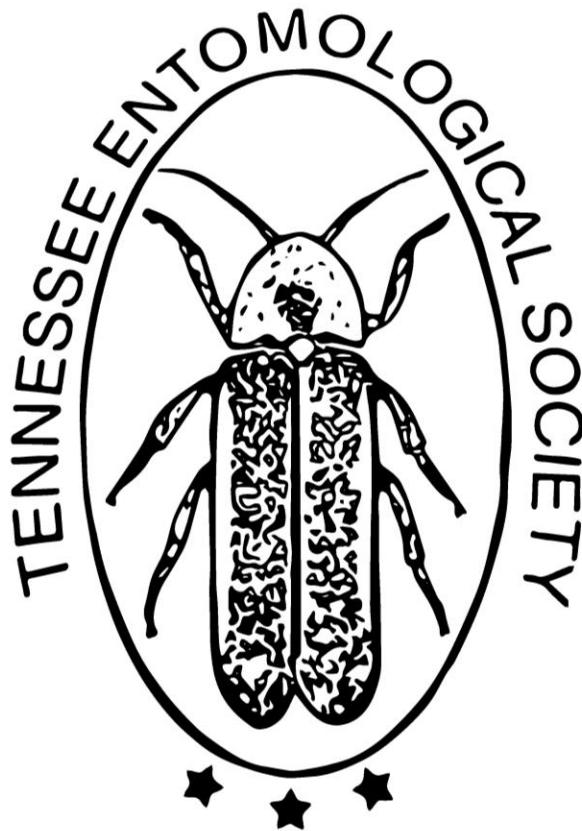


THE FIREFLY

**Proceedings of the 45th Annual Meeting
of the
Tennessee Entomological Society**



October 4-5, 2018

**Room 130
Brehm Animal Sciences Building
University of Tennessee
Knoxville, Tennessee**

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RICHARD E. CARON

OUTSTANDING ENTOMOLOGIST AWARD

NOMINATION FORM

The Awards Committee of the Tennessee Entomological Society invites nominations from any TES member for the Richard E. Caron Outstanding Entomologist Award. The award is awarded periodically to TES members who have distinguished themselves by making outstanding contributions to entomology in Tennessee.

Name of Nominee _____

Brief Description of His/Her Qualifications for the Award

Name of Nominator _____

Phone Number of Nominee: Area Code () _____

Please submit your nomination by **August 1, 2019** to:

Dr. Jerome Grant

University of Tennessee
Institute of Agriculture
432 Plant Biotechnology Building
Knoxville, TN 37996
jmoulton@utk.edu
865-974-7950

**PROCEEDINGS
OF THE 45th
ANNUAL MEETING**

**OCTOBER 4-5,
2018**

Keynote Speaker

The value of native bees: feeding and supporting our communities

Keynote Address, Tennessee Entomological Society 45th Annual meeting

Nancy Adamson

Pollinator Conservation Specialist, USDA Natural Resources Conservation Service and Xerces Society

Student Presentations

Undergraduate

***Aedes albopictus* co-occurs with other *Aedes* species in artificial oviposition cups: Knox County, TN**

Andrew Dixon¹, Rebecca Trout Fryxell¹ Ronnie Nease² and Nathan Jackson²

¹Department of Entomology and Plant Pathology, University of Tennessee, Knoxville, TN

²Department of Health, Knox County, TN

La Crosse virus (LACV) is the leading cause of arboviral encephalitis in children in the United States and is transmitted to humans through the bite of an infected *Aedes* mosquito. Interactions between *Aedes triseriatus*, the primary vector of LACV, and *Aedes albopictus*, an accessory vector invasive to the United States, may influence the risk of LACV transmission to humans through synergistic or competitive effects. We used plastic oviposition cups located at eighteen sites throughout Knox County, TN, to determine the degree of co-occurrence between eggs of *Aedes albopictus* and other *Aedes* species during the 2016 and 2017 mosquito seasons. Next, we identified heterogeneity in the degree of co-occurrence with respect to time and space. Cole's coefficients of interspecific association (C_7) revealed that *Ae. albopictus* eggs co-occurred with other *Aedes* species more often than would be expected in a random distribution. Furthermore, both *Ae. albopictus* and other *Aedes* species preferred to oviposit in black-colored ovicups containing grass-infused water. An analysis of variance revealed that time of year and geographic location were significant sources of heterogeneity for egg counts of both species, and a window of co-occurrence was identified from June to August for the 2016 collections. Co-occurrence between *Ae. albopictus* and other *Aedes* eggs implies that methods used to control *Ae. albopictus* at the larval stage may also control other *Aedes* species at La Crosse endemic sites.

Modeling the range of thousand cankers disease in the eastern US under future climate predictions: The climates they are a changing

Brianna Alred¹, Benjamin Reber², Benjamin Schenk³, Greg Wiggins⁴ and Monica Papes⁴

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²Mathematics Department, Houghton College, Houghton, NY

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Graduate

Monitoring field populations of *Orius insidiosus* and thrips in sweet pepper using herbivore induced plant volatiles

Uzoamaka C. Abana, Kaushalya G. Amarasekare and Richard H. Link

Department of Agricultural and Environmental Sciences, Tennessee State University, Nashville, TN

Impact of insecticide on pollinator communities in a forested system: A model system using hemlocks, *Rhododendron maximum*, and imidacloprid

David Bechtel¹, Jerome Grant¹, Becky Nichols², Jesse Webster², Gregory J. Wiggins³ and John Skinner¹

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²Great Smoky Mountains National Park, National Park Service, Gatlinburg, TN

³National Institute for Mathematical and Biological Synthesis, University of Tennessee, Knoxville, TN

Eastern hemlock, *Tsuga canadensis* (L.) Carrière (Pinales: Pinaceae), has been dying in eastern North America at a high rate since the arrival of the invasive pest hemlock woolly adelgid (HWA), *Adelges tsugae* Annand (Hemiptera: Adelgidae). Predators introduced for biological control from the native range of HWA have potential to ameliorate some impacts of HWA but little evidence suggests that these predators will prevent hemlock mortality. Currently, the only effective control of HWA has been through the use of the neonicotinoid pesticide imidacloprid. Studies conducted to assess responses of associated macroinvertebrate communities have included examining effects of the imidacloprid treatments on soil arthropods, canopy arthropods, and aquatic macroinvertebrates.

One more piece of the puzzle is to assess the impact of imidacloprid treatments on pollinators of hemlock-associated flowering plants, specifically *Rhododendron maximum* L. (Ericales: Ericaceae). Imidacloprid is a systemic neonicotinoid insecticide that is readily translocated by plants and can be present in all parts of the plant, including pollen and nectar. Neonicotinoids have been tentatively linked to pollinator decline. The purpose of the proposed research is to assess if a quantifiable difference in pollinator species diversity, abundance, and evenness is associated with the neonicotinoid insecticide treatments of hemlock woolly adelgid-infested eastern hemlock in the Great Smoky Mountains National Park. Research objectives are to: 1) determine the influence of imidacloprid treatment of hemlock trees on pollinators of adjacent, non-target *R. maximum*, 2) assess influence of imidacloprid treatment of hemlock on seed production and germination of seed collected from *R. maximum* growing in close association with treated hemlocks, and 3) determine species incidence, species composition, and seasonality of pollinators of *R. maximum* in the Great Smoky Mountains National Park. This research will inform resource management about potential ecological risks to pollinators from the use of imidacloprid in a forest system.

Hosts factors and abiotic factors affect expansion of *Borrelia*-infected tick populations in southeastern states

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3 Tennessee Department of Health, Nashville TN, USA

4 Department of Environmental Science and Technology, University of Maryland, College Park MD, USA

Lyme disease is caused by the bacterium *Borrelia burgdorferi* sensu stricto (*Bbss*), which in the eastern US is vectored by *Ixodes scapularis* (the blacklegged tick). Blacklegged ticks are found in wooded habitats throughout the eastern US, however populations infected with *Bbss* have been rare in most southeastern states. To explain this pattern, it has previously been suggested that: i) tick abundance may be too low in most southern states for *Bbss* cycles to easily persist; and ii) that immature black-legged ticks in the Southeast may feed primarily on lizards, which are non-reservoir-competent hosts for *Bbss*.

We are undertaking field studies to quantify the latitudinal gradient in *Bbss* prevalence in ticks along the eastern and western foothills of the Appalachian Mountains to determine more precisely how far south infected blacklegged ticks can be found, and to test the hypothesis that there is an ecological

barrier limiting southwards spread of infected ticks. We sampled 102 sites in eastern Tennessee (TN), southeastern Kentucky (KY), and southwest Virginia (VA) using drag-cloth survey methods in winter 2017-2018, the season when adults are most active. All ticks were tested for *B. burgdorferi* by 16S PCR. A subset were further tested by IGS PCR and sequencing to determine *Borrelia* species identity and RST strain type.

Bbss-infected *I. scapularis* populations were found throughout VA's New River Valley, from the West Virginia border south into North Carolina. *Bbss*-infected tick populations were also detected in four TN counties and three KY counties. *Bbss* prevalences among blacklegged ticks at infected sites in VA, TN and KY were 46%, 23% and 4%, respectively. *Ixodes scapularis* in TN share *Borrelia* RST1 types with the VA tick population, and RST2 types with both the VA and KY tick populations.

The emerging disease foci that we have detected are closely associated with major river systems, which appear to act as corridors for spread of infected ticks. To better understand the characteristics of these foci of infection, we are using GIS techniques to map abiotic and other habitat factors associated with foci. In addition, we are evaluating Stable Isotope Analysis of wild-caught blacklegged ticks as a technique for characterizing host selection by ticks at *Bbss* foci. The relative importance of host vs. abiotic factors for emergence of infected tick populations will be discussed. A key goal of this research is to assess the likelihood that *Bbss*-infected tick populations will become more widespread in Tennessee and Kentucky in coming years.

Monitoring seasonal abundance of the green lacewing *Chrysopa nigricornis* in tree-fruit orchards in middle Tennessee

Kyle T. Williams, Kaushalya. G. Amarasekare and Richard H. Link
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TN.

Green lacewings (Neuroptera: Chrysopidae) are important natural enemies (generalist predators) of soft-bodied arthropods in many agricultural cropping systems including tree-fruit orchards. They play an important role in the integrated pest management (IPM) of arthropod pests. Information on green lacewings in Tennessee is scarce. Genus *Chrysopa* and *Chrysoperla* are the two most important genera of green lacewings in the family Chrysopidae. *Chrysopa nigricornis* is a large and robust green lacewing species that is commonly found in the tree-fruit orchards in the U.S. Both larvae and adults of *C. nigricornis* are predacious while only the larvae are predacious in the genus

Chrysoperla. We investigated the seasonal abundance of *C. nigricornis* and *Chrysoperla* species of green lacewings in apple and peach orchards in three middle Tennessee counties (Davidson, Chatham and Sumner) from March to October 2018, using two herbivore induced plant volatile (HIPV) treatments [squalene (*C. nigricornis*) and a combination of geraniol, methyl salicylate and 2-phenylethanol (*Chrysoperla* species)] using Delta traps with sticky liners. Lures were prepared in the laboratory using polyvinyl tubing and cotton wicks. The treatments were replicated four times and were arranged in a randomized complete block design (RCBD). Each trap (with a lure and a sticky liner) was hung on a tree branch approximately 1.5 - 2.0 m above ground. Lures and liners were replaced monthly and weekly, respectively. Each collected liner was covered with polythene wrap and stored in a freezer until the lacewing identification. Weekly collections of sticky liners from the squalene lure traps showed two peaks of *C. nigricornis* populations. The peaks occurred in May and late-August, respectively. Due to this discovery, it is believed that *C. nigricornis* is bivoltine in Tennessee. We observed a low population of *Chrysoperla* species. We also speculate that temperature plays an important role in the seasonal abundance of *C. nigricornis*.

