

# Using Double-Decker Traps to Detect Emerald Ash Borer

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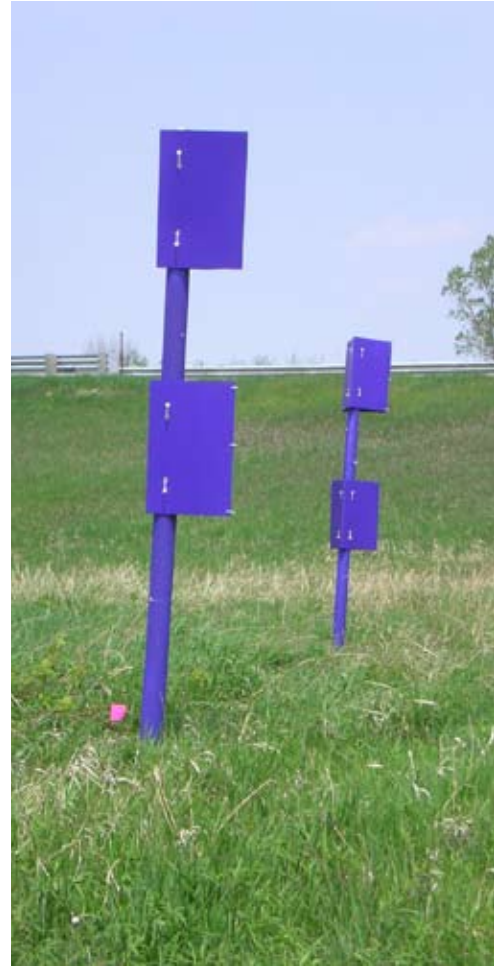


# The Double-Decker Trap for Emerald Ash Borer

Detecting or monitoring populations of emerald ash borer (*Agrilus planipennis* Fairmaire) is very difficult when infestations are relatively new or when densities of this invasive pest are low. Emerald ash borer (EAB) beetles do not appear to use long distance pheromones. They do, however, use volatile odors emitted by ash leaves, bark and wood to distinguish ash trees from other kinds of trees. We also know these beetles are very “visual”. They respond to some colors but not others. They are also consistently attracted to light and sun. Beetles are much more likely to colonize open-grown trees than shaded trees, for example.

## Design

The Double-Decker (DD) trap is designed to integrate several visual and olfactory cues that are likely to attract EAB beetles. The DD traps are designed to be highly apparent to beetles. The vertical silhouette of the DD trap somewhat mimics the silhouette of an open-grown tree. The trap includes two purple panels, partly because beetles respond positively to that particular shade of purple. The two panels help to mimic the shape of a tree “canopy.” In addition, they increase the surface area available for trapping beetles.



## Lures

Each DD trap include two lures. One lure, a green leaf alcohol, is a primary volatile associated with ash leaves. The other lure, Manuka oil, contains many of the chemicals emitted by ash bark and wood. Lab studies and field trials have shown that these compounds are attractive to adult EAB beetles.

## Trap Placement

The DD traps are designed to be placed out in the open rather than being suspended in the canopy of a live ash tree. Placing the DD trap in the open serves at least three purposes. First, the lures on the panels of the DD traps do not have to directly compete with compounds emitted by live ash trees. This provides the beetles with a point source of ash-like volatiles that they can readily identify.

Second, placing the DD trap in the open takes advantage of the strong and consistent preference for sunny conditions exhibited by EAB beetles. Obviously, the DD traps should be placed near ash trees – after all, if there were no ash trees, there would be no reason to trap EAB. But setting the trap 3-15 m away from a wooded area or placing traps in the midst of open-grown ash trees should increase the likelihood of detecting a low-density infestation.

Finally, the DD traps are simple to install and easy to check. The sturdy DD traps are not affected by strong winds. The traps, designed to be highly apparent to EAB, are also easy for survey personnel to locate for mid-season checks or recovery. We also should point out that we have used these traps for 3 years in dozens of sites and the traps have experienced little or no vandalism. The unappealing stickiness of the panels may serve to quell the enthusiasm of would-be vandals.

## **Results with the DD Trap**

We have conducted several field studies in numerous sites to evaluate the DD trap and lures. Many of the field sites used for these studies had low or very low EAB populations. For example, in 2007, a baited DD trap captured 4 EAB in a site that was not previously known to be infested. Results from all of our 2006-2008 studies indicate that the baited purple DD trap consistently attracts more adult EAB beetles than other trap designs. In 2008, at a site with ultra-low EAB densities, purple DD traps baited with a leaf lure, Manuka oil, and ethanol captured more EAB than similarly-baited green DD traps or purple panel traps baited with only Manuka oil and suspended in the canopy of ash trees. The purple DD traps accounted for 65% of the captured beetles and 80% of the purple DD traps had at least one beetle. In contrast, the purple canopy traps accounted for less than 5% of the total EAB capture and only 25% of canopy traps captured a beetle. The green DD traps were intermediate. Roughly half of the green DD traps captured at least one EAB but the total number of beetles on the green DD traps was 60% lower than the purple DD traps.

## **Choosing to Use DD Traps**

DD traps are obviously somewhat more expensive than the single panel traps that are suspended in the canopy of ash trees. The DD traps may be most appropriate for high risk areas such as campgrounds or recreation areas where firewood presents an ongoing threat. Typically, we install DD traps 3-15 m away from the edge of wooded areas where ash occurs. DD traps can also be placed in the midst of open-grown ash trees.

## **Educational Signs**

In areas where people are likely to encounter traps, we often display a sign with photos of the traps and an explanation of the purpose of the trap. Our signs are printed (in color) with a desktop printer, laminated, glued to a wood or fiberboard backing, then attached to a t-post. The signs, along with the traps, can serve as an educational tool and help to increase public awareness of EAB.

