Forest Health Review

January 2019

Spotted lanternfly. Photo credit: Eric Day, Virginia Cooperative Extension

In this issue...

Greetings

The Forest Health Program at the Virginia Department of Forestry was busy in 2018 with a relatively new invasive species, the emerald ash borer; established pests such as the gypsy moth, and a brand new introduction. The year started out with a bang in January with the detection of the spotted lanternfly in Frederick County. The spotted lanternfly is an invasive insect that is native to Southeast Asia and is a serious threat to multiple U.S. industries. You can read more about this pest on page 6. We encourage everyone to learn how to identify the different life stages of the insect and to "Stop, Scrape and Squash" any spotted lanternflies that you find!

Meredith Bean, the new VDOF emerald ash borer coordinator, joined the Forest Health team in 2018 and took on the task of developing and implementing a grant-funded emerald ash borer program in Virginia. This program promotes the protection of ash on state and private land via chemical and biological control, along with emphasis on education and outreach. Details and accomplishments of this program can be found on page 8. While the emerald ash borer is spreading rapidly throughout the state, there is still time to treat and protect ash trees in many locations.

We hope this edition of the Forest Health Review is enjoyable and informative. Please contact us with any questions and have a good 2019!

Lori Chamberlin, forest health program manager
(434) 220-9026
lori.chamberlin@dof.virginia.gov

Katlin Mooneyham, forest health specialist
(434) 220-9060
katlin.mooneyham@dof.virginia.gov

Meredith Bean, emerald ash borer coordinator
(434) 220-9034
meredith.bean@dof.virginia.gov

Native Defoliators

Some insects native to Virginia are present every year in low numbers and cause tree damage that is so minor it is rarely noticed. However, sometimes populations of these insects explode and cause significant damage for a year or two. Two native defoliators were present in high enough numbers in 2018 to warrant reporting: the oak button gall wasp and the oak sawfly.

The oak button gall wasp is a native pest that causes damage to white oaks that can be quite alarming in times of heavy attack. The first symptom of infestation is browning of the leaves in late spring. In times of heavy infestation, leaves may curl and fall off the tree. Looking at the leaves more closely reveals small "buttons" or galls the size of sesame seeds. The damage is caused by a tiny stingless wasp in the genus *Neuroterus*. In spring, the females lay eggs in developing white oak buds. Once the eggs hatch, the larvae feed in gall tissue that was created when the female laid her eggs. At the beginning of summer, these galls fall off the leaf. This pest has previously been referred to as the "jumping oak gall" because when these galls fall to the ground, they may appear to jump as they settle into the soil to overwinter. The following spring, the female wasp will chew its way out of the gall and begin the cycle again. Reports of oak button gall damage in 2018 were concentrated in the Piedmont region (Culpeper, Spotsylvania, Hanover, Powhatan and Chesterfield counties), but symptomatic white oaks were seen in other parts of the state as well. The last major outbreak of this pest was noted in 2014, primarily in northern Virginia. Damage that year was reported in Fauquier, Loudoun, Prince William and portions of Culpeper, Orange and Rappahannock counties.

Continued on page 3

Native Defoliators, continued

The oak sawfly is another native defoliator of oaks that caused noticeable damage in 2018. Populations of this pest have exploded in southwest Virginia where damage to red oaks has been reported for the past three years (2016 to 2018). VDOF staff in the Headwaters work area reported defoliation on red oaks, mainly in the upper crown, scattered across the landscape in Buchanan County. Similar damage was observed in eastern Kentucky. There are a few species of sawflies in the genus *Caliroa* that feed on oak foliage and we suspect that the species causing damage in Buchanan is the scarlet oak sawfly, *Caliroa quercuscoccineae*, although this has not been confirmed. There was an epidemic of *C. quercuscoccineae* in Virginia, Kentucky and Tennessee from 1974 to 1976 and the following is an excerpt from a VDOF Pest Report from July of 1975:

Oak button gall damage on white oaks

> ***VDOF Pest Report, July 1975...***
>
> ***Oak Sawfly defoliation*** *in SW Virginia: defoliation of red and white oaks (and other tree species in mixed oak stands) expanded considerably this year in Virginia and in adjacent states to the west. Kentucky reports an estimated 1 million gross acres with oak sawfly damage this summer. In Virginia, an aerial survey of state, private and federal lands showed 104,650 acres of visible defoliation in Districts 5 and 6. Because of preference for red oaks, defoliation is scattered and most often evident in small groups. The larval stage was almost non-existent in Hyters Gap on July 23, 1975; at least one additional generation is expected yet this summer.*

Defoliation starts in the upper crown in early summer and progresses downward. Oak sawfly larvae feed in groups and skeletonize leaves by consuming the epidermis and leaving only a transparent network of veins. These insects are sometimes called "slug sawflies" because their bodies are covered in a coating of slime that helps them adhere to the leaf surface. Larvae are one-half inch long, yellow-green, slug-like and shiny with a black head. During the last larval stage, they shed their slime and drop to the ground where they burrow into the leaf litter and pupate. The adult sawfly is a small, light brown wasp one-quarter inch long and lays eggs on oak leaves. There are generally two generations per year, sometimes three.