Biochemical and transcriptome characterization of the cellulolytic system in *Thermobia domestica* for identification of novel enzymes with industrial applications

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²Department of Entomology and Nematology, University of California, Davis, CA

³Department of Plant sciences, University of Tennessee, Knoxville, TN

Rickettsia proliferation in fleas and Ticks on small mammals by the detection of ompA and gltA proteins

Rebecca A. Butler¹, Rebecca Trout Fryxell², Allan E. Houston³, Emerson K. Bowers¹, David Paulsen², Lewis B. Coons¹ and Michael L. Kennedy¹

¹Department of Biology, University of Memphis, Memphis, TN

²Department of Entomology and Plant Pathology, University of Tennessee, Knoxville, TN

³Department of Forestry, Wildlife and Fisheries, University of Tennessee, Knoxville, TN

Selection for resistance to insecticidal RNAi in Colorado potato beetle (*Leptinotarsa decemlineata*)

Swati Mishra¹, James Dee¹, Bill Moar², Jodie Beattie² and Juan Luis Jurat-Fuentes¹

1University of Tennessee, Knoxville, TN
2Monsanto Company

Larvae and adults of Colorado potato beetle (*Leptinotarsa decemlineata*, CPB) are a major pest of potato and solanaceous crops in North America, Europe and Asia. This insect is characterized by its ability to quickly develop resistance to a wide range of chemical pesticides, urging the need to develop alternative management strategies. In the last decade, silencing of essential genes by RNA interference (RNAi) through ingestion of dsRNA produced in transgenic crops or in sprays has been identified as a revolutionary insecticidal technology. The highly specific nature of RNAi also probably makes it the safest insecticide to non-target organisms. Studies have shown that CPB is able to uptake dsRNA from the gut lumen and subsequently induce a potent systemic RNAi response, suggesting that RNAi could be a feasible novel control method for this insect pest. As we move towards the commercialization of insecticidal dsRNA pesticides, it becomes crucial to develop resistance management tools for the sustainability of this technology. Towards this goal, the current project aims to understand how insects develop resistance to insecticidal dsRNA. We describe the development of a population of CPB (named CEAS) that is >5,000-fold resistant to insecticidal dsRNA when compared to the population used for selection (named GC). Preliminary experiments suggest that nucleases are not involved in resistance. The results obtained from this project will allow to make science-based informed decisions towards the development of Insect Resistance Management (IRM) strategies for insecticidal RNAi and will allow the optimization of insecticidal RNAi technology.

Impacts of prescribed fire and forest thinning on tick populations and prevalence of tick-borne diseases in a southeastern mixed pine forest

Brent Newman¹, William B Sutton¹, Bharat Pokharel¹, Abelardo Moncayo² and Thomas Moore²

¹Department of Agricultural and Environmental Sciences, Tennessee State University, Nashville, TN

²Vector-Borne Diseases Program, Division of Communicable and Environmental Diseases and Emergency Preparedness, Tennessee Department of Health

Determining spread rate of kudzu bug and factors impacting its spread

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3National Institute for Mathematical and Biological Synthesis, University of Tennessee, Knoxville, TN

4Department of Agriculture, Nutrition and Veterinary Sciences, University of Nevada, Reno, NV

5West Tennessee AgResearch and Education Center, Jackson, TN

Non-Student

Cedarwood oil as a barrier product to exclude imported fire ants

Mary Scott, Karla M. Adesso and Jason B. Oliver, Otis L Floyd Nursery Research Center, Tennessee State University, McMinnville, TN.

Imported fire ants (IFAs) are a concern in agriculture production, natural ecosystems and urban environments. A CO₂ extracted cedarwood oil, previously reported as an IFA repellent and toxicant, was evaluated as a potential barrier product to exclude IFAs. An effective barrier product can be used to stop the ants from spreading into treated areas or entering sensitive equipment. This project used a thermal gel as a carrier for the cedarwood oil and the tracking software, EthoVision XT, to obtain behavioral data on the IFA response to the oil. A 5, 10, 25, and 50 percent concentration of cedarwood oil was used to identify the lowest percentage of oil that would maintain a viable barrier for fire ants. Five reps of each treatment were analyzed as well as a gel control. Behavioral observations as well as statistical data were used to determine the lowest effective concentration of cedarwood oil. The behaviors monitored included time spent in specific zones, number of times crossing the barriers, and cleaning behaviors. The second test performed was a field test using cedarwood gel barrier placed on a disturbed fire ant mound to observe behavior and instances of crossing over the barrier. Image J software was used to determine the relative number of ants crossing each barrier. Results from these experiments suggest cedarwood oil can be used as a component of barrier products to exclude IFAs from sensitive areas.

Entomological Hot Topic: Spotted lanternfly, a new invasive pest in the U.S.

Frank A. Hale

Soil, Plant and Pest Center, Department of Entomology and Plant Pathology, University of Tennessee, Nashville, TN.

Spotted lanternfly, *Lycorma delicatula* (White), Hemiptera: Fulgoridae is native to parts of Asia (China, Bangladesh, Vietnam) (1). It has been introduced to Korea and Japan where it is a serious

pest of grapes (1) and is known to feed on over 70 types of plants. One of its preferred hosts is the invasive *Ailanthus altissima*, tree of heaven. It was first found in the U.S. in Berks County Pennsylvania in September, 2014. It has spread to other counties in southeastern Pennsylvania. It is found in 13 counties in Pennsylvania, three adjacent counties in New Jersey and the furthest north county in Virginia, Frederick County.

Adults are approximately 1 inch long and ½ inch wide at rest (1). They have gray forewings with many black spots. The hind wings are black at the distal third and red with black spots at the basal third with a white band between. The legs and head are black while the abdomen is yellow with broad black bands (1).

Adult females oviposit egg masses in the fall which are covered with a white waxy material that turns gray as it dries. The eggs are the overwintering stage and they can be deposited on tree trunks and many other surfaces. There is concern that egg masses deposited on storage pods, rail cars and other objects can be moved and accidentally spread infestations long distances. Early instar nymphs (Instars 1-3) are black with small white spots. Fourth instar nymphs have black legs with the head and body primarily red with some black areas and white spots. Nymphs and especially adults could also accidentally spread via modes of transportation.

Literature Cited

- 1) Spotted Lanternfly Alert, 2018. Pennsylvania Department of Agriculture.
https://www.agriculture.pa.gov/Plants_Land_Water/PlantIndustry/Entomology/spotted_lanternfly/SpottedLanternflyAlert/Pages/default.aspx

Does odorous house ant clade affect efficacy of perimeter treatments around homes?

Jennifer Chandler, Lucas Hietala, Geordan Hall, Karen Vail and Becky Trout Fryxell
Department of Entomology and Plant Pathology, University of Tennessee, Knoxville, TN.

Short-term detection of imidacloprid in streams adjacent to treated hemlock stands

Greg Wiggins¹, Elizabeth Benton², Jerome Grant³ and Paris Lambdin³

¹National Institute for Mathematical and Biological Synthesis, University of Tennessee, Knoxville, TN

²Warnell School of Forestry and Natural Resources, University of Georgia,

³Department of Entomology and Plant Pathology, University of Tennessee, Knoxville, TN.

The creation of the 2017 and 2018 Tennessee state fair live butterfly house exhibit—from an idea to reality

David Cook

University of Tennessee Extension, Davidson County, Nashville, TN.

The Davidson County Extension Office received a request from the general manager of the 2017 Tennessee state fair about the possibilities of creating a live butterfly house exhibit. After several meetings, the idea was fast becoming a reality. The logistics involved selecting the perfect indoor site, constructing a large mesh tent enclosure, selecting live flowering plants to provide a nectar source for the butterflies, an elaborate lighting system and timers to maintain healthy plants, a watering schedule, butterfly feeding stations, educational exhibits, and the ordering of 500 live butterflies. Participants viewed various educational exhibits before entering the butterfly house. Approximately 15,000 people viewed the exhibits and interacted with live butterflies. With the success of the exhibit, the state fair manager suggested the possibility of a larger and more elaborate exhibit for the 2018 fair. The 2018 live butterfly house exhibit was 4 times larger with more plants and over 1,000 live butterflies. The approximately 20,000 visitors to the exhibit proved that bigger was better.

Alterations to flight behavior of Cry1Fa-resistant and susceptible *Spodoptera frugiperda* in response to feeding on Cry1Fa toxin

Lucas Hietala, Nickholas Hietala and Juan Luis Jurat-Fuentes

Department of Entomology and Plant Pathology, University of Tennessee, Knoxville, TN.

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<https://ag.tennessee.edu/EPP/Minutes/Forms/AllItems.aspx>

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Mendell Snodgrass	'73 - '74	USDA
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Ray McDonnell	'01 - '02	TN Dept. of Agriculture
David Cook	'06 - '07	University of Tennessee
Steve Murphree	'06 - '07	Belmont University

Steve Hamilton	'07 - '08	Austin Peay State University
Clint Strohmeier	'07 - '08	TN Division of Forestry
Gray Haun	'08 - '09	TN Dept. of Agriculture
Mike Studer	'08 - '09	TN Dept. of Agriculture
Steve Hamilton	'09 - '10	Austin Peay State University
Mike Studer	'09 - '10	TN Dept. of Agriculture
Steve Hamilton	'10 - '11	Austin Peay State University
Mike Studer	'10 - '11	TN Dept. of Agriculture
David Cook	'11 - '12	University of Tennessee
Steve Hamilton	'11 - '12	Austin Peay State University
Amy Dismukes	12 - '13	University of Tennessee
Amy Dismukes	12 - '13	University of Tennessee
David Cook	13 - '14	University of Tennessee
Amy Dismukes	13 - '14	University of Tennessee
Karla Adesso	14 - '15	TN State University
David Cook	'14 - '15	University of Tennessee
Karla Adesso	15 - '16	TN State University
David Cook	'15 - '16	University of Tennessee
Gene Burgess	16 - '17	University of Tennessee (ret.)
Gray Haun	'16 - '19	TN Dept. of Agriculture (ret.)

