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Lilac-Ash Borer

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What You Should Know

• Lilac-ash borer (*Podosesia syringae*), a clear-wing moth common in Utah, can be a destructive pest of many species of ash (*Fraxinus* spp.), privet (*Ligustrum* spp.), lilac (*Sryinga* spp.), and related species.

• Adults emerge from host trees and lay eggs in the spring; larvae feed on wood within branches, overwinter in the heartwood, and emerge as adults the following spring.

• Diversifying species used in the landscape, maintaining optimum plant health, monitoring, and preventive sprays (if necessary) are the best methods for preventing infestations.

• Only preventive treatments exist. There are no insecticides registered that can eliminate borers once larvae are inside the plant.

Description, Biology, and Habits

The lilac-ash borer (*Podosesia syringae*), belongs to a group of insects known as the clear-winged moths. The wings of most sesiid moths in have at least partially transparent wings (devoid of the colored scales that coat most moth and butterfly wings). Many of them mimic bees or wasps and, unlike most moths, fly during the day.

Adult lilac-ash borers mimic the common paper wasp in color, size, shape, and flight habits (Fig. 1). Both the dark colored forewings and the transparent hind wings are narrow. The slender body is black in color with yellow banding on the abdomen. The wingspan varies from 1 to $1^{1/2}$ inches. Females are somewhat larger than males.

Lilac-ash borers are generally distributed throughout the United States and Canada. They feed primarily in the trunks and larger limbs of lilac, ash, and privet, but occasionally attack related plants in the family Oleaceae. Significant damage in Utah has been reported from ash, primarily in European, blue, and green ash, and lilacs.



Figure. 1. Adult lilac-ash borer (*Podosesia syringae*)[1].

Depending on your location in Utah, adults may emerge from infested hosts as early as late March (but usually late April) and continue until mid-July (Table 1). Females emit a pheromone (chemical communication signal), which attracts males for mating, within 7 to 14 days after emergence. Within an hour of mating, females are able to lay the tan, elliptical eggs in cracks, crevices, and wounds in the bark. Eggs can be laid singly or in clusters. A single female can lay about 395 eggs. Eggs hatch within 14 days, and the larvae (immatures) bore into the plant (Fig. 2).

Initial feeding occurs just beneath the bark and later extends into the sapwood. Larvae continue feeding in the sapwood as summer progresses. Their tunnels (galleries) eventually turn upward and terminate just beneath the bark surface by the end of the season. Larvae enlarge their galleries as they grow, frequently pushing frass (sawdust-like excrement) out of the entrance hole. Completed galleries may be over 12 inches long and 1/3 inch wide. Full grown larvae are about 1 inch long and white with a brown head. Mature larvae overwinter in the heartwood.

In spring, a larva will cut an emergence hole in the bark, leaving a thin flap of tissue over the hole. Pupation (formation of a cocoon) occurs in the burrow. When

development is complete, the pupa wriggles through the protective flap, and emerges as an adult moth. The reddish-brown pupal cases are left protruding from the plant (Fig. 3). There is one generation produced each year in Utah.



Figure 2. Lilac-ash borer larva in gallery[2].

Symptoms and Damage

Limb dieback is a common symptom resulting from lilac-ash borer infestation. Newly infested plants can be distinguished by the frass which is pushed out of the burrows by the larvae. Older infestations are characterized by burrow exit holes and protruding empty pupal cases (Fig. 3). Heavy infestations decrease plant vigor, increase the potential for wind damage, and may kill individual branches or even entire plants. Lilac-ash borers generally attack the lower trunk first, but may be found 25 feet high on the trunk and branches. Terminal shoots of young ash can also be killed (Fig. 4)[1].



Figure 3. Cast pupal skin of a lilac-ash borer extruding from a hole in an ash tree[3].



Fig. 4. Branch tip death caused from boring by lilac-ash borer larva[4].

Lilac-ash borer is more severe when plants are growing under stressful conditions.

Monitoring and Determining Treatment

Lilac-ash borers emerge from their overwintering site, mate, and lay eggs within a specific time period each year. Spray treatments can be determined for an exact date each year. The date will vary yearly depending on the temperature.