While local outbreaks of the oak button gall wasp and the oak sawfly can cause unsightly damage, outbreaks are generally short-lived with minimal long-term damage. Natural predators, parasites and pathogens will eventually control populations of these two native pests. However, some branch dieback and tree mortality may follow multiple consecutive years of defoliation. If landowners are concerned, they can encourage tree health with regular mulching and watering. In most cases, native defoliators will not cause tree mortality.

Oak sawfly. Photo credit: Abe Nielsen, Kentucky Division of Forestry

Southern Pine Beetle

The southern pine beetle (SPB) is the most destructive native pest in the southeast, but Virginia has seen very little SPB damage in recent years. However, we continue to monitor the population and place SPB pheromone traps every spring. In 2018, we placed a total of 24 traps throughout 10 counties in the Commonwealth. SPB trapping is a large undertaking that the VDOF forest health program could not accomplish without the help of area foresters and support from the Virginia Department of Conservation and Recreation. The funnel traps are placed in early spring when eastern redbud begins flowering. Traps are checked every week and the samples are sorted and identified by the VDOF forest health staff. We caught very few SPB in 2018 (only at the Chesterfield and Assateague sites), but clerid beetles (native predator of SPB) were caught at all locations. These results indicate that SPB persist at low, static levels in Virginia.

Although there has been very little SPB activity in Virginia for many years, there was a recent outbreak on Chincoteague Island on the Eastern Shore of Virginia. This outbreak was first documented in 2012 and widespread pine mortality was evident on the Eastern Shore in 2014 and 2015. Beetle activity began to decline in 2016 and 2017, and an aerial survey was conducted in 2018 to map pine mortality. Katlin Mooneyham, VDOF forest health specialist, and Kenny Midgett, Maritime forest technician, flew over the affected area in October 2018 and mapped 475 acres of pine mortality on Chincoteague Island and Chincoteague National Wildlife Refuge. No active SPB spots were observed so it appears that this outbreak has run its course. We believe that these trees were already starting to decline due to stress from salt water, old age and lack of management. All of this contributes to what we call "beetle bait"– trees that are prime for attack by the SPB. In some areas on Chincoteague, SPB was simply a contributing factor to tree decline that was initiated by saltwater intrusion. Nonetheless, once established, the beetles moved through acres of mature pine on the island leaving a large swath of dead trees. While we have been lucky in Virginia to have such little SPB activity, this is a good reminder of the destructive power of these tiny beetles.

In Virginia, natural pine stands may be overstocked and planted stands can become overstocked through seedling germination of natural pine. This contributes to poor growing conditions and increased susceptibility to SPB. Thinning has been proven to reduce the probability of SPB outbreak by increasing the spacing between trees to allow for more air movement and the disruption of aggregating pheromones. VDOF encourages good pine management through our Pine Bark Beetle Prevention Program funded by USDA Forest Service, Forest Health Protection Southern Pine Beetle Program funds. Our program is composed of three cost-share programs: pre-commercial pine thinning for landowners, first commercial pine thinning for loggers and longleaf restoration for landowners. At the time of this report, Virginia had thinned nearly 60,000 acres of pine (mostly pre-commercial) since 2004.