**Historians of the Tennessee
Entomological Society (1973 - Present)**

<u>Historian</u>	<u>Term</u>	<u>Affiliation</u>
Charles Pless	'73 - '76	Univ. of Tennessee
Herb Morgan	'76 - '79	USDA
Mendell Snodgrass	'79 - '82	USDA
Russ Patrick	'82 - '92	Univ. of Tennessee
Harry Williams	'92 - '01	Univ. of Tennessee (retired)
Frank Hale	'01 - '21	Univ. of Tennessee

**Honorary Members of the Tennessee
Entomological Society (1982 - Present)**

<u>Honorary Member</u>	<u>Year</u>	<u>Affiliation</u>
Jimmy White	1982	Tenn. Dept. of Agric.
Mendell Snodgrass	1983	USDA
Carl Brown	1985	Memphis State
Myrtice Snodgrass	1985	Knoxville, TN
John A. Hammett	1987	Tenn. Dept. of Agric.
Joe C. Dunn	1990	American Cyanamid
Harry Williams	1997	Univ. of TN (retired)

Harry E. Williams Award (est. 2002)

<u>Recipient</u>	<u>Year</u>	<u>Location</u>
Kim Woodard	2002	Trousdale Co.
Liam Black and Kimberly Woodard	2003	Hardeman Co. and Trousdale Co.
Reed Avent	2006	Bolivar, TN
Andy Brown	2008	Coffee Co.
Phillip Adams	2009	Burns, TN
Jonathan Belcher	2010	Rutherford Co.
Kade Parker	2011	Maryville, TN
Kade Parker	2012	Maryville, TN
Steven Davis	2013	Loudin Co.
Angel Chaffin	2014	Sevier Co.
Perrein Heselschwerdt	2015	Claiborne Co.
-----	2016	(No award given)
Keaton Pennick	2017	Weakley Co.
Samantha Bussell	2018	Macon Co.

Howard Bruer Award (est. 1975)
Recipients of the Tennessee Entomological Society (1975 - Present)

<u>Recipient</u>	<u>Year</u>	<u>Location</u>
Whitney Eckler	1975	Memphis, TN
Joe Martin	1976	Bolivar, TN
Bryan Peters	1977	College Grove, TN
Tidus Pollard	1978	Huron, TN
John Bentley	1979	
Melissa Hart	1980	Watertown, TN
Gary Miller	1981	Knoxville, TN
Harold Glass	1982	Knoxville, TN
-----	1983	(No award given)
-----	1984	(No award given)
Penny Thompson	1985	Davidson County
Matthew Fumich	1986	Munford, TN
Christie Greer	1987	Greene Co.
Dottie Hodges	1988	Hamblen Co.
-----	1989	(No award given)
Tim Gentry	1990	Woodbury, TN
Jennifer Hartsell	1991	Hamblen Co.
Jessica Taylor	1992	Lincoln Co.
Jennifer Lenter	1993	Fayetteville Co.
Jeremy Smith	1994	Savannah Co.
George Carroll	1995	Anderson Co.
Stacy Milhahn	1996	Lincoln Co
Nancy Warden	1997	Marshall Co.
Denise Byrum	1998	Moore Co.
James Johnson	1999	Bolivar, TN
Wade Black	2000	Hardeman Co.
Sara List	2006	Coffee Co.
-----	2008	(No award given)
Grant Fisher	2009	Sevierville, TN
Julia Britto	2012	Oak Ridge, TN
Swasti Mishra	2013	Davidson Co.
-----	2014-2018	(No award given)

**Outstanding Entomologist (Tennessee Entomologist of the Year)
Award (est. 1981) Recipients of the Tennessee
Entomological Society (1981 - Present)**

<u>Recipient</u>	<u>Year</u>	<u>Affiliation</u>
Myron Smith	1981	Hill Smith Pest Control
Harry Williams	1985	Univ. of Tennessee
John A. Hammett	1987	Tenn. Dept. of Agric.
Joe C. Dunn	1991	American Cyanamid

Richard E. Caron Outstanding Entomologist Award

<u>Recipient</u>	<u>Year</u>	<u>Affiliation</u>
Harry Williams	1995	Univ. of TN (Retired)
Harvey Barton	1996	Arkansas State Univ. (Retired)
Carroll Southards	1997	Univ. of TN (Retired)
Harold Bancroft	2001	Univ. of Memphis
Charles Pless	2002	Univ. of Tennessee (retired)
Gary Lentz	2008	Univ. of Tennessee (retired)
Reid Gerhardt	2009	Univ. of Tennessee (retired)
Gene Burgess	2011	Univ. of Tennessee (retired)

**Undergraduate Student Award (est. 2015) Recipients of the Tennessee
Entomological Society**

<u>Recipient</u>	<u>Year</u>	<u>Location</u>
Erik Hearn (1st)	2015	University of Tennessee
Rachel Harmon (2nd)	2015	University of Tennessee
Amber Dunnaway (1st)	2017	Tennessee State University
Sandra Bojic (2nd)	2017	Belmont University
Andrew Dixon (1st)	2018	University of Tennessee
Brianna Alred (2nd)	2018	University of Tennessee

**Graduate Student Award (est. 1986) Recipients of the
Tennessee Entomological Society (1986 - Present)**

<u>Recipient</u>	<u>Year</u>	<u>Location</u>
Jay Avery	1986	Knoxville, TN
Laura Rogers	1987	Knoxville, TN
Jason Oliver	1988	Knoxville, TN
Steve D. Powell	1989	Knoxville, TN
Robert C. Brown	1990	Knoxville, TN
Donald L. Sudbrink, Jr.	1991	Knoxville, TN
Deborah Landau	1992	Knoxville, TN
Deanna Colby	1993	Knoxville, TN
Lee Holt	1994	Knoxville, TN
Kenneth Copley	1995	Knoxville, TN
Dina Roberts	1996	Memphis, TN
Bryan Hed	1997	Knoxville, TN
Gary Moughler	1998	Knoxville, TN
Andrew Beld	1999	Nashville, TN
Lacey McNally	2000	Baton Rouge, LA
Ken Davenport	2001	Clarksville, TN
Debra Hoyme	2002	Knoxville, TN
Amy Kovach	2003	Knoxville, TN
Andrew Haddow	2004	Knoxville, TN
Greg Wiggins (1st)	2005	University of Tennessee
Issac Deal (2nd)	2005	University of Tennessee
Auora Teonnisson (1st)	2006	University of Tennessee
Derek Bailey (2nd)	2006	University of Tennessee
Eric Janson (1st)	2007	Vanderbilt University
Carla Dilling (2nd)	2007	University of Tennessee
Jonathan Willis (1st)	2008	University of Tennessee
Greg Wiggins (2nd)	2008	University of Tennessee
Robert Brucker (1st)	2009	Vanderbilt University
Paul Rhoades (2nd)	2009	University of Tennessee
Abdul Hakeem (1st)	2010	University of Tennessee
Keith Post (2nd)	2010	University of Tennessee
Carla Coots (1st)	2011	University of Tennessee
Angelina Fisher (2nd)	2011	Austin Peay State University
Abdul Hakeem (1st)	2012	University of Tennessee
Brittney Jones (2nd)	2012	Austin Peay State University
Elizabeth Benton (1st)	2013	University of Tennessee
Katheryne Nix (2nd)	2013	University of Tennessee
Elizabeth Benton (1st)	2014	University of Tennessee

Sara Mays (2nd)	2014	University of Tennessee
Elizabeth Benton (1st)	2015	University of Tennessee
Katie Britt (2nd)	2015	University of Tennessee
David Theuret (1st)	2016	University of Tennessee
Emel Oren (2nd)	2016	University of Tennessee
Brandy Schnettler (2nd)	2016	Austin Peay State University
Katherin Solo (1st)	2017	University of Tennessee
WanWan Liang (2nd)	2017	University of Tennessee
Brent Newman (1st)	2018	Tennessee State University
Ratnasri Pothula (2nd)	2018	University of Tennessee

CONSTITUTION
of the
TENNESSEE ENTOMOLOGICAL SOCIETY
(as of October 1991)

Article 1. Name

This Society is formed in the name and style of the "Tennessee Entomological Society", as an educational institution, not contemplating financial gain or profit. It is herein and after called the Society.

Article 2. Purpose

The purpose and object of the Society is to foster entomological accomplishment among its members and to promote the welfare of all of the State of Tennessee through the encouragement of: (1) the preparation, reading, and/or publication of papers, (2) association and free discussion among all members, (3) the dissemination of entomological information to the general public, and (4) cooperative efforts in statewide insect surveys.

Article 3. Membership

Section 1. Original Members: Any person designated at the organizational meeting of the Society to occupy the status of "Member" shall be considered as and be a Charter Member. Thereafter, the organizational membership shall have no authority to name or appoint members of the Society.

Section 2. Membership: Membership shall be open to all persons interested in Entomology.

Section 3. Sustaining Membership: Sustaining Membership is open to commercial or industrial organizations upon meeting approval and requirements of the Board of Directors.

Section 4. Honorary Membership: Honorary Members may be selected from time to time by a majority vote of the Board of Directors.

Section 5. Student Membership: Student Membership is open to students enrolled in any education institution and meeting the requirements of the Board of Directors.

Section 6. Procedure to Obtain Membership: Any person desiring to become a member of the Society shall do so by application and payment of dues to the Treasurer. After approval of the majority of the Board of Directors, said applicant shall become a duly constituted member.

Section 7. Members in Good Standing: A member who is current in payment of dues.

Article 4. Membership Rights

Section 1. Voting: Each member in good standing shall be entitled to one vote at any regular or special meeting or by mail. Voting by proxy shall not be allowed.

Section 2. Privileges: All members in good standing shall have equal privileges in the presentation of papers and discussions at meetings.

Article 5. Membership Certificates

Section 1. Certificates: The Board of Directors shall decide upon what evidence of membership each member in good standing shall be entitled to receive.

Section 2. Transfer: Evidence of membership in the Society will not be transferable or assignable.

Article 6. Dues

Section 1. Annual Dues: The amount of the annual dues for membership in the Society will be established by the Board of Directors from time to time. The use or uses of dues collected shall also be determined by the Board.

Section 2. Time of Payment: The Board of Directors shall set such times during each year as it deems advisable for the payment of annual dues by members. Generally, annual dues shall be paid during registration at the annual meetings. However, a member may mail dues to the Treasurer of the Society if the member cannot attend a given annual meeting. If a member fails to pay dues two (2) years in a row, such member shall be dropped from the rolls.

Section 3. Honorary Members: There shall be no dues required for Honorary Members or others specially designated by the Board of Directors.

Article 7. Meetings of the Society

Section 1. Annual Meetings: The Society shall hold annual meetings at such times and places as may be designated by the Board of Directors and specified in the notice thereof, for the election of officers and any other business as may be properly brought before the meeting.

Section 2. Registration Fee: A registration fee, in the amount to be determined by the Board of Directors, shall be paid at each annual meeting by all members and non-members who attend. The Board of Directors will determine the use of these fees.

Section 3. Special Meetings: Special meetings of the Society shall be held at any time and place as specified in the notice thereof whenever called by the President or any two (2) or more members of the Board of Directors.

Section 4. Notice: Notice of all meetings of the Society, annual or special, stating time, place, and agenda shall be mailed to each member by the President, Secretary, Treasurer, or Directors calling the meeting not less than seven (7) days prior to the meeting.

Article 8. Officers

Section 1. Officers: The officers of the Society shall consist of a President, President-elect, Secretary, Treasurer, Editor, and Historian, all of whom, except the President, shall be elected by and from the membership by a majority vote of members or by mail. The first President of the Society shall be elected by and from the membership at the organizational meeting for a term extending to the beginning of the first annual meeting. Thenceforth, the President-Elect shall automatically accede to the office of President at each annual meeting, or when the President is unable or unwilling to act for any reason. Nominees for each elective office of the Society shall be selected by a nominating committee of three (3) members appointed at the annual meeting by the President. Nominations may also be presented from the floor. The President and President-Elect shall hold office from the date of election at the annual meeting until the election of their successors at the next annual meeting, and shall not be eligible for re-election to the same office for a successive term. The Secretary, Treasurer, and Editor shall hold office from the date of election at the annual meeting until the election of a successor at the third following annual meeting and shall be eligible for re-election. The Historian shall hold office from the date of election at the annual meeting until the election of a successor at the fifth following annual meeting and shall be eligible for re-election. No member shall occupy more than one office at any one time.

