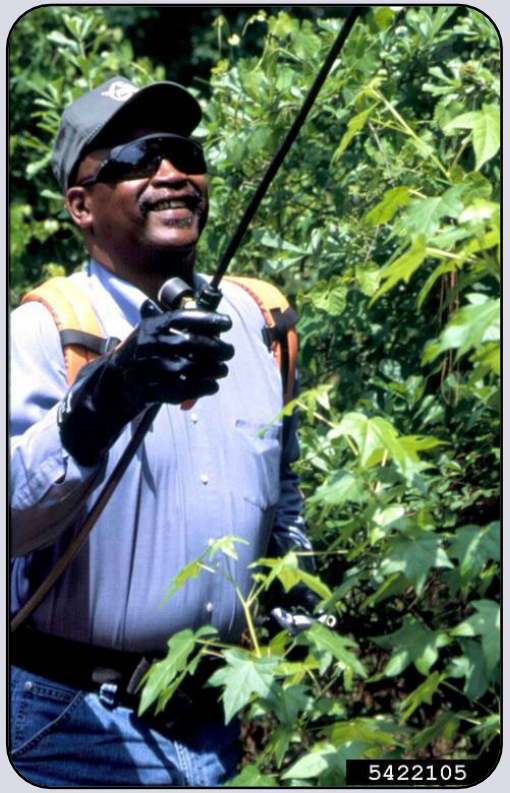


Photo:Juan Campá, MGAP, Bugwood.org, #5548578; James H. Miller, USDA Forest Service, Bugwood.org, #5422105; USDA Forest Service - Region 8 - Southern , USDA Forest Service, Bugwood.org, #UGA1518072

Reporting to UF/IFAS Faculty in Florida

- Local county extension office

https://sfyl.ifas.ufl.edu/find-your-local-office/

- Insect ID Lab - Dr. Lyle Buss

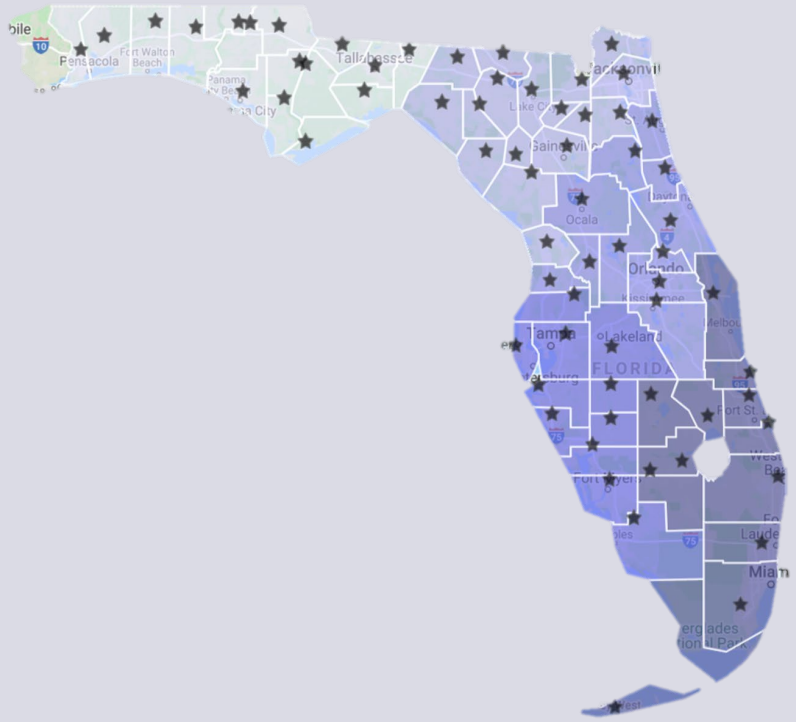
http://entnemdept.ufl.edu/insectid/

- Nematode Diagnostic Lab - Dr. Billy Crow

http://nematology.ifas.ufl.edu/assaylab/index.html

- Plant Diagnostic Center - Dr. Carrie Harmon

https://plantpath.ifas.ufl.edu/extension/plant-diagnostic-center/



Reporting to FDACS-DPI in Florida

Florida Department of Agriculture and Consumer Services (FDACS) - Division of Plant Industry (DPI)

- FDACS, DPI Responsibility
  - Announcing detection or establishment of new invasive species.
  - Reporting is a legal obligation under Florida Statute 581.091.
- Submission Form
  - http://forms.freshfromflorida.com/08400.pdf
  - https://www.fdacs.gov/Agriculture-Industry/Pests-and-Diseases/How-to-Submit-a-Sample-for-Identification

FDACS, DPI Contact

- Dr. Leroy Whilby, Bureau Chief-Entomology, Nematology and Plant Pathology
  - 352-395-4661
  - Leroy.whilby@freshfromflorida.com
- Dr. Paul Skelley, Assistant Chief-Entomology, Nematology and Plant Pathology
  - 352-395-4678
  - Paul.skelley@freshfromflorida.com
- Division of Plant Industry Hotline
  - 1-888-397-1517
  - DPIHelpline@FDACS.gov