Pine mortality on Chincoteague National Wildlife Refuge, August 2018

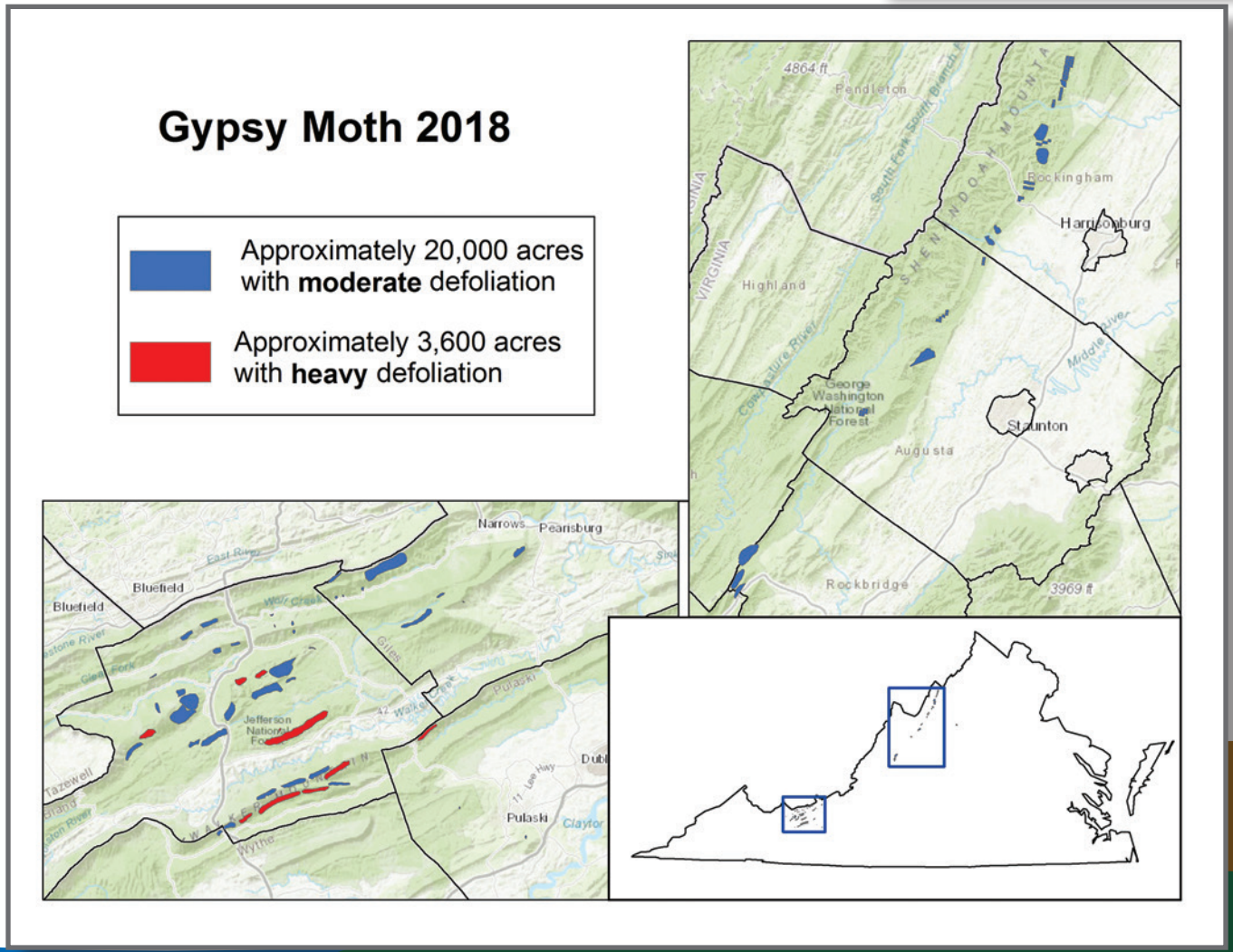
Aerial survey over Chincoteague, Virginia, October 2018

Gypsy Moth

One positive aspect of the cool, wet spring we had this year was that gypsy moth populations were generally low. Gypsy moth damage has been observed in southwest Virginia for the past three years, and some defoliation was reported from that area again in 2018. The USDA Forest Service conducted an aerial survey in the southwest and mapped moderate and severe defoliation in Giles and Bland counties. Gypsy moth was also reported in the Shenandoah Mountains, so VDOF forest health staff flew the area and mapped patchy moderate defoliation. This aerial survey was followed by a ground survey to confirm the damage was in fact due to gypsy moth.

The gypsy moth is an introduced pest that is a major defoliator of hardwoods in the eastern United States. It has a preference for oak species but during large outbreaks, it will feed on many other species as well. Virginia's unusually wet spring may have contributed to the relatively low gypsy moth activity observed in 2018 because rain spreads the fungus *Entomophaga maimaiga*, which kills gypsy moth caterpillars. This was the third consecutive year of defoliation in Giles and Bland counties and, though there was considerably less damage than in the previous years, the cumulative stress could lead to some tree mortality. We will continue to monitor these areas for the pesky gypsy moth caterpillars and hope for a quiet spring in 2019.