Section 2. Duties and Powers of the President: The President shall be the Chief Executive Officer of the Society and shall preside at all meetings of the Society and the Board of Directors, have and exercise general and active management of the Society, execute and enforce all orders and resolutions and regulations duly adopted by the Board of Directors, execute all contracts in the name of the Society, and perform such other duties as assigned by the Board of Directors.

Section 3. Duties and Powers of the President-Elect: In the absence of the President, or in the case of failure to act, the President-Elect shall have all the powers of the President and shall perform such other duties as shall be imposed by the Board of Directors from time to time.

Section 4. Duties and Powers of the Secretary: The Secretary shall attend and keep the minutes of all meetings of the Board of Directors and the Society, shall have charge of the records and seal of the Society, and shall, in general, perform all the duties incident to the office of Secretary of the Society.

Section 5. Duties and Powers of the Treasurer: The Treasurer shall keep full and accurate accounts of the books of the Society and shall deposit all monies and the valuable properties and effects in the name of and to the credit of the Society in such depository or depositories as may be designated by the Board of Directors. The Treasurer shall disperse funds as may be ordered by the Board, getting proper receipts for such disbursements; and shall render to the Board of Directors whenever required by it, an accounting of all transactions as Treasurer. During each

annual meeting, the Treasurer shall give a report on the annual financial condition of the Society. The Treasurer shall, in general, perform all the duties incident to the office of Treasurer of the Society.

Section 6. Duties and Powers of the Editor: The Editor shall be a member of the Board of Directors and Chair of the Publication and Editorial Committee and be responsible for editing and publishing such publications as directed by the Board of Directors and passed by the majority of the voting membership at a called meeting.

Section 7. Duties and Powers of the Historian: The Historian shall maintain and be responsible for keeping a complete and accurate history of the activities of the Society from year to year.

Section 8. Vacancies in Office: Any vacancy in the office of President-Elect, Secretary, Treasurer, Editor, or Historian, however occasioned, may be filled, pending the election of a successor by the Society, by a majority vote of the remaining Directors. Should an office be filled by vote of the Board of Directors, the person so elected shall not become the officer upon the next annual meeting unless elected as such by the Society according to the procedures set forth for the election of officers of the Society in Article 8, Section 1, of this Constitution.

Article 9. Board of Directors

Section 1. Makeup and Responsibilities: The Board of Directors shall consist of the immediate past-President, the President, President-Elect, Secretary, Treasurer, Editor, and Historian of the Society and two members-at-large. The members-at-large shall be elected at the Annual Meeting of the Society and shall serve a term of one year. Any three (3) Directors shall constitute a quorum for the transaction of business. All properties, property rights, objects and purposes of the Society shall be managed, promoted, and regulated generally by the Board of Directors.

Section 2. Installation and Term of Office: The members of the Board of Directors shall be installed after their election as officers of the Society as set forth in Article 8, Section 1, of this Constitution, at the annual meeting of the Society, or at any adjourned meeting, or at any special meeting called for that purpose. All installed Directors shall serve for a term corresponding to that of the office in the Society to which each was elected by the members and thereafter until their successors are elected, accept office, and are installed.

Section 3. Annual Meetings: The Board of Directors shall meet immediately after the adjournment of the annual meeting of the members for the transaction of such business as may come before the Board. No notice of such meeting shall be required, and should a majority of the newly-elected Directors fail to be present, those present may adjourn, without further notice to a specified future time.

Section 4. Other Meetings: The Board of Directors shall not be required by this Constitution to hold regular meetings but may, by resolution or otherwise, establish such order of meetings as it

deems desirable. Special meetings of the Board shall be held at any time at such places as may be specified in the notice thereof, whenever called by the President or any two (2) or more Directors.

Section 5. Notice: Notice of all meetings of the Board of Directors, other than the annual meeting, starting time, place, and agenda for which the meeting was called, shall be given to each Director by the President or Directors calling the meeting not less than three (3) days prior to the meeting.

Section 6. Vacancies in Board of Directors: Any vacancy in the office of any Director, however occasioned, may be filled, pending the election of a successor by the Society, by a majority vote of the remaining Directors.

Article 10. Miscellaneous Provisions

Section 1. All checks and drafts shall be signed in such manner as the Board of Directors may from time to time determine.

Section 2. At all duly constituted meetings of the Society or Board of Directors of the Society, 10% of the eligible members, or 3 Directors, respectively, present shall constitute a quorum for the transaction of any business presented at such meetings.

Section 3. All notices required to be given by this Constitution relative to any regular or special meeting of the Society or the Board of Directors may be waived by the Directors or members entitled to such notice, either before or on the date of the meeting and shall be deemed equivalent thereto. Attendance at any meeting of the Society or the Board of Directors shall be deemed a waiver of notice thereof.

Section 4. General Prohibitions: Notwithstanding any provision of this Constitution and By-Laws which might be susceptible to a contrary construction. A. No part of the activities of the Society shall consist of carrying on propaganda, or otherwise attempting to influence legislation. B. This Society shall not participate in, or intervene in, (including the publishing or distribution of statements), any political campaign on behalf of a candidate for public office.

Article 11. Amendments

Section 1. This Constitution may be altered or amended or By-Laws adopted by a majority vote of the quorum present at any annual or special meeting of the Society membership, provided that notice of such proposed amendment or By-Laws shall have been given to the membership prior to the meeting.

OPERATING PROCEDURES OF THE TENNESSEE ENTOMOLOGICAL SOCIETY

The Tennessee Entomological Society (TES) is an organization formed for the purpose of fostering entomological accomplishment among its members and to promote the welfare of all of the State of Tennessee through the encouragement of: (1) the preparation, reading, and/or publication of papers, (2) association and free discussion among all members, (3) the dissemination of entomological information to the general public, and (4) cooperative efforts in statewide insect surveys. All necessary permanent records are maintained by person or persons designated by the Board of Directors and the President of the Organization.

Changes in Operating Procedures

The Constitution or By-laws may be altered or amended by a majority vote of the quorum present at any annual or special meeting of the Society membership, provided that notice of such proposed amendment or By-laws shall have been given to the membership prior to the meeting; the operating procedures of TES should be more flexible. The Constitution and Operating Procedures Committee is charged with the responsibility of studying these procedures each year to recommend possible improvements. Proposed changes in procedures are recommended to the Board of Directors for final action.

Registration and Dues

Registration and dues shall be set by majority vote of the Board of Directors. Dues for voting members will be collected by the membership committee at the time of the annual meeting.

The Board of Directors

The Board of Directors shall:

1. Consist of the immediate past-President, the President, President-Elect, Secretary, Treasurer, Editor, and Historian of the Society and two members-at-large.
2. Be responsible for management of the TES and conduct the affairs of the organization.
3. Conduct such business of the organization as is not delegated to the officers or committees and receive from the officers and committees reports and recommendations requiring specific board action or requiring recommendation for action by the membership.
4. Be responsible for changes in the manual of operating procedures after study and recommendation by the Constitution and Operating Procedures Committee.

5. Be responsible for transacting any official business.
6. Be responsible for assembling the board meetings.
7. Nominate honorary members to be voted on by membership.

President

The President shall:

1. Serve as Chairman of the Board of Directors, prepare an agenda for meetings of the Board of Directors and preside at such meetings.
2. Be responsible for determining that the decisions of the Board of Directors are correctly enforced within the framework of the organization's Constitution and By-laws.
3. Select chairman of committees at annual meeting and appoint committee members.
4. Serve as ex-officio member of all committees, maintain close liaison with the chairman of the committees, and encourage and assist them with development of program beneficial to the organization.
5. Work with the chairman of the program and local arrangements committees in planning the programs for annual meetings.
6. Preside at the general or introductory session of the annual meeting.
7. Advise all officers and board members on significant activities of the organization and solicit their suggestions.
8. Serve as the official representative for TES, when appropriate.

President-Elect

The President-Elect shall:

1. Perform the duties of the President if he cannot serve.
2. Serve as chairman of the program committee, and select the membership of that committee with the President and Board of Directors' approval.
3. Work with the Local Arrangements Chairman in the planning of all details of the annual meeting.

4. Prepare and mail announcements of the annual meeting. Assist with the printing of programs and mailing of programs.
5. Prepare and have the program of the annual meeting in print.
6. Be responsible for reminding speakers at each annual meeting to prepare papers before the meeting according to prescribed standards of the organization and to have these papers at the time of the presentation.

Secretary

The Secretary shall:

1. Have charge of the records and seal of the TES.
2. Take the minutes of all official business meetings of the association. Supply a copy of these minutes to the membership, Board of Directors and committee chairmen as necessary.
3. Consult with the President and inform all officers and board members of occurrences of any official meetings of the Board of Directors.
4. Maintain current lists of members and provide these along with the minutes of the annual business meeting to those persons with official need to know.
5. Make any mailing to the membership as needed or designated by the President or Board of Directors. Maintain a supply of the organizational supplies and letterhead paper for use by the officers.
6. Maintain a supply of operating procedures and provide copies to officers and board members and committee chairmen.
7. Serve as a member of the membership committee.

Editor

The Editor shall:

1. Chair the Publication and Editorial Committee.
2. Perform or be responsible for all editorial duties of the organization including the newsletter and any other publication of the organization.

Treasurer

The Treasurer shall:

1. Be responsible for the financial affairs of the TES. This includes depositing all

money received by the TES into appropriate Association accounts, handling the TES's money for maximum income (upon consultation with the Finance Committee), and paying of all expenses and invoices received by the TES.

2. Serve as a member of the Finance Committee.
3. Provide a written financial report to the Board of Directors at least annually, and for the published business meeting minutes. Make an oral financial report as the annual business meeting and at Board of Director meetings as necessary. Provide the necessary information for the Auditing Committee's activities.

Immediate Past-President

The Immediate Past-President shall:

1. Serve as a member of the Board of Directors during the year following his term of Presidency.

Committees

All committees and members of committees are selected by the President (or President-Elect). Each committee shall attempt to complete his/her assigned duties during the term of their appointment. The chairman of each committee shall solicit the assistance of his/her members as necessary. The standing committees are as follows:

Program Committee

The Program Committee shall:

1. Plan the general program format to fit the annual meeting time established by the general membership.
2. Contact invitational speakers and make arrangements for an honorarium, if appropriate.
3. Request papers from the general membership and establish a deadline for submittal of titles.
4. Prepare a program outline for printing.
5. Arrange to have chairpersons for each session.
6. Compile abstracts from program speakers for the proceedings of the program.