Reporting using DDIS in Florida

Digital Diagnostic and Identification System (DDIS)

- Digital Diagnostic Collaboration
  - Extension agents
  - Laboratories
  - Clinics
  - Specialists
- https://ddis.ifas.ufl.edu/

Find More Information At:

https://entnemdept.ufl.edu/ffd/

Lab Team

Authors & Editors

Julia Rycyna, M.S.
Department of Entomology and Nematology, University of Florida

Ariana Rollins, B.S. – Graduate Student, Doctor of Plant Medicine Program, University of Florida

Daniela Perez Lugones, M.S. – Graduate Student, Doctor of Plant Medicine Program, University of Florida

Lyuyi Chen, M.S. – Graduate Student, Doctor of Plant Medicine Program, University of Florida

Sarah Tafel, B.S. – Graduate Student, Doctor of Plant Medicine Program, University of Florida

Lab Director

Amanda Hodges, Ph.D. - Extension Scientist and DPM Director, Department of Entomology and Nematology, University of Florida

Collaborating Agencies

- U.S. Department of Agriculture Animal and Plant Health Inspection Service (USDA-APHIS)
- Cooperative Agricultural Pest Survey Program (CAPS)
- Florida Department of Agriculture and Consumer Services (FDACS)
- National Plant Diagnostic Network (NPDN)
- Sentinel Plant Network (SPN)
- University of Florida Institute of Food and Agricultural Sciences (UF-IFAS)
- Protect U.S.

Educational Disclaimer and Citation

- This presentation can be used for educational purposes for NON-PROFIT workshops, trainings, etc.

- Citation:
  - University of Florida, Entomology and Nematology Department, Biosecurity Research and Education Lab. May 2024, Spotted Lanternfly, Day Accessed

References

- Animal and Plant Health Inspection Service. 2024. Spotted Lanternfly. United States Department of Agriculture. https://www.aphis.usda.gov/plant-pests-diseases/slf#:~:text=Spotted%20lanternfly%20populations%20are%20in,%2C%20Virginia%2C%20and%20West%20Virginia.
- Clifton, E.H., Castillo, L.A., Jaronski, S.T., Hajek, A.E. 2023. Cryptic diversity and virulence of Beauveria bassiana recovered from Lycorma delicatula (Spotted lanternfly) in eastern Pennsylvania. Front. Insect Sci., Sec. Invasive Insect Species. Volume 3. https://doi.org/10.3389/finsc.2023.1127682
- Cornell College of Agriculture and Life Sciences. Spotted lanternfly damage. Accessed November 2, 2022.https://nysipm.cornell.edu/environment/invasive-species-exotic-pests/spotted-lanternfly/spotted-lanternfly-ipm/damage/
- Cornell College of Agriculture and Life Sciences. Tree of heaven (TOH), *Ailanthus altissima.* Accessed November 2, 2022.https://nysipm.cornell.edu/environment/invasive-species-exotic-pests/spotted-lanternfly/spotted-lanternfly-ipm/hosts/
- Dara, S.K. 2018. An update on the invasive spotted lanternfly, Lycorma delicatula: Current distribution, pest detection efforts, and management strategies. Pest News eJournal about endemic and invasive pests in California. University of California, Agriculture and Natural Resources. https://ucanr.edu/blogs/pestnews/index.cfm?tagname=tree-of-heaven.
- Hajek, A. 2022. Hajek Lab. Insect Pathology and Epizootiology of Enomopathogens. Cornell University. https://blogs.cornell.edu/hajek/spotted-lanternfly/
- New Jersey Department of Agriculture. About the spotted lanternfly. Accessed November 1, 2022.https://www.nj.gov/agriculture/divisions/pi/prog/pests-diseases/spotted-lanternfly/about/
- New York State Integrated Pest Management. No date. Spotted Lanternfly Damage. Cornell College of Agriculture and Life Sciences. https://cals.cornell.edu/new-york-state-integrated-pest-management/outreach-education/whats-bugging-you/spotted-lanternfly/spotted-lanternfly-damage.
- New York State Department of Environmental Conservation. Spotted lanternfly. Accessed November 1, 2022.https://www.dec.ny.gov/animals/113303.html
- Otto, E. 2021. Spotted Lanternfly Control Program in the Mid-Atlantic Region, North Carolina, Ohio, and Kentucky. Animal and Plant Health Inspection Services. United States Department of Agriculture. https://www.aphis.usda.gov/sites/default/files/supplemental-slf-mid-atlantic-october-2021.pdf
- Scott, C., Kaufman, P.E. 2022. Buck Moth Hemileuca Maia (Drury). Publciation #EENY464. EDIS. University of Florida/IFAS Extension. https://edis.ifas.ufl.edu/publication/IN834.
- PennState Extension. 2021. Spotted lanternfly management guide. Accessed November 2, 2022.https://extension.psu.edu/spotted-lanternfly-management-guide
- USDA APHIS. Spotted lanternfly. Accessed November 1, 2022. https://www.aphis.usda.gov/aphis/resources/pests-diseases/hungry-pests/the-threat/spotted-lanternfly/spotted-lanternfly