Aerial survey over Shenandoah Mountains, July 2018



Spotted Lanternfly

Alert! There is a new invasive insect in North America that is a serious threat to the country's grape, orchard and logging industries. The spotted lanternfly, *Lycorma delicatula* (White) (Hemiptera: Fulgoridae), is native to Asia and was first found in the United States in 2014 in Pennsylvania. It has spread rapidly in Pennsylvania over the last four years and was first detected in Virginia in January 2018.

The spotted lanternfly is a planthopper native to China, India and Southeast Asia. It was recently introduced to Japan and South Korea and has become a significant pest of fruit trees in South Korea. This insect feeds on tree-of-heaven, *Ailanthus altissima*, which is itself an incredibly invasive plant that is difficult to control. While tree-of-heaven is certainly a preferred host, the spotted lanternfly unfortunately also feeds on at least 70 other host plants including grape, apple, stone fruit, hops, oak, walnut, poplar and pine. Adults feed on the woody parts of plants and can be present in very high numbers. As they feed, lanternflies excrete a sticky sugary substance called honeydew. When large numbers are feeding, the honeydew accumulates under the insects and sooty mold develops. Other yeast-like organisms will grow on the honeydew resulting in an unpleasant odor. Trees with high numbers of spotted lanternflies feeding on them become stressed and more vulnerable to attack by other insects and diseases. Small plants can be overwhelmed by feeding injury and die, while flagging and dead branch tips have been seen in larger trees. In Virginia, we are still trying to figure out exactly how this invasive insect will affect our forests, but we know it will impact our vineyards and orchards and could be devastating for the wine industry. Feeding by the spotted lanternfly will certainly stress a grape vine and there is also great potential for the sooty mold that accumulates on the honeydew to reduce the quality of this crop. In addition, the spotted lanternfly could also become a significant "nuisance pest" due to the accumulation of honeydew and sooty mold on residential structures and property.

Since the spotted lanternfly is capable of causing serious damage in Virginia, it is important that residents learn how to identify the insect and perform inspections when moving around infested areas. The adults have spotted wings held tent-like when at rest and a wing span of 1.5 inches when spread. Egg laying starts in the fall when females begin laying eggs in rows and then covering them with a waxy secretion. Egg masses are gray, 1.5 inches long and contain 30 to 50 eggs. The spotted lanternfly lays eggs on a variety of smooth surfaces including tree trunks and branches, rocks, stones, lawn furniture and vehicles. Egg masses resemble a splotch of gray clay and can be difficult to find, but are easily transported when objects

Adult spotted lanternfly

Spotted lanternfly nymph, fourth instar (developmental stage)

with egg masses are moved to new areas. Eggs overwinter and hatch in the spring, and then nymphs progress through four instars (developmental stages). During the first through third instars, lanternflies are black with white spots on the body and legs. During the last instar, they become red while retaining the white-spot pattern. Adults emerge in late July.

The spotted lanternfly was first detected in Virginia in Winchester and Frederick County. Goods are constantly being shipped to and from this industrial location, which is right off the highway, next to a railroad and near the Virginia Inland Port – a "perfect storm" for the introduction of the spotted lanternfly. After detection, the Virginia Department of Agriculture and Consumer Services (VDACS) immediately began conducting egg mass surveys to delimit the area of infestation, and Virginia Cooperative Extension initiated an

Continued on page 7

outreach and education campaign. Tree bands were placed on tree-of-heaven to monitor the spotted lanternfly population and treatment was conducted in the summer of 2018. VDACS worked with USDA Animal and Plant Health Inspection Service (APHIS) to treat tree-of-heaven in the infested area. While treatment efforts were thorough and certainly successful at slowing the spread, surveys this fall have revealed positive sites outside of the treatment block, so it appears that spotted lanternfly was not eradicated. The known area of infestation is currently limited to the city of Winchester and Frederick County north of Winchester, but has expanded to an area of about six-by-three miles. Self-inspections are critical when moving around the Winchester area!

The spotted lanternfly could cause significant damage and loss to multiple U.S. industries and there is great potential for it to spread quickly throughout the state. Management costs will only increase as the infestation grows, so rapid response is absolutely critical. Increasing public awareness is essential, so please help us spread the word and prevent the accidental movement of this pest. Look for adults and nymphs on tree-of-heaven in the spring and summer, and egg masses on smooth surfaces in the fall and winter. Pennsylvania has started a "Stop, Scrape and Squash" campaign, which is pretty self-explanatory: take time to look for the insect, scrape and destroy egg masses, and squash any spotted lanternfly insects that you find. You can find more information and report discoveries to the Virginia Cooperative Extension here: http://ext.vt.edu/spotted-lanternfly.