Local Arrangements Committee

The Local Arrangements Committee shall:

1. Be responsible for all physical arrangements for the Annual Meeting, working cooperatively with the Officers.
2. Reserve meeting rooms for estimated attendance at the Annual Meeting.
3. Specific Responsibilities will include:
 - a. Arranging for visual and audio equipment, including projectors.
 - b. Liaison with Treasurer regarding registration help, convention typewriters, etc.
 - c. Signs for sessions and activities; coordinate with Program Chairman.
 - d. Helping arrange transportation or lodging of guest speakers if needed; coordinate with Program Chairman.
 - e. Preparing a report of activities for inclusion in the minutes of the business meeting.
 - f. Approving all expenses incurred in conjunction with the Annual Meeting and forwarding invoices to the Treasurer for payment.
4. In addition to the above, be responsible for special functions carried out in conjunction with the Annual Meeting. This may include such special activities as coordinating exhibits at the Annual Meeting, as well as door prizes, with representatives of other organizations joining in this meeting, if desired. If necessary, the Local Arrangements Committee will be appointed with a sufficient number of members that these functions may be designated as the responsibilities of sub-committees of the overall committee.
5. Insure that sufficient facilities are available for morning and afternoon breaks.
6. A sponsored or dutch banquet and/or mixer could also be in order. Arrangements for banquet facilities, an after-dinner speaker and door prizes may be desired.

Membership Committee

The Membership Committee shall:

1. Encourage any interested person in Entomology to join our Society.

2. Send information about the Society to heads of Biology and Zoology Departments at all colleges and universities in the state, enclosing a few applications.
3. Encourage interested people of Pest Control organizations and other agricultural businesses to join the Society.
4. The Secretary shall send at least two blank membership applications to each member asking them to give to good prospects.
5. Each committee member should make a conscientious effort to enroll as many new members during the year as possible.
6. When notices of annual meetings are sent to major newspapers, television, and radio stations, an invitation to interested people could be given at that time.
7. The Chairman should coordinate this committee's efforts with the publicity and other committees when appropriate.
8. Collect dues at the annual meeting.

Auditing Committee

The Auditing Committee shall:

1. Review and certify the accuracy of the financial records and books of the Treasurer prior to the general business session of each Annual Meeting.
2. Conduct special audits as may be directed by the President or the Board of Directors.
3. Report any mistakes or misuses found by the committee to the President for appropriate action prior to the general business session.
4. Prepare a report of the committee's findings, with recommendations, for presentation at the general business session.

Nominating Committee

The Nominating Committee shall:

1. Present a slate of nominees from the active membership of the TES which will include a nominee for President-elect, and two nominees for members-at-large on the Board of Directors every year. The Secretary, Editor and Treasurer hold office for three years, and shall be eligible for re-election. In each case, it is suggested that the Nominating Committee present more than one nominee for each position.

2. Secure the prior approval of all nominees before their names are put before the membership.
3. Submit a written report to the Board of Directors consisting of current committee actions and suggestions for improvement.

Awards Committee

The Awards Committee shall:

1. Consist of 5-6 TES members including a Chair, who are selected following the business meeting of the annual meeting.
2. Obtain name(s) of state 4-H winner (level II), the entomology winner of the Mid-South Fair (Tennessee resident), or other outstanding young entomologist(s) and select the Howard Bruer Award recipient.^{1/}
3. Arrange to have a plaque made honoring the Howard Bruer Award recipient (contact TES treasurer) and deliver the plaque and news release information to the recipient's county agent for presentation/publicity at a later date.^{2/}
4. Obtain commitments from 3-5 TES members to serve as judges of the Student Paper Competition at the upcoming annual meeting (It is preferable that none of the judges have students in the competition).
5. Contact the TES Treasurer about preparing a \$150.00 and \$75.00 check to be given to the Student Paper Competition 1st and 2nd place winners during the business meeting of the annual meeting.
6. Have Student Paper Competition Evaluation Forms (with student names and presentation titles) ready for the judges the morning before the competition and assist in determining the winner following the competition.
7. Arrange to have a plaque made honoring the outgoing TES President (contact the TES Treasurer) and present it to him/her when asked by the new President during the business meeting of the annual meeting.^{2/}
8. Determine if it is appropriate to award the Richard E. Caron Outstanding Entomologist Award to a TES member at the upcoming annual meeting and submit for review by the Board of Directors. This award will be given periodically to individuals who have distinguished themselves by making outstanding contributions to entomology in Tennessee during their career. If a recipient is chosen, arrangements should be made to have a plaque made (contact the TES Treasurer) to be presented at the business meeting.^{2/}

^{1/}Contact Award Committee Chair at least one month prior to the annual meeting.

- ^{2/} Contact Award Committee Chair and President about having plaques made at least one month before the annual meeting.
9. Have a committee meeting immediately following the second paper session at the annual meeting.

Prediction, Evaluation Committee

The Prediction and Evaluation Committee shall:

1. List major agricultural commodities in Tennessee (Plant & Animal)
 - a. Approximate percent commodity loss due to various insect pests.
 - b. Approximate monetary loss due to each pest on various crops.
 - c. Approximate cost of control for each pest.
2. List insects which face a serious threat and crops which may be affected.
3. Major household, structural, and nuisance insects.
 - a. List major insects.
 - b. Approximate amount of money spent each year in control.
 - c. Approximate damage and loss from pest.

Constitution and Operating Procedures Committee

The Constitution and Operating Procedures Committee shall:

1. Annually review the Constitution and Operating Procedures and develop recommendations for improvements or needed changes and submit these to the Board of Directors for study and approval.
2. The Chairman of the Constitution Committee shall prepare adoption of amendments at any annual or special meeting.
3. The Chairman of the Constitution Committee shall coordinate with the Secretary in inserting such amendments into the notice and proceedings of the meeting.

Publication and Editorial Committee

The publication and Editorial Committee shall:

1. Determine and make recommendations to the Society of the type of publication suitable to the Society's needs and when such a publication should be initiated.
2. Set up guidelines and standards for such a publication, and investigate possible mechanisms for implementation upon decision of the organization.
3. Be responsible for soliciting and gathering of articles for publication.
4. Act as an editorial committee in screening such articles to be published.
5. The chairman will be responsible for the coordination of this committee's responsibilities with the Board, Secretary-Treasurer, and other committees as necessary.

Publicity Committee

The Publicity Committee shall:

1. Be responsible for developing and implementing an effective public relations program for the Tennessee Entomological Society.
2. Prepare general news releases on the society's activities and accomplishments and publicize the meetings. Specifically, these things should be done:
 - a. Prepare and release general news release as soon as Program Committee has planned a theme or area of interest for either meeting. Also, include location of meeting and time. This should begin by mid-summer and meeting dates should be sent to magazines and trade publications such as Delta Farm Press, Southeast Farm Press, Tennessee Market Bulletin, Ag Pesticide Notes, newspapers, etc.
 - b. A follow-up news release should be issued about one month before each meeting. Location of meeting, date, time, and outstanding invitational speakers could be mentioned.
 - c. Prepare follow-up news release after the meeting for use by news media.
 - d. Send notice to Entomological Society of America and other state societies.
3. Maintain close liaison with the Program Committee in obtaining early copies of the program of both meetings for publicity purposes.
4. Arrange for radio, television, and press coverage of society's meetings by contacting

area radio and TV stations just prior to the meetings and by calling the news rooms of local newspapers on the first day of the meetings.

5. Arrange for group photos of outgoing and in-coming officers and directors of the Association at the Annual meeting.
6. Prepare a report of the year's activities for the committee for presentation at the annual business meeting.
7. Post notices on the bulletin boards of the Entomology, Biology, and Zoology Departments in the colleges and universities across the state.
8. Direct mail to members.

Dates ('00), ('01) refer to last meeting attendance or last dues payment.

H = Honorary Member

TENNESSEE ENTOMOLOGICAL SOCIETY

MEMBERSHIP LIST

OCTOBER 2018

***THE MEMBERSHIP LIST
IS NOT AVAILABLE.***

**For information on members,
please contact the Secretary
of the Tennessee Entomological Society.**

TES Predictions and Evaluations 2018 – Steve Powell

In 2018, three new counties (Cheatham, Giles, and Maury) were found to be infested with Emerald Ash Borer (EAB) in Tennessee. There are 62 counties in Tennessee quarantined for EAB with 48 county records. By county, the Gypsy Moth catches in 2018 to date (20) are as follows (NOTE – There are many more (several dozen) that are also expected to be confirmed as Gypsy Moths): Davidson (1), Johnson (7), Loudon (1), McMinn (2), Robertson (1), Rutherford (1), Sevier (1), Shelby (2), Sullivan (3), and Unicoi (1). There are no areas in Tennessee considered to be infested with Gypsy Moth at this time. Some changes were made to the Imported Fire Ant Quarantine in Tennessee on March 1, 2018; Cumberland County and Jefferson County were changed from a partially quarantined county to a fully quarantined county; Hamblen County was changed from a non-quarantined county to a fully quarantined county; Trousdale County was changed from a non-quarantined county to a fully quarantined county. We do not yet have any identification information for Tennessee Department of Agriculture (TDA) Walnut Twig Beetle (WTB) trapping results in 2018. However, we do have complete information for TDA WTB trapping in 2017. By county, there were 69 WTB caught in 1 trap location in Blount County (13 positive two week trapping periods with a sharp peak of 33 WTB caught in the 9/25-10/10 trapping period); 1 WTB in Claiborne County; 5 WTB in three traps in Knox County; 1 WTB in McMinn County; 1 WTB in Sevier County; 1913 WTB in three traps in very close proximity in Sequatchie County (Daus Community). Of the total of 1990 WTB caught in Tennessee by TDA trapping in 2017, 780 were males and 1210 were females. On February 4, 2018, the TDA Thousand Cankers Disease Quarantine was changed from a two-tiered system of quarantined and buffer regulated counties to a single tier system of just quarantined counties. All of the former buffer regulated counties with the exception of Roane County was deregulated. All of the current quarantined counties (Anderson, Blount, Jefferson, Knox, Loudon, Morgan, Rhea, Roane, Sevier, and Union) with the exception of Roane County has had a confirmation of Thousand Cankers Disease.

Dr. Karla Adesso (TSU) reports that Japanese Maple Scale is an increasingly common management problem in nursery production and landscapes.

Spotted Lanternfly appears to be spreading in the northeast. There are state regulated areas in Pennsylvania and New Jersey. Spot infestations have been found in New Castle County, Delaware and Frederick County, Virginia. A single dead specimen has been found in Delaware County, New York. While spotted lanternfly is primarily known to affect tree of heaven, it has been detected on many host plants, including apples, plums, cherries, peaches, nectarines, apricots, almonds, and pine. It also feeds on oak, walnut, poplar, and grapes.

**IMPORTED FIRE ANT AREAS IN TENNESSEE
QUARANTINED AREAS FOR YEAR 2018 – effective 3/01/2018**

NOTE: Italics indicate a new county or a change from year 2017

1. **Anderson County** – The entire county.
2. **Bedford County** - The entire county.
3. **Benton County** - The entire county.
4. **Bledsoe County** - The entire county.
5. **Blount County** - The entire county.
6. **Bradley County** - The entire county.
7. **Cannon County** – The entire county.
8. **Carroll County** - The entire county.
9. **Chester County** - The entire county.
10. **Cocke County** – The entire county
11. **Coffee County** - The entire county.
12. **Crockett County** – The entire county.
13. **Cumberland County** – *The entire county.*
14. **Davidson County** - That portion of the county lying south of the Cumberland River.
15. **Decatur County** - The entire county.
16. **Dekalb County** – The entire county.
17. **Dickson County** - That portion of the county lying south of a line beginning at the Houston/Dickson County line on Tennessee Highway 49 and then continuing southeast along Tennessee Highway 49 until reaching Tennessee Highway 48 and then continuing south along Tennessee Highway 48 until reaching Tennessee Highway 47 and then continuing southeast along Tennessee Highway 47 until reaching United States Highway 70 and then continuing east along United States Highway 70 until reaching the Dickson/Cheatham County line.
18. **Fayette County** - The entire county.
19. **Franklin County** - The entire county.
20. **Gibson County** – That portion of the county lying southeast of a line beginning at the Dyer/Gibson County line on Tennessee Highway 104 and then continuing east on Tennessee Highway 104 until reaching United States Highway 45W and then continuing north on United States Highway 45W until reaching Tennessee Highway 54 and then continuing northeast

along Tennessee Highway 54 until reaching Tennessee Highway 105 and then continuing east along Tennessee Highway 105 until reaching the Gibson/Carroll County line.

