



Invasive Shot-Hole Borers + Fusarium Dieback Monitoring Trap Guidelines

WHEN TO TRAP

Monitoring for Invasive Shot-Hole Borer (ISHB), *Euwallacea* spp., and Fusarium Dieback can be challenging: the invasive pest complex has attacked over 260 different species, including common native, landscape, and agricultural trees.

Visual surveys are effective for identifying ISHB symptoms on individual trees, but may not be practical for several acres of inaccessible forest. In this case, monitoring traps can be installed to detect ISHB presence. A lure called quercivorol helps attract beetles to the trap. This document describes trap options and the process of trap installation and maintenance.



An adult female beetle¹ is 1.8-2.5 mm (0.07-0.1 inches) long

VISUAL SURVEYS

Whenever possible, visual tree surveys are preferred over monitoring traps. Trapping is a passive detection method that is useful for large or inaccessible areas. However, regular inspections of individual trees are recommended for homes or managed landscapes. If time and resources allow, this is a more accurate and precise way of detecting ISHB.

Visit www.pshb.org for the full ISHB host list and photos of symptoms on a variety of tree species.

TRAP OPTIONS



Trap Type	Lindgren/Funnel Trap (A)	Panel Trap (B)	Bottle Trap (C)
How it Works	Insects encounter trap, tumble down through funnels, and fall into cup of preservative*	Insects that fly into trap become stuck on the sticky surface of the panel	Insects encounter upper bottle and tumble down into lower bottle of preservative*
Pros	<ul style="list-style-type: none"> • Lasts for multiple field seasons • Easy to service and maintain • Insects will be easier to identify 	<ul style="list-style-type: none"> • Less expensive than Lindgren/Funnel trap • Less frequent service required, as beetles are preserved well on surface 	<ul style="list-style-type: none"> • Less expensive than Lindgren/Funnel trap
Cons	<ul style="list-style-type: none"> • More expensive than other traps • More frequent service required to prevent trap cup from overflowing or drying out • Requires regular cleaning (dust, spider webs) • Possibility of vandalism 	<ul style="list-style-type: none"> • Samples need to be individually removed from trap surface • Insects are sticky and harder to identify • Traps are not re-usable (good for ~1 field season) 	<ul style="list-style-type: none"> • Lower trap catches expected compared to other trap options • Requires assembly and multiple parts

*see Trap Preservatives section on reverse side

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TRAP PLACEMENT

- Location: Consider placing traps near riparian areas, green waste facilities, firewood vendors, golf courses, or botanical gardens.
- Host material: Place traps where ISHB's reproductive (most preferred) host species are available (e.g. sycamore, willow, cottonwood, box elder, castor bean).
- Quantity/density: Traps may be placed at 25 to 35 yard intervals throughout the monitored area (or 2-5 traps per acre). A higher concentration of traps/lures is not advised.
- Public visibility: Traps should be accessible for maintenance, but away from high-traffic areas.
- Do NOT hang traps: in or under tree canopies, in areas exposed to high winds, or where traps may get wet (i.e. irrigated lawns or planters).
- If possible, collect x-/y-coordinates for each trap to facilitate maintenance and inspection.

TRAP INSTALLATION

1. Hang trap approximately 5 feet high (a simple stand can be constructed from a rebar stake and a 5' length of EMT or sturdy PVC). Panel traps can be clipped to the stand using binder clips.
2. Fasten lure near the top of the trap (4-5' above ground) with a zip-tie or twist-tie.
3. Always attach contact information and "Do Not Disturb" notices to each trap. If placing more than one trap in an area, assign each one a number and label the traps.



MAINTENANCE AND INSPECTION

Inspect and empty traps every 1-2 weeks, depending on the liquid used and whether ISHB is in the area. Remove debris and non-target insects from trap cups or panels as needed.

We recommend retrieving trap contents from the field for examination in a lab or indoor workspace. Use sealable sampling bags to store trap contents.

Do not transport live insects: PSHB/KSHB can chew through plastic. Transport samples in a sealed container. To guarantee that insects are dead, and to prevent decay, place samples in a freezer until they can be inspected.

Lindgren/Funnel and Bottle Traps

1. For each trap, label a sampling bag and paint strainer with trap number and collection date.
2. Remove the collection cup/bottle from the bottom of the trap. Filter the contents by pouring the antifreeze through a paint strainer and into another container (e.g. bucket, jar).
3. Place the paint strainer in the labeled sampling bag. The contents of each trap should be sealed in a separate one quart bag. Make sure that any insects collected have drowned in the antifreeze.
4. Return the antifreeze to the collection container. If needed, top off container to be ~1/3 full of antifreeze.

Panel Traps

1. For each trap, label a sampling bag with the trap number and collection date.
2. Using a pair of forceps/tweezers, gently remove insects from the surface of the panel trap and place them in the sampling bag.
3. Sticky panel traps will eventually require replacement.

Alternatively, the entire panel can be removed and examined in an indoor space. However, one-time use of each panel makes this method more costly.

ISHB RESOURCES

www.pshb.org - UC Cooperative Extension ISHB website

www.eskalenlab.ucr.edu - Eskalen Lab, UC Riverside

www.ipm.ucanr.edu - UC Statewide IPM Program

HOW TO USE THE LURE

Quercivorol is a plant-based chemical lure that attracts ISHB and other insects. It is not strong enough to be used to trap and kill ISHB in large numbers, but it is useful in confirming the presence of the tiny beetle.

Some tips to help maximize the effectiveness of the lure include:

- **Replace** lures every 6-8 weeks. No special procedures are required for lure disposal.
- **Only use 1** lure per trap; a high concentration of lures can actually make them less effective.
- **Store** lures in the freezer until you are ready to use them. Otherwise, the chemical may be released before being installed in the field.



TRAP PRESERVATIVES

The collection cup/bottle at the bottom of **Lindgren/Funnel and bottle traps** should be ~1/3 full of soapy water OR a propylene-glycol-based antifreeze. Antifreeze preserves the beetles better than soapy water (which will need to be inspected more often).

Avoid ethanol-based formulas (i.e. ethanol, ethyl alcohol, ethylene glycol). Ethanol attracts many species of ambrosia beetle, which will make identification of ISHB more difficult.

REPORTING ISHB

If you recover suspected ISHB from a trap, please visit www.pshb.org for current reporting information.