Spotted lanternfly egg mass on a tree

Spotted lanternfly egg mass on a structure. Photo credit: Emelie Swackhamer, Penn State University, Bugwood.org

Tree-of-heaven with sticky band to catch spotted lanternfly. This tree is marked for treatment.

Emerald Ash Borer

The Forest Health and Urban and Community Forestry programs teamed up to launch an emerald ash borer (EAB) treatment program funded by a USDA Forest Service Landscape Scale Restoration grant. This year marks a decade from when EAB established in northern Virginia. Currently, EAB presence has been confirmed in 71 counties as shown on the infestation map. Trapping and bark-peeling efforts confirmed EAB in the 16 following counties in 2018: Amelia, Carroll, Chesterfield, Cumberland, Dickenson, Essex, Floyd, Fluvanna, Goochland, Henry, King George, Louisa, Patrick, Powhatan, Smyth and Washington. Although eradication of this pest is no longer feasible in Virginia, several control measures can be utilized to protect select ash trees. The VDOF EAB program encourages ash preservation through cost-sharing chemical treatments, releasing biological control agents on state lands and educating landowners about utilizing ash wood wisely through partnership with the VDOF Urban Wood Program.

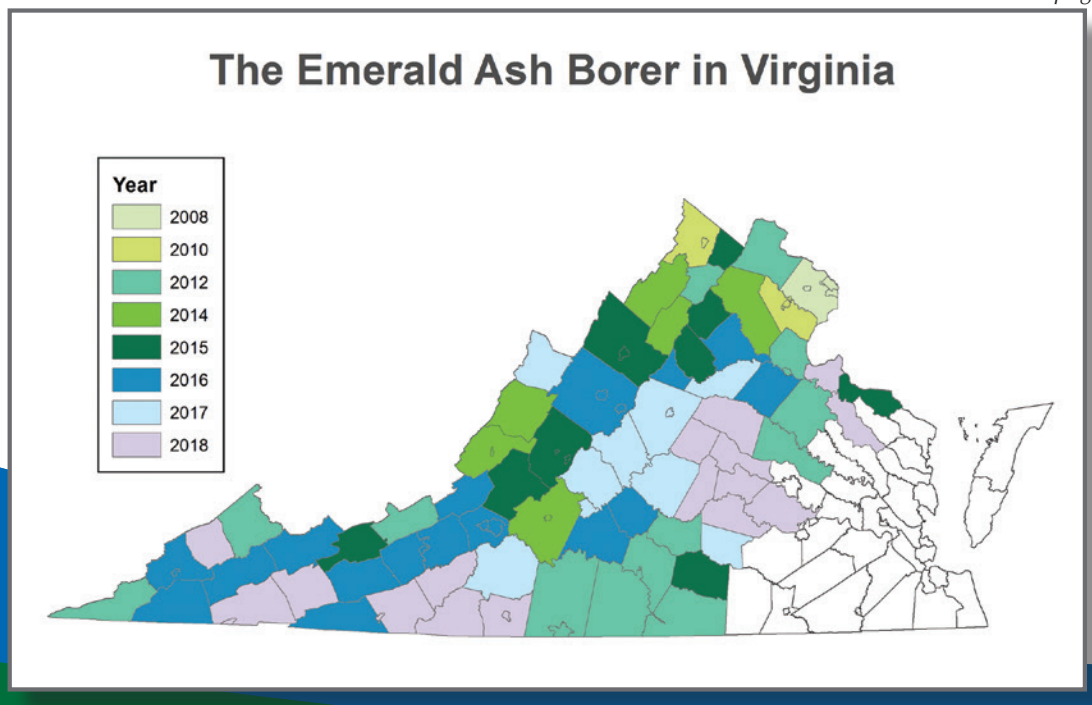
Ash is often found in high concentrations as a dominant or foundation species within sensitive ecosystems, such as along riverways, in seasonally flooded wetlands, in planted riparian buffers and along city streets. These habitats are already threatened by stream bank erosion, severe storm damage, pollution, urbanization, as well as invasive species. As Virginia's critically endangered ash populations continue to decline, the sensitive habitats that they maintain will be greatly impacted by the carbon loss, loss of biodiversity, water table flux and energy flow disruption that would result from the devastation caused by EAB.

In 2018, VDOF launched an ash treatment cost-share program to provide financial incentive for the treatment of ash trees in Virginia. The cost-share program is targeted to urban and residential areas in order to maintain high-value specimen trees providing important ecosystem services. Densely-populated areas with high concentrations of ash face the greatest risk as both homes and lives are put in danger when an ash tree goes untreated or is not removed pre-emptively. "Ash snap" is the phenomenon of ash trees falling or dropping large limbs without warning because EAB has compromised the tree's structural integrity by interrupting the flow of water and nutrients through the tree. States that were first infested with EAB, such as Michigan, are experiencing significant economic impacts as "ash snap" takes lives, damages buildings, downs power lines, blocks roads and adds workload to city maintenance crews. Therefore, we encourage preventative treatment or removal to avoid a similar outcome in Virginia.