21. **Giles County** - The entire county.
22. **Grundy County** - The entire county.
23. **Hamblen County** – *The entire county.*
24. **Hamilton County** - The entire county.
25. **Hardeman County** - The entire county.
26. **Hardin County** - The entire county.
27. **Haywood County** - The entire county.
28. **Henderson County** - The entire county.
29. **Hickman County** - The entire county.
30. **Houston County** – The entire county.
31. **Humphreys County** – The entire county.
32. **Jefferson County** – *The entire county.*
33. **Knox County** – The entire county.
34. **Lauderdale County** - That portion of the county lying southeast of a line beginning at the Mississippi County, Arkansas/Lauderdale County, Tennessee line at Latitude 35 Degrees 45 Minutes and then continuing east along Latitude 35 Degrees 45 Minutes until reaching Tennessee Highway 19 and then continuing east along Tennessee Highway 19 until reaching United States Highway 51 and then continuing northeast along United States Highway 51 until reaching Tennessee Highway 180 and then continuing east along Tennessee Highway 180 until reaching Tennessee Highway 209 and then continuing north along Tennessee Highway 209 until reaching Tennessee Highway 88 and then continuing east along Tennessee Highway 88 until reaching Lawrence Road and then continuing north along Lawrence Road until reaching Espy Park Road and then continuing east along Espy Park Road until reaching the Lauderdale/Crockett County line.
35. **Lawrence County** - The entire county.
36. **Lewis County** - The entire county.
37. **Lincoln County** - The entire county.
38. **Loudon County** - The entire county.
39. **Madison County** - The entire county.
40. **Marion County** - The entire county.
41. **Marshall County** - The entire county.
42. **Maury County** - The entire county.

43. **McMinn County** - The entire county.
44. **McNairy County** - The entire county.
45. **Meigs County** - The entire county.
46. **Monroe County** - The entire county.
47. **Moore County** - The entire county.
48. **Morgan County** - That portion of the county lying south of a line beginning at the Cumberland/Morgan County line on Tennessee Highway 298 and then continuing northeast along Tennessee Highway 298 until reaching Tennessee Highway 62 and then continuing southeast along Tennessee Highway 62 until reaching the Morgan/Roane County line.
49. **Perry County** - The entire county.
50. **Polk County** - The entire county.
51. **Rhea County** - The entire county.
52. **Roane County** - The entire county.
53. **Rutherford County** - The entire county.
54. **Sequatchie County** - The entire county.
55. **Sevier County** - The entire county.
56. **Shelby County** - The entire county.
57. **Stewart County** – That portion of the county lying southwest of a line beginning at the Trigg County, Kentucky/Stewart County, Tennessee border along the Cumberland River and then continuing southeast along the Cumberland River until reaching United States Highway 79 and then continuing east along United States Highway 79 until reaching the Stewart/Montgomery County line.
58. **Tipton County** - The entire county.
59. **Trousdale County** – *That portion of the county lying southeast of the Cumberland River.*
60. **Union County** - That portion of the county lying southeast of a line beginning at the Anderson/Union County line along Tennessee Highway 170 and then continuing northeast along Tennessee Highway 170 until reaching Tennessee Highway 33 and then continuing northeast along Tennessee Highway 33 until reaching the Union/Claiborne County line.
61. **Van Buren County** - The entire county.
62. **Warren County** - The entire county.
63. **Wayne County** - The entire county.
64. **White County** - The entire county.
65. **Williamson County** – The entire county.

66. Wilson County – The entire county.

Pest Alert

Emerald Ash Borer



Emerald ash borer (*Agrilus planipennis* Fairmaire (Coleoptera: Buprestidae)) is a wood-boring beetle from Asia that was identified in July 2002 as the cause of widespread ash tree (*Fraxinus* spp.) decline and mortality in southeastern Michigan

and adjacent parts of Ontario, Canada. Larval feeding between the bark and sapwood disrupts transport of nutrients and water in a tree, causing dieback of the branches and eventually death of the tree. Tens of millions of ash trees in forest, rural, and urban areas have already been killed, and many more are rapidly declining from this pest.

Emerald ash borer (EAB) infestations have since been confirmed in all or parts of 24 States and the Canadian Provinces of Ontario and Quebec. While most of the detections have occurred in eastern North America, the insect has been found as far west as Colorado. New EAB detections in other areas are likely as surveys continue (see www.emeraldashborer.info/ for periodic updates). Evidence indicates that EAB is often established in an area for several years before it is detected.

The broad distribution of this pest in the United States and Canada is primarily due to commerce and the inadvertent transport of infested ash firewood, unprocessed logs, nursery stock, and other ash commodities. Federal and State quarantines now regulate the movement of these products from the infested areas to areas not known to have EAB.

Identification

Adult beetles (Fig. 1) are slender, elongate, and 7.5 to 13.5 mm (0.3 to 0.5 in.) long. They generally have dark, metallic emerald green wing covers and bodies that are bronze, golden, or reddish green. The dorsal side of the abdomen is metallic purplish red and can be seen when the wings are spread (Fig. 2). Males are smaller than females and have fine hairs, which the females lack, on the ventral side of the thorax. The prothorax, the segment behind the head and to which the first pair of legs is attached, is slightly wider than the head and the same width as the wing covers. Adult EAB are generally larger and brighter green than the native North American *Agrilus* species.

Larvae reach a length of 26 to 32 mm (1.0 to 1.3 in.), are white to cream colored, and dorso-ventrally flattened (Fig. 3). The brown head is mostly retracted into the prothorax,



Figure 1. Adult emerald ash borer



Figure 2. Purplish red abdomen on adult beetle.



Figure 3. (Bottom to top) Second, third, and fourth stage larvae.



Figure 4. Gallery of an emerald ash borer larva

and only the mouthparts are visible. The abdomen has 10 segments, and the last segment has a pair of brown, pincer-like appendages.

Biology

EAB generally has a 1-year life cycle. In the upper Midwest, adult beetles begin emerging in May or early June. Beetle activity peaks between mid June and early July, and continues into August. Adults probably live for about 3 weeks, although some have survived for more than 6 weeks in the laboratory. Beetles generally are most active during the day, particularly when it is warm and sunny, and move to protected locations in bark crevices or cling to foliage during inclement weather.

Adult beetles feed on ash foliage, usually leaving small, irregularly shaped patches along the leaf margins, causing negligible damage to the tree. At least a few days of feeding are needed before beetles mate, and an additional 1 to 2 weeks of feeding may be needed before females begin laying eggs. Females can mate multiple times. Each female probably lays 30 to 60 eggs during an average lifespan, but a long-lived female may lay more than 200 eggs. Eggs are deposited individually in bark crevices or under bark flaps on the trunk or branches, and soon darken to a reddish brown. Eggs hatch in 7 to 10 days.

Newly hatched larvae chew through the bark and into the phloem and cambial region of the tree. Larvae feed on phloem for several weeks, creating serpentine (S-shaped) galleries packed with fine sawdust-like frass. As a larva grows, its gallery becomes progressively wider (Fig. 4), often etching the outer sapwood. The length of the gallery generally ranges from 10 to 50 cm (about 4 to 20 in.). Feeding is usually completed in autumn.

Prepupal larvae overwinter in shallow chambers, roughly 1 cm (0.4 in.) deep, excavated in the outer sapwood or in the bark on thick-barked trees. Pupation begins in late April or May. Newly eclosed adults often remain in the pupal chamber or bark for 1 to 2 weeks before emerging head-first through a D-shaped exit hole that is 3 to 4 mm (0.1 to 0.2 in.) in diameter (Fig. 5).



Figure 5. D-shaped hole where an adult beetle emerged.

Two-year development of EAB larvae is typical in newly infested ash trees that are relatively healthy. In these trees, many larvae overwinter as early instars, feed a second summer, overwinter as prepupae, and emerge the following summer. However, in trees stressed by physical injury, high EAB densities, or other problems, many or all larvae may develop in a single year. Whether a 2-year life cycle will occur in warmer southern States is not yet known.

Distribution and Hosts

EAB is native to Asia and is found in China and Korea. It is also reported in Japan, Mongolia, the Russian Far East, and Taiwan. In China, high populations of EAB occur primarily in *Fraxinus chinensis* and *F. rhynchophylla*, usually when those trees are stressed by drought or injury. Other Asian hosts (*F. mandshurica* var. *japonica*, *Ulmus davidiana* var. *japonica*, *Juglans mandshurica* var. *sieboldiana*, and *Pterocarya rhoifolia*) may be colonized by this or a related species.

In North America EAB has attacked only ash trees. Host preference of EAB or resistance among North American ash species may vary. Green ash (*F. pennsylvanica*) and black ash (*F. nigra*), for example, appear to be highly preferred, while white ash (*F. americana*) and blue ash (*F. quadrangulata*) are less preferred. At this time all species and varieties of native ash in North America appear to be at risk from this pest. Recently EAB was found on white fringetree (*Chionanthus virginicus*); however, its role as a susceptible host or as a secondary host in areas of high EAB densities is not fully understood and continues to be evaluated.

Signs and Symptoms

It is difficult to detect EAB in newly infested trees because they exhibit few, if any, external symptoms. Jagged holes excavated by woodpeckers feeding on late instar or prepupal larvae may be the first sign that a tree is infested (Fig. 6). D-shaped exit holes left by emerging adult beetles may be seen on branches or the trunk, especially on trees with smooth bark (Fig. 5). Bark may split vertically over larval feeding galleries. When the bark is removed from infested trees, the distinct, frass-filled, serpentine larval galleries that etch the outer sapwood and phloem are readily visible (Fig. 4 and Fig. 7). An elliptical area of discolored sapwood, usually a result of secondary infection by fungal pathogens, sometimes surrounds galleries.

Left to right:

Figure 6. Jagged holes left by woodpeckers feeding on larvae.



Figure 7. Ash tree killed by emerald ash borer. Note the serpentine galleries.



As EAB densities build, foliage wilts, branches die, and the tree canopy becomes increasingly thin. Many trees appear to lose about 30 to 50 percent of the canopy after only a few years of infestation. Trees may die after 3 to 4 years of heavy infestation (Fig. 7). Epicormic shoots may arise on the trunk or branches of the tree (Fig. 8), often at the margin of live and dead tissues. Dense root sprouting sometimes occurs after trees die.



Figure 8. Epicormic branching on a heavily infested ash tree.

EAB larvae have developed in branches and trunks ranging from 2.5 to 140 cm (1 to 55 in.) in diameter. Although stressed trees are initially more attractive to EAB than healthy trees are, in many areas all or nearly all ash trees greater than 3 cm (1.2 in.) in diameter have been colonized by this invasive beetle.