To determine when moths are active,traps and clearwing moth pheromone lures (chemical sex attractants), should be hung at about shoulder height in various susceptible host trees. The lures will attract moths from long distances, so they do not have to be located near an active infestation. A standard set-up includes a large delta trap and a clearwing moth lure. Various traps and lures are available from different suppliers (see page 4). Dark colored traps are more effective than light colored traps[2].

Lilac-ash borer development and emergence can be predicted by tracking growing degree-days (GDD) in a given location over time, calculated from maximum and minimum temperatures. Table 1 shows approximate dates, using historic GDD, when traps should be placed in different locations in Utah. In Colorado, trap catches of *P. syringae* occurred from April 20 to July 21 in the north, April 24 to July 9 centrally, and April 4 to July 11 in the south[3]. In Kentucky, adult flight begins about 1 week after full bloom of lilac (*Syringa vulgaris*), flowering dogwood (*Cornus florida*), and Sargent crab apple (*Malus sargentii*)[4].

Host: Lilac, Ash, Privet	GDD*	Management Action	Average Date in North Logan (range)	Average Date in Salt Lake City (range)	Average Date in St. George** (range)
Before first emergence	200	put out traps	May 12 (May 4 - May 20)	April 25 (April 6 - May 2)	March 30 (*na*)
First capture of males	304	no action	May 21 (May 16 - May 30)	May 5 (April 26 - May 18)	April 4 (*na*)
10% capture of males	507	1st spray	June 11 (June 4 - June 20)	May 20 (May 10 - May 30)	April 14 (*na*)
50% capture of males	930	spray	July 6 (July 2 - July 14)	June 16 (June 12 - June 27)	May 10 (*na*)
90% capture of males	1369	end sprays	July 25 (July 20 - Aug. 3)	July 4 (June 29 - July 12)	May 29 (*na*)

Table 1. Management actions based on the lilac-ash borer phenology model (Potter and Timmons[4]) for three regions in Utah. Growing degree-day (GDD) data are based on weather station data from 2004, 2005, 2006, and 2007. For more information on degree days, see the "Using Degree Days to Time Treatments for Insect Pests" fact sheet.
*GDD calculated after January 1, using a lower threshold of 50°F.
**St. George only includes GDD data from 2004, and is not a true average.

Other monitoring methods include examining the bases of the trees and shrubs for fine sawdust-like fragments (frass), oozing sap, and a circular exit hole, and the shed skins from clearwing pupae.

Trunk sprays should start at 507 GDD, and continue on the interval stated on the label of the product you select until 1369 GDD. Table 1 shows approximate start and end spray dates based on locations within Utah. For accurate, weekly GDD updates, please subscribe to one or all of the Integrated Pest Management (IPM) Advisorys.

Lilac-ash moths caught in the sticky trap will resemble common paper wasps (Figs. 1, 4). If you are uncertain of what moth you caught, please send samples to the UPPDL--there are many look-alikes (see "Other Boring Insects" below). In Utah, lures can last up to 30 days.

Control

Ash and lilac are commonly planted in Utah, but under stressed conditions can be susceptible to attack by borers. Many other less common landscape plants are as adapted or more adapted to the Intermountain-West climate. Diversification of the landscape will reduce the impact of an insect or disease outbreak. Consult local Extension agents for alternative species to plant in your area.

Because lilac-ash borers prefer to attack larger, older branches, a technique known as renewal pruning is a great preventive method. Renewal pruning involves removing older branches near the tree base, allowing younger, more vigorous branches continued growth. Renewal pruning increases the amount of flowers produced in lilac, controls the ultimate size of the shrub, and makes shearing (if desired) more manageable over time. Up to 1/3 of branches can be removed in a given year. Additionally, damaged branches may need to be removed to stop them from becoming a danger.



Fig. 4. Adult lilac-ash borers mating (*Podosesia syringae*)[3].

Apply preventive insecticide sprays to the trunk and larger limbs during the egg-laying period to kill newly hatched larvae before they can bore into the bark. The initial application should be made within 10 to 20 days of adult emergence, depending on your location. Primary insecticides include permethrin (group 3A), bifenthrin (group 3A) and endosulfan (restricted use; group 2A). Keep in mind that imidacloprid (group 4A), a systemic insecticide often used for general borer control in trees, is ineffective against lilac-ash borer and should not be used for this purpose. Depending on the product, multiple applications may be necessary due to the extended egg laying period. Larger trees may require a professional applicator due to specialized equipment needed to treat the full canopy.