The goal of the VDOF's ash treatment cost-share program is to encourage landowners and organizations to chemically protect specimen ash trees in order to safeguard a core surviving population of ash. Any native ash tree measuring 12 inches or larger in diameter and displaying 30 percent or less crown dieback qualified for treatment via injection or soil drench in 2018. The program's debut gained a surprising number of applicants across 27 counties including 16 organizations, such as municipalities, homeowners' associations, non-profits and universities. Of the 121 applications received, 115 were approved and 107 were completed then reimbursed. We reimbursed $82,300, a little less than 50 percent of the total amount applicants spent on ash treatment, which was $211,449. On average, treatments cost about $13.99 per DBH inch, on track with market averages of $13-$15 per inch. All in all, 547 ash trees were treated, which is 15,111 DBH inches protected from EAB! None of this would have been possible without the work of the more than 23 dedicated VDOF foresters that visited each property and approved the treatments. This cost-share will be available again in 2019, but only injection treatments of emamectin benzoate will qualify. Enrollment will open in April.

Chemical treatment of viable ash is one of the few remaining tools we have available, which can be very effective when

Continued on page 9

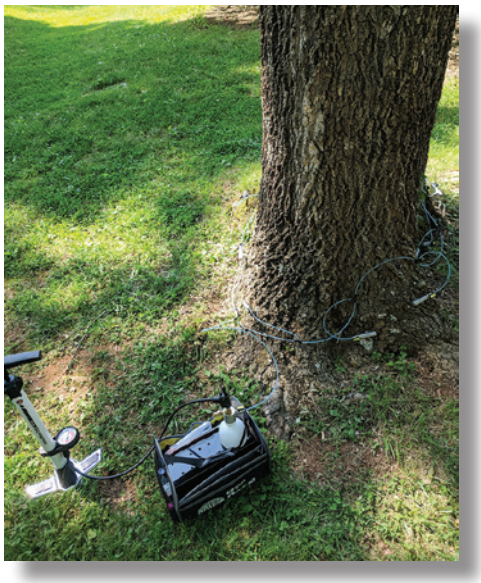


applied during the optimal time and with well-researched products. The most effective treatment is the trunk injection of emamectin benzoate. While the most expensive option, it is one of the most researched pesticides for the control of EAB. Risk to pollinators and non-target arthropods are greatly diminished as the product is directly injected into the trunk of a tree. Once an EAB larvae consumes or comes in contact with ash phloem containing emamectin benzoate, it will die almost immediately.

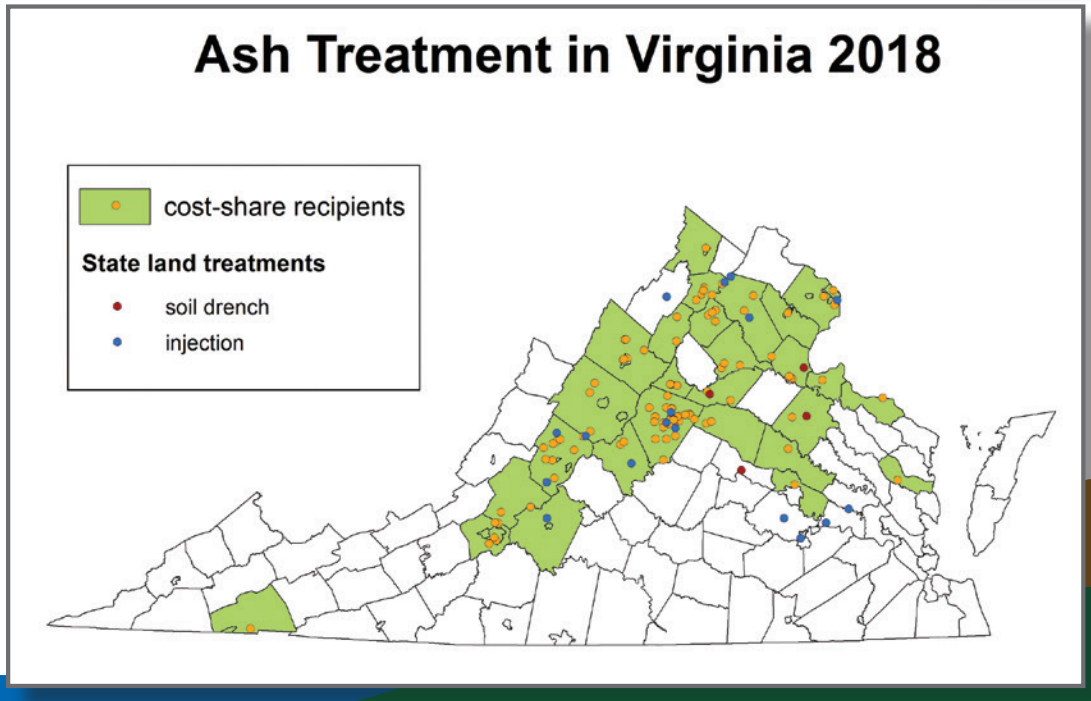
Another treatment option is a soil drench of a high-concentration imidacloprid or dinotefuran product. This method is less expensive, easier to apply and is most effective when applied in areas with low populations of EAB. Unfortunately, imidacloprid and dinotefuran are classified as neonicotinoids and pose a risk to pollinators, aquatic invertebrates and earthworms (Kreutzweiser et. al. 2008). There are strict restrictions on where and when this treatment can be performed and the product labels provide guidance on how to apply safely and minimize non-target effects. There are a variety of products available for treatment of ash trees, but most may only be applied by a VDACS-certified pesticide applicator. All methods of treatment are summarized in the online publication "Insecticide Options for Protecting Ash Trees from EAB," which can be accessed at the following link: http://www.emeraldashborer.info/documents/Multistate_EAB_Insecticide_Fact_Sheet.pdf.