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Photo credits:

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Steven A. Katovich, USDA Forest Service, www.forestryimages.org

Edward Czerwinski, Ontario Ministry of Natural Resources, www.forestryimages.org

Additional Resources

For the latest information on EAB in your area:

Contact your State Department of Agriculture, State Forester, or Cooperative Extension Office; and visit the following Web sites:

www.emeraldashborer.info
www.hungrypests.com



Tennessee Emerald Ash Borer Quarantine



Emerald Ash Borer Quarantined Areas

In Tennessee, EAB quarantines exist for 62 counties. They include **Anderson, Bedford, Bledsoe, Blount, Bradley, Campbell, Cannon, Carter, Cheatham, Claiborne, Clay, Cocke, Coffee, Cumberland, Davidson, DeKalb, Fentress, Franklin, Giles, Grainger, Greene, Grundy, Hamblen, Hancock, Hamilton, Hawkins, Jackson, Jefferson, Johnson, Knox, Lincoln, Loudon, Macon, Marion, Marshall, Maury, McMinn, Meigs, Monroe, Moore, Morgan, Overton, Pickett, Polk, Putnam, Rhea, Roane, Rutherford, Scott, Sequatchie, Sevier, Smith, Sullivan, Trousdale, Unicoi, Union, Van Buren, Warren, Washington, White, Williamson and Wilson Counties.**

The following are regulated articles:

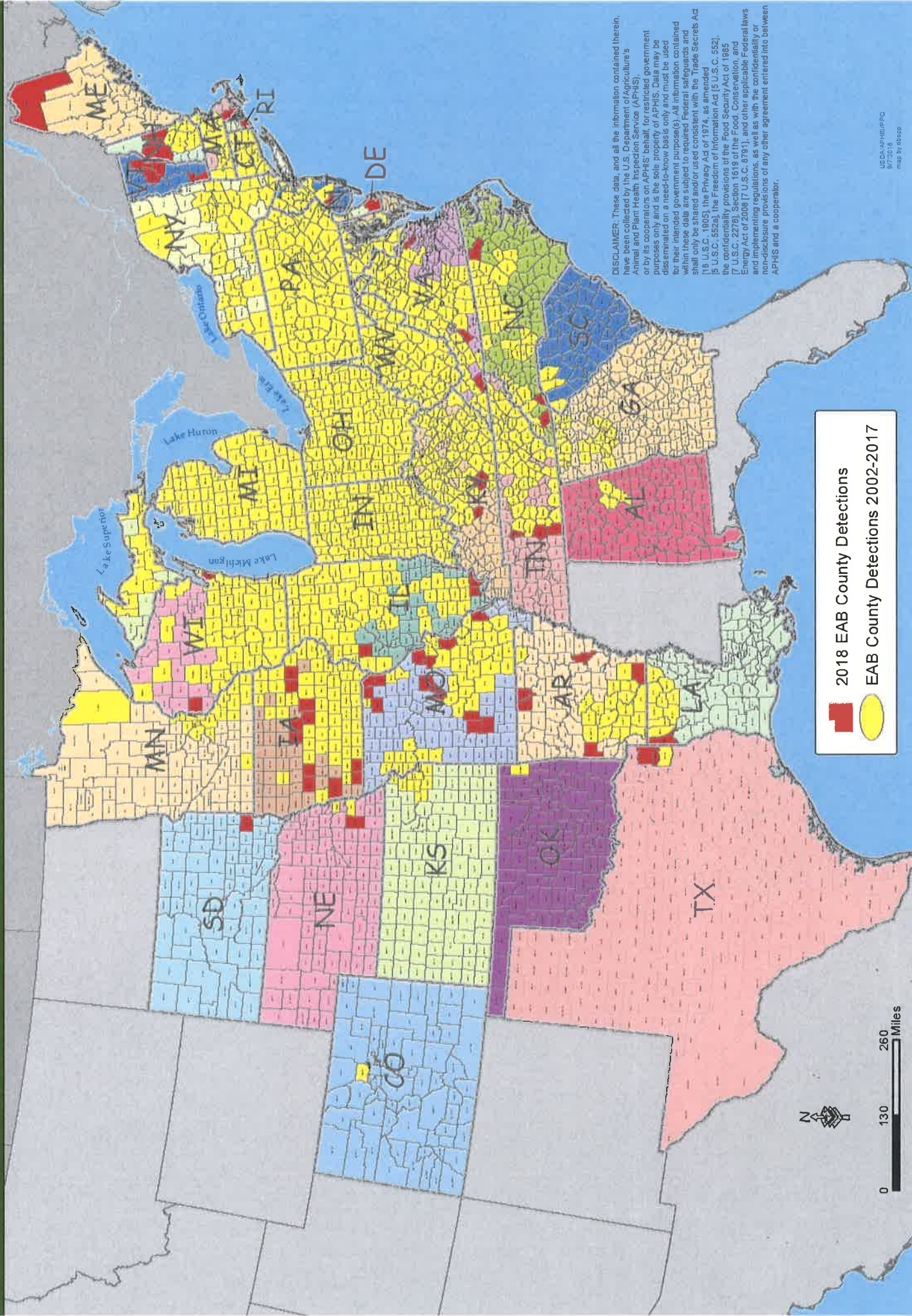
- (a) Emerald Ash Borer; firewood of all hardwood (non-coniferous) species; nursery stock, green lumber, and other material living, dead, cut, or fallen, including logs, stumps, roots, branches, mulch and composted and uncomposted chips of the genus *Fraxinus*.
- (b) Any other article, product, or means of conveyance not listed in paragraph (a) of this section may be designated as a regulated article if the Commissioner determines that it presents a risk of spreading Emerald Ash Borer and notifies the person in possession of the article, product, or means of conveyance that it is subject to these regulations.



United States
Department of
Agriculture

Cooperative Emerald Ash Borer Project EAB County Detections

September 6, 2018



Pest Alert

United States
Department of Agriculture
Forest Service
Northeastern Area
State and Private Forestry
NA-PR-02-10
Revised February 2013

Thousand Cankers Disease

Dieback and mortality of eastern black walnut (*Juglans nigra*) in several Western States have become more common and severe during the last decade. A tiny bark beetle is creating numerous galleries beneath the bark of affected branches and the main stem, resulting in fungal infection and canker formation. The large numbers of cankers associated with dead branches and the stem suggest the disease's name—*thousand cankers disease*.

The principal agents involved in this disease are a newly identified fungus (*Geosmithia morbida*) and the walnut twig beetle (*Pityophthorus juglandis*). Both the fungus and the beetle only occur on walnut species and on a closely related tree called wingnut (*Pterocarya* sp.). Infested trees can die within 3 years of initial symptoms.

Thousand cankers disease has been found in nine Western States (figure 1). Since 2010, the fungus and the beetle have also been found east of the Great Plains. This disease is expected to spread in eastern forests because of the widespread distribution of eastern black walnut, the susceptibility of this tree species to the disease, and the capacity of the fungus and beetle to invade new areas and survive under a wide range of climatic conditions in the West.

Disease Symptoms

The three major symptoms of this disease are branch mortality, numerous small cankers on branches and the bole, and evidence of tiny bark beetles. The earliest symptom is yellowing foliage that progresses rapidly to brown wilted foliage, then finally branch mortality (figure 2). The fungus causes distinctive circular to oblong cankers in the phloem under the bark, which eventually kill the phloem and cambium (figure 3). The bark surface may have no symptoms, or a dark amber to black stain or cracking of the bark may occur directly above a canker. Numerous tiny bark beetle entrance and exit holes are visible on dead and dying branches (figure 4), and bark beetle galleries are often found within the cankers. In the final stages of disease, even the main stem has beetle attacks and cankers.

Geosmithia morbida

Members of the genus *Geosmithia* have not been considered to be important plant pathogens, but *Geosmithia morbida* appears to be much more virulent than related species. Aside from causing cankers, the fungus is inconspicuous. Currently, either culturing on an agar

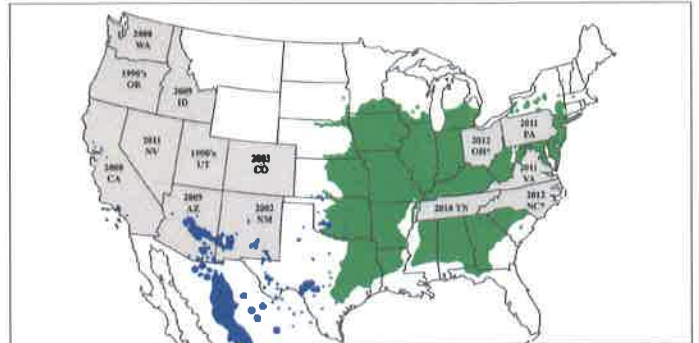


Figure 1. Thousand cankers disease occurs in nine Western and five Eastern States (shaded gray); the year in which the disease was confirmed is noted. Since 2010, TCD has been confirmed in PA, TN, and VA, whereas the beetle alone and the pathogen alone have been found in OH and NC, respectively (denoted with asterisks). The map shows the native ranges of eastern black walnut (dark green) and four western black walnut species (blue). Eastern black walnut is widely planted in the West, but this map does not depict these western locations.



Figure 2. Wilting black walnut in the last stages of thousand cankers disease.



Figure 3. Small branch cankers caused by *Geosmithia morbida*.

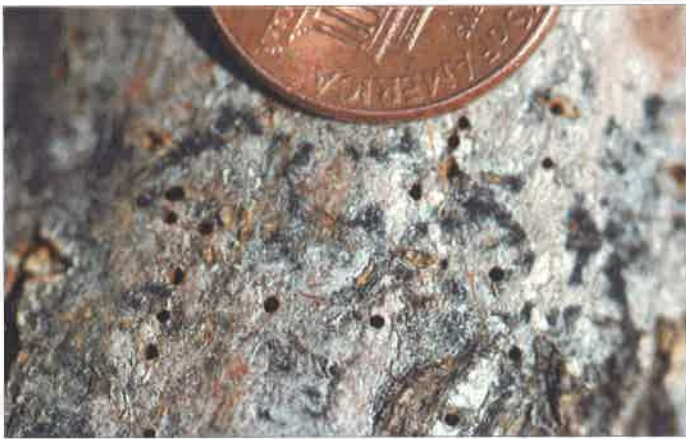


Figure 4. Exit holes made by adult walnut twig beetles.

medium or DNA analysis is required to confirm its identity. Adult bark beetles carry fungal spores that are then introduced into the phloem when they construct galleries. Small cankers develop around the galleries; these cankers may enlarge and coalesce to completely girdle the branch or stem. Trees die as a result of these canker infections that form at each of the thousands of beetle attack sites.

Walnut Twig Beetle

The walnut twig beetle is native to Arizona, California, and New Mexico. It has invaded Colorado, Idaho, Nevada, Oregon, Utah, and Washington where eastern black walnut has been widely planted. Since 2010, established populations have also been detected in Pennsylvania, Tennessee, and Virginia; North Carolina and Ohio also likely harbor populations, pending confirmation. Historically, the beetle has not caused significant branch mortality by itself. Through its association with this newly identified fungus, it appears to have greatly increased in abundance and distribution. Adult beetles are very small (1.5 to 2.0 mm long or about $\frac{1}{16}$ in) and are reddish brown in color (figure 5). This species is a typical-looking bark beetle that is characterized by its very small size and four to six concentric ridges on the upper surface of the pronotum (the shield-like cover behind and over the head) (figure 5A). Like most bark beetles, the larvae are white, C-shaped, and found in the phloem. For this species, the egg galleries created by the adults are horizontal (across the grain) and the larval galleries tend to be vertical (along the grain) (figure 6).