Proper care and planting to relieve future stress can greatly limit attacks. Fresh pruning wounds are highly attractive to egg-laying moths. It is important to avoid pruning prior to moth flight.

Other Boring Insects

Several long-horned beetles also attack ash. However, they limit attacks primarily to dying trees and are much less important than the lilac-ash borer in landscape plantings. Other similar, common moths that may be attracted to lilac-ash borer pheromone traps include: greater peach tree borer (*Synanthedon exitiosa*), redbelted clearwing (*Synanthedon culiciformis*), currant borer (*Synanthedon tipuliformes*), cottonwood crown borer (*Sesia tibialis*), and the western poplar clearwing (*Paranthrene robiniae*).

Non-clearwing moth borers include the redheaded ash borer (*Neoclytus acuminatus*) (Figs. 5,6), and the banded ash borer (*Neoclytus caprea*). However, the lilac-ash borer is the most common damaging species, particularly of poorly sited and stressed ash trees.



Fig. 5. Adult redheaded ash borer (*Neoclytus acuminatus*) and emergence holes[5].



Fig. 6. Redheaded ash borer larva (*Neoclytus acuminatus*)[1]. This larva is similar in appearence to other roundheaded borer larvae.

Invasive Pest Warning

Emerald ash borer (EAB) (*Agrilus planipennis*: Buprestidae) (Fig. 7), an insect native to Asia, has become a devastating pest in the Great Lakes region, killing over 10 million ash trees since 2007. So far this pest has not been found in Utah, but it has the potential to cause severe mortality to urban ash plantings. Federally enforced quarantines are in place to prevent the exportation of ash timber products from the infested area. However, vigilance is always needed to prevent this pest from making its way to Utah. Click here for more information concerning Emerald Ash Borer. Suspect EAB should be submitted to the UPPDL for diagnosis; phone: 435-797-2435.



Fig. 7. Emerald ash borer adult (*Agrilus planipennis*)[2].

Vendors that supply clearwing moth traps and lures.

BioQuip Products
(310) 667-8800
www.bioquip.com

Gempler's
(800) 382-8473
www.gemplers.com

Phero Tech
(800) 665-0076
www.pherotech.com

Great Lakes IPM
(989) 268-5693
www.greatlakesipm.com

IPM Laboratories
(315) 497-2063

Scentry Biologicals
(800) 735-5323
www.scentry.com

Trece
(918) 758-3061
www.trece.com

Further Reading

[1]Solomon, J. 1983. Terminal Mortality in Young Ashes. Journal of the Georgia Entomological Society, Vol. 18(3),

[2]Timmons, G.M., and Potter, D.A. 1981. Influence of Pheromone Trap Color on Capture of Lilac Borer Males. Environmental Entomology, Vol. 10, pg. 756-759.

[3]Meyer, W.L., Cranshaw, W.S., and Eichlin, T.D. 1988. Flight Patterns of Clearwing Borers in Colorado Based on Pheromone Trap Captures. The Southwestern Entomologist, Vol. 13, No. 1, pg. 39-46.

[4]Potter, M.F., and Potter, D.A. University of Kentucky College of Agriculture Insect Borers of Trees and Shrubs. http://www.ca.uky.edu/entomology/entfacts/ent43.asp. Last accessed 02/01/2010.

[5]Timmons, G.M., and Potter, D.A. 1983. Forecasting Emergence and Flight of the Lilac Borer (Lepidoptera: Sessidae) Based on Pheromone Trapping and Degree-Day Accumulations. Environmental Entomology, Vol. 12, pg. 400-403.

Picture Citations

[1]Images courtesy of Daniel Herms, Ohio State University, Bugwood.org.

[2]Images courtesy of David Cappaert, Michigan State University, Bugwood.org

[3]Images courtesy of Whitney Cranshaw, Colorado State University, Bugwood.org.

[4]Images courtesy of James Solomon, USDA Forest Service, Bugwood.org.

[5]Howard Ensign Evans, Colorado State University, Bugwood.org.

Precautionary Statement: All pesticides have benefits and risks, however following the label will maximize the benefits and reduce risks. Pay attention to the directions for use and follow precautionary statements. Pesticide labels are considered legal documents containing instructions and limitations. Inconsistent use of the product or disregarding the label is a violation of both federal and state laws. The pesticide applicator is legally responsible for proper use.

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