While chemical treatment is the most efficient method of control available against EAB, there are times when this is not feasible due to financial, logistical or environmental constraints. Biological control is being utilized widely to supplement insecticides for long-term management. There are three species of tiny, stingless wasps (also known as parasitoids) that have been approved by USDA APHIS for release in Virginia for the biological control of EAB: *Oobius agrili*, *Tetrastichus planipennisi* and *Spathius agrili*. Once these parasitoids establish, they can complete multiple generations per year, killing 50 to 90 percent of EAB larvae present (Duan et. al. 2017). With the help of area foresters, VDOF forest health staff released biocontrol agents at four sites in 2018: Cumberland State Forest, Whitney State Forest, Rapidan Wildlife Management Area (WMA) and G. R. Thompson WMA. Two to three rounds of parasitoids were released per site, for a total of approximately 2,000 female parasitoids at each location. In the G. R. Thompson WMA, Fairfax County Urban Forest Management, VDGIF and VDOF worked together to treat surviving black and white ash with emamectin benzoate in hopes of protecting a fraction of this rare pocket of black ash.

The parasitoids were produced and supplied from the USDA's APHIS Plant Protection and Quarantine (PPQ) EAB Parasitoid Rearing Facility in Brighton, MI. For parasitoid information please call 866-322-4512.



Trunk injection of emamectin benzoate



Sassafras Monitoring

Laurel wilt disease (LWD) is spreading throughout the southeast. It has not yet reached Virginia but is in neighboring North Carolina where it is killing species in the family Lauraceae, including redbay and sassafras. This disease is caused by a fungus, *Raffaelea lauricola*, which clogs up the vascular tissue of trees thereby disrupting the movement of water. The fungus is introduced to trees by the redbay ambrosia beetle, *Xyleborus glabratus*, which carries the fungus in a specialized chamber on its back called a mycangium. Once the fungus is introduced into the tree's system, it moves quickly, disrupting the movement of water. Trees can die within a few weeks.

Redbay is not abundant in Virginia, other than the very southeast part of the state, but sassafras is scattered throughout much of the commonwealth. Should LWD spread to Virginia, the impacts to sassafras could be severe. Researchers with the USDA Forest Service Southern Research Station in Asheville, NC, are monitoring the spread of LWD in sassafras from the Atlantic Coastal Plain into the Piedmont and Mountain regions of the eastern U.S. to better understand how the disease impacts sassafras and develop an early detection system. Virginia is one of eight states participating in this study and VDOF established five sassafras monitoring sites during the summer of 2018. These sites have at least 10 healthy sassafras trees greater than two inches in diameter and show no signs of LWD. They were chosen because of their proximity to potential entry points for the redbay ambrosia beetle (near mills or campgrounds where infested wood could be brought in). Three of these sites are located in parks in Virginia's coastal plain region in Williamsburg, Hampton and Virginia Beach, and the remaining two sites are in the mountain region in Shenandoah National Park and Lesesne State Forest. Pheromone-baited traps were placed at two sites to attract any potential redbay ambrosia beetles. Trapping occurred for eight weeks and samples were collected every two weeks and sent to USDA Forest Service entomologists for processing and identification. **Good news: no redbay ambrosia beetles were found in 2018!** All of the sites will be visited once a year to assess stand health and potential crown dieback. Signs of LWD include vascular staining beneath the bark and "toothpicks" that are created as redbay ambrosia beetles bore into the tree and push out sawdust. Fingers crossed that we don't observe any symptomatic sassafras in Virginia!