Survey and Samples

Visually inspecting walnut trees for dieback is currently the best survey tool for detecting the disease in the Eastern United States. A pheromone-baited trap placed near (but never on) walnut trees is also available for detecting the beetle (<http://www.ipm.ucdavis.edu/PMG/menu.thousandcankers.html>). Look for declining trees with the

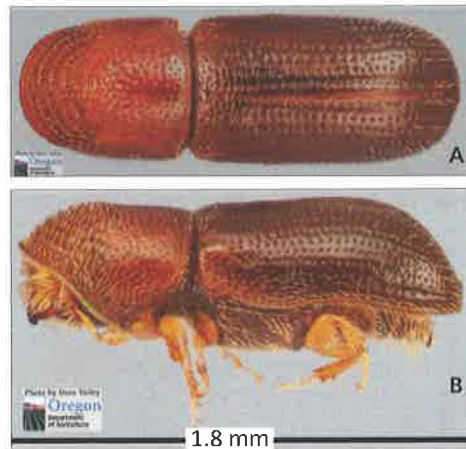


Figure 5. Walnut twig beetle: top view (A) and side view (B).



Figure 6. Walnut twig beetle galleries under the bark of a large branch.

symptoms described above. If you suspect that your walnut trees have thousand cankers disease, collect a branch 2 to 4 inches in diameter and 6 to 12 inches long that has visible symptoms. Please submit branch samples to your State's plant diagnostic clinic. Each State has a clinic that is part of the National Plant Diagnostic Network (NPDN). They can be found at the NPDN Web site (www.npdn.org). You may also contact your State Department of Agriculture, State Forester, or Cooperative Extension Office for assistance.

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Photographs:

Figure 1: Andrew Graves

Figure 2: Manfred Mielke, U.S. Forest Service

Figures 3, 4, 6: Whitney Cranshaw, Colorado State University, www.forestryimages.org

Figure 5: Steve Valley, Oregon Department of Agriculture

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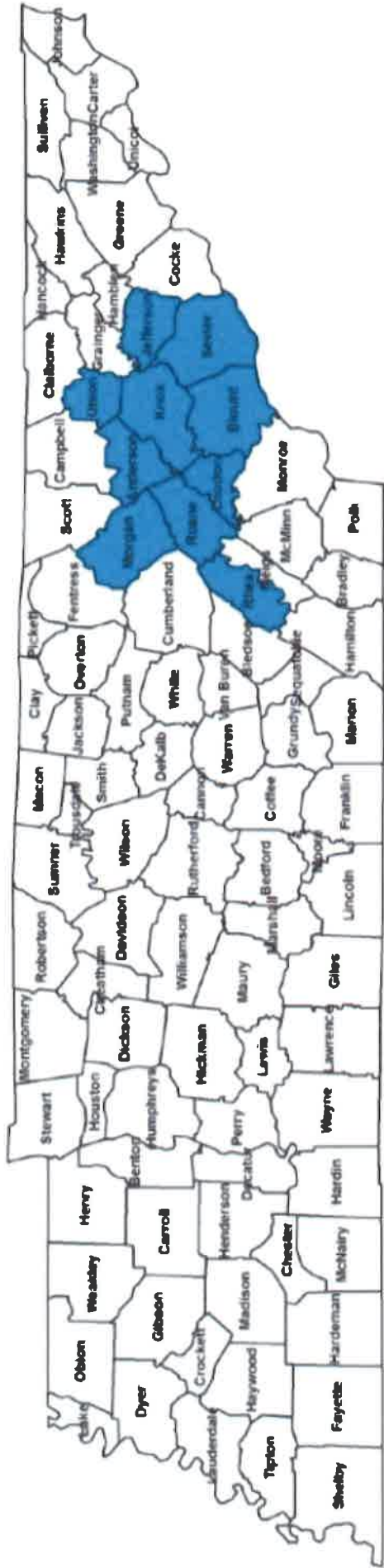
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Tennessee Thousand Cankers Disease Quarantine

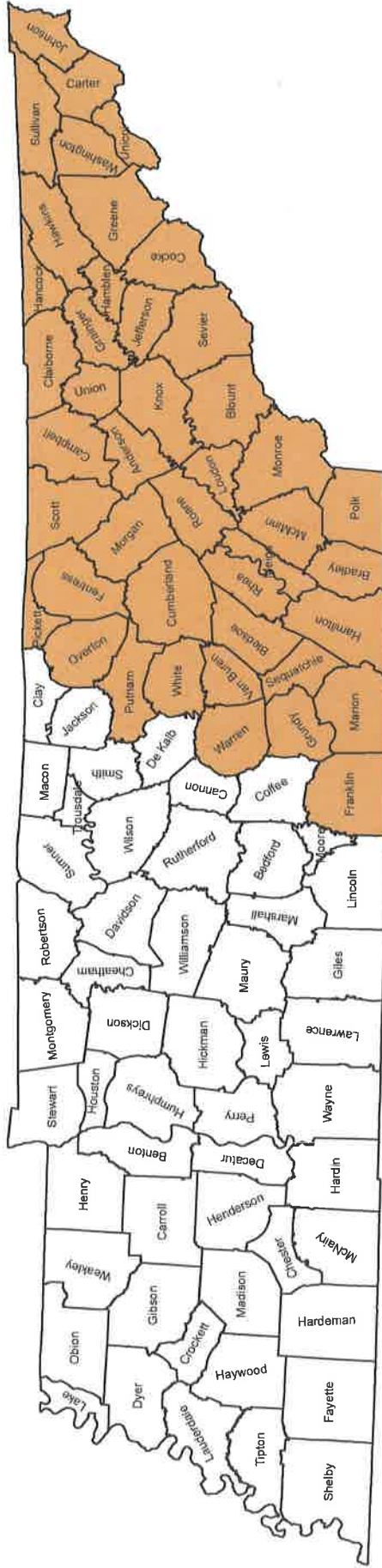


Thousand Cankers Disease Quarantine Areas
Anderson, Blount, Jefferson, Knox, Loudon, Morgan, Rhea, Roane, Sevier and Union Counties
Citizens in these counties cannot move walnut tree products or hardwood firewood outside the quarantined counties.





Tennessee Counties Infested with Hemlock Woolly Adelgid



Hemlock Woolly Adelgid infested counties

In Tennessee, 43 counties are known to be infested with HWA. They include **Anderson, Blount, Bradley, Campbell, Carter, Claiborne, Cocke, Cumberland, Fentress, Franklin, Grainger, Greene, Grundy, Hamblen, Hamilton, Hancock, Hawkins, Jefferson, Johnson, Knox, Loudon, Marion, McMinn, Meigs, Monroe, Morgan, Overton, Pickett, Polk, Putnam, Rhea, Roane, Scott, Sequatchie, Sevier, Sullivan, Union, Van Buren, Warren Washington and White.**

Six states with HWA quarantines are Maine, Michigan, New Hampshire, Ohio, Vermont, Wisconsin and Canada. Entry requirements for hemlocks from infested or adjacent areas vary from state to state. A State Phytosanitary Certificate is required. The state summaries can be found at <http://na.fs.fed.us/fhp/hwa/quarantines/quarantines.shtml> or at the National Plant Board (NPB) laws and summaries site <http://nationalplantboard.org/laws/>.



Pest Alert

Animal and Plant Health Inspection Service
Plant Protection and Quarantine

Spotted Lanternfly (*Lycorma delicatula*)

The spotted lanternfly is an invasive pest, primarily known to affect tree of heaven (*Ailanthus altissima*). It has been detected on many host plants, including apples, plums, cherries, peaches, nectarines, apricots, almonds, and pine. It also feeds on oak, walnut, poplar, and grapes. The insect will change hosts as it goes through its developmental stages. Nymphs feed on a wide range of plant species, while adults prefer to feed and lay eggs on tree of heaven (*A. altissima*).¹ If allowed to spread in the United States, this pest could seriously harm the country's grape, orchard, and logging industries.

Distribution and Spread

The spotted lanternfly is present in China, India, Japan, South Korea, and Vietnam. The insect was detected in Pennsylvania in September 2014. This was the first detection of spotted lanternfly in the United States.

Spotted lanternflies are invasive and can spread rapidly when introduced to new areas. While the insect can walk, jump, or fly short distances, its long-distance spread is facilitated by people who move infested material or items containing egg masses.

Damage

Both nymphs and adults of spotted lanternfly cause damage when they feed, sucking sap from stems and leaves. This can reduce photosynthesis, weaken the plant, and eventually contribute to the plant's death. In addition, feeding can cause the plant to ooze or weep,



Adult spotted lanternfly

resulting in a fermented odor, and the insects themselves excrete large amounts of fluid (honeydew). These fluids promote mold growth and attract other insects.

Description

Adult spotted lanternflies are approximately 1 inch long and one-half inch wide, and they have large and visually striking wings. Their forewings are light brown with black spots at the front and a speckled band at the rear. Their hind wings are scarlet with black spots at the front and white and black bars at the rear. Their abdomen is yellow with black bars. Nymphs in their early stages of

development appear black with white spots and turn to a red phase before becoming adults. Egg masses are yellowish-brown in color, covered with a gray, waxy coating prior to hatching.

Life Cycle

The spotted lanternfly lays its eggs on smooth host plant surfaces and on non-host material, such as bricks, stones, and dead plants. Eggs hatch in the spring and early summer, and nymphs begin feeding on a wide range of host plants by sucking sap from young stems and leaves. Adults appear in late July and tend to focus their feeding on tree of heaven (*A. altissima*) and grapevine

¹In Pennsylvania, adult spotted lanternflies have also been found feeding and egg laying on willow, maple, poplar, and sycamore, as well as on fruit trees, like plum, cherry, and peach.

(*Vitis vinifera*). As the adults feed, they excrete sticky, sugar-rich fluid similar to honeydew. The fluid can build up on plants and on the ground underneath infested plants, causing sooty mold to form.

Where To Look

Spotted lanternfly adults and nymphs frequently gather in large numbers on host plants. They are easiest to spot at dusk or at night as they migrate up and down the trunk of the plant. During the day, they tend to cluster near the base of the plant if there is adequate cover or in the canopy, making them more difficult to see. Egg masses can be found on smooth surfaces on the trunks of host plants and on other smooth surfaces, including brick, stone, and dead plants.

Report Your Findings

If you find an insect that you suspect is the spotted lanternfly, please contact your local Extension office or State Plant Regulatory Official to have the specimen identified properly.

To locate an Extension specialist near you, go to the U.S. Department of Agriculture (USDA) Web site at www.nifa.usda.gov/Extension. A directory of State Plant Regulatory Officials is available on the National Plant Board Web site at www.nationalplantboard.org/membership.



Nymphs are black with white spots in early stages of development. (Credit: ItchydogImages)



Nymphs turn red just before becoming adults. (Credit: ItchydogImages)



Hatched and unhatched egg masses



Cluster of adults on the trunk of a tree at night