Molly O'Liddy (VDOF forest health liaison) and Lori Chamberlin (VDOF forest health manager) implement a sassafras monitoring plot at False Cape State Park.

Vascular staining underneath the bark of a tree infected with laurel wilt disease (LWD) in North Carolina

Frass "toothpicks" produced as ambrosia beetles bore into trees

What Am I? Answers

(From page 11)

A: Telial horns of cedar apple rust
B: Yellownecked caterpillars on chestnut
C: Passalid beetle on dead branch
D: Giant puffball mushroom with hat for scale
E: Monarch chrysalis
F: Dung beetle rolling a ball of poo

What Am I?

Can you identify these photos?

A

B

C

D

E

F

References

Duan, Jian J., Roy G. Van Driesche, Leah S. Bauer, Richard Reardon, Juli Gould, and Joseph S. Elkinton. 2017. The role of biocontrol of emerald ash borer in protecting ash regeneration after invasion. FHAAST-2017-02. Morgantown, WV: US Department of Agriculture, Forest Service, Forest Health Assessment and Applied Sciences Team. 10 p: 1-10.

Kreutzweiser, David P., Kevin P. Good, Derek T. Chartrand, Taylor A. Scarr, Stephen B. Holmes, and Dean G. Thompson. 2008. Effects on litter-dwelling earthworms and microbial decomposition of soil-applied imidacloprid for control of wood-boring insects. Pest Management Science: formerly Pesticide Science 64, no. 2: 112-118.

South, David B.; Brown, Patrick; Dougherty, Phillip M.; Olykan, Sonya; Runion, Brett; Singh, Adya; Skinner, Malcolm. 2002. Tip-Dieback in Young Loblolly Pine Plantations. In: Gen. Tech. Rep. SRS-48. Asheville, NC: U.S. Department of Agriculture, Forest Service, Southern Research Station. pg. 574-578.

Freeze Damage

Tip dieback was reported on young loblolly pine in multiple locations within central Virginia in the spring of 2018. Symptoms included red/brown needles on top branches and necrotic terminal shoots that were easy to snap off. There was no sign of insect damage or root disease, so we hypothesized that the damage was the result of freeze injury. The winter of 2017/2018 was cold with some irregular weather patterns including periods of warmer-than-usual temperatures followed by more freezing temperatures. This type of temperature fluctuation can cause tree damage and South et. al. (2002) suggests that freeze injury is most common on trees between two and five years old growing on intensively-managed plantations with good site conditions. Trees growing at rapid rates with actively dividing cells in the cambium are most at risk. There may also be a genetic component since some fast-growing families are more susceptible to freeze injury. It is possible that our genetic selections having more coastal pedigrees could be more susceptible to unusual winter weather patterns. Trees that experience tip dieback in the spring due to freeze injury should recover. In some cases, the crown may develop a bushy appearance until a lateral bud expresses dominance, but dead needles will fall off by mid-summer and trees should appear normal again.

In addition to tip dieback, seedling mortality was also observed. Up to 30 percent mortality of seedlings of VDOF's higher productivity families was experienced by some landowners this past spring. Seedlings that survived showed signs of reduced vigor and dissection of roots revealed freeze damage as the culprit. Injury probably occurred in the winter when warmer temperatures caused the seedlings to become physiologically active, but then subsequent freezing temperatures caused damage. This can occur either in the nursery before lifting or in the field after planting and may lead to rapid mortality. Freeze damage was also reported in North Carolina this spring, so it appears to be a widespread phenomenon. Unfortunately, there is nothing we can do to prevent these unusual winter weather patterns, but we will continue to monitor forecasts and hope for favorable weather in 2019.

Tip dieback on loblolly pine in Buckingham County

Virginia Department of Forestry
900 Natural Resources Drive, Suite 800
Charlottesville, Virginia 22903
Phone: (434) 977-6555
www.dof.virginia.gov

01/2019

Virginia Department of Forestry
900 Natural Resources Drive, Suite 800
Charlottesville, VA 22903