## **Acknowledgements**

We thank James Wieferich, Tara Dell, Andrea Anulewicz and Jacob Bournay for their assistance.

# Double Decker (DD) Trap Construction

## Materials:

- 1 PVC pipe; 10 ft. long, 4 inch diam. HDPE (high density polyethylene) plastic pipe
- 2 coroplast plastic panels, each 4 ft x 2 ft; purple
  - Coroplast plastic is sold in 4 ft x 8 ft sheets, 4mm thick ; each sheet yields 4 panels
  - Can be purchased through Harbor Sales Company (<http://www.harborsales.net/>)
- 1 T-post (5 ft tall)
- 6 large cable ties (each 21 inches long; 175 lb capacity) (aka zip ties)
- 6 small cable ties (each 7 inches long; 50 lb capacity)
- utility knife
- cordless drill and bits ( $\frac{1}{4}$  inch &  $\frac{1}{2}$  inch)
- T-post pounder
- Permanent marker

## DD Trap Installation

- Pestick
  - Pestick can be purchased through Hummert International (<http://www.hummert.com/>)
- Latex gloves
- Paintbrush (4 inch wide)

## Baiting the Traps

- Leaf Blend Lure (2 cis-3-hexenol bubble caps) available from Con Tech International, Inc. (<http://www.contech-inc.com/>)
- Bark Blend Lure (1 manuka oil pouch) available from Synergy Semiochemical (<http://www.semiochemical.com/>)

## DD Trap Checking

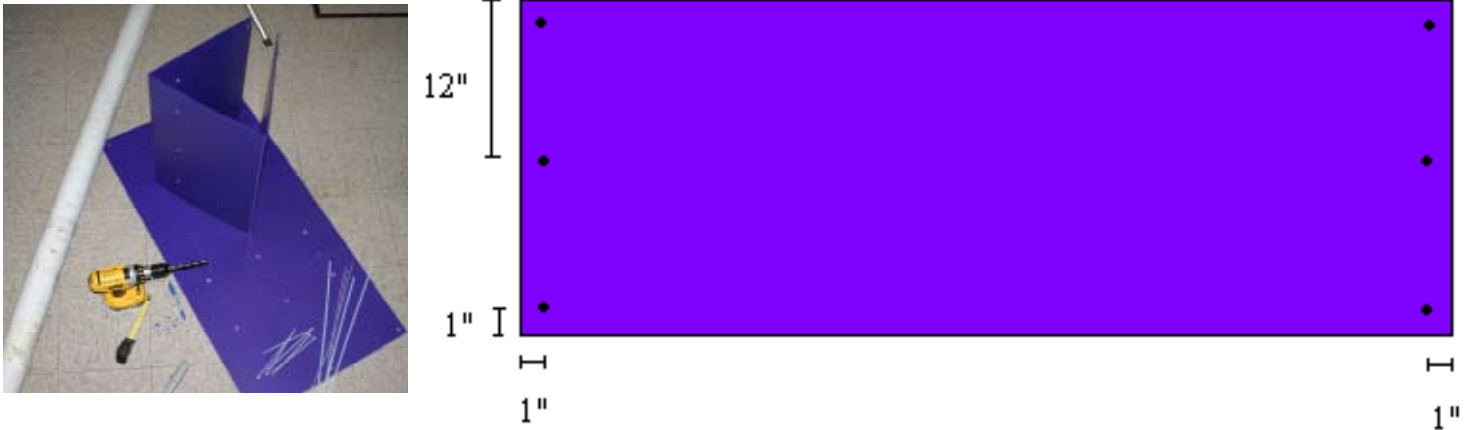
- Ziplock polyethylene specimen bags
- forceps



## Step One: Preparation of Purple Panels

Each DD trap consists of two panels (24" x 48") attached to a single 10 ft tall pvc pipe.

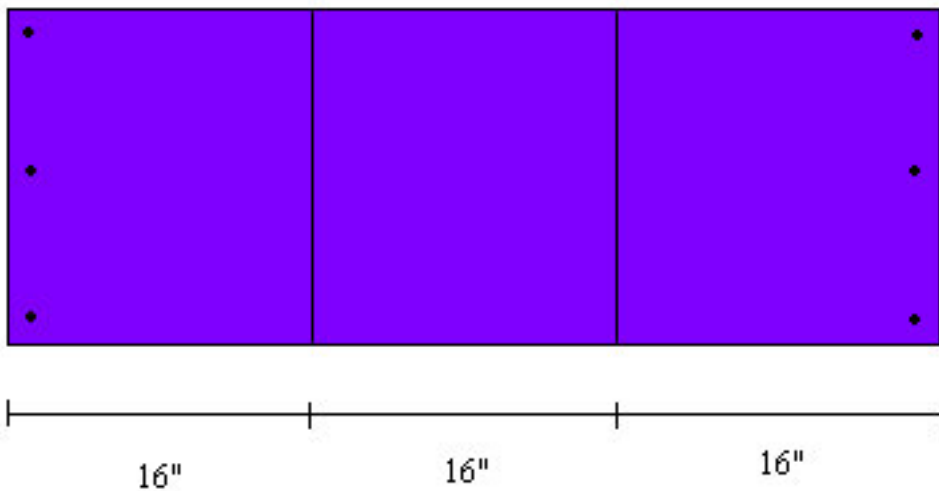
For each panel:



**Figure 1:**

Using a ¼ inch drill bit, drill 4 holes, one in each corner of the panel. Each hole should be 1 inch from the edge.

Drill an additional hole between the corner holes along each side (total of 2 more holes). Each of these holes should be 12" from the top of the panel and 1" from the side of the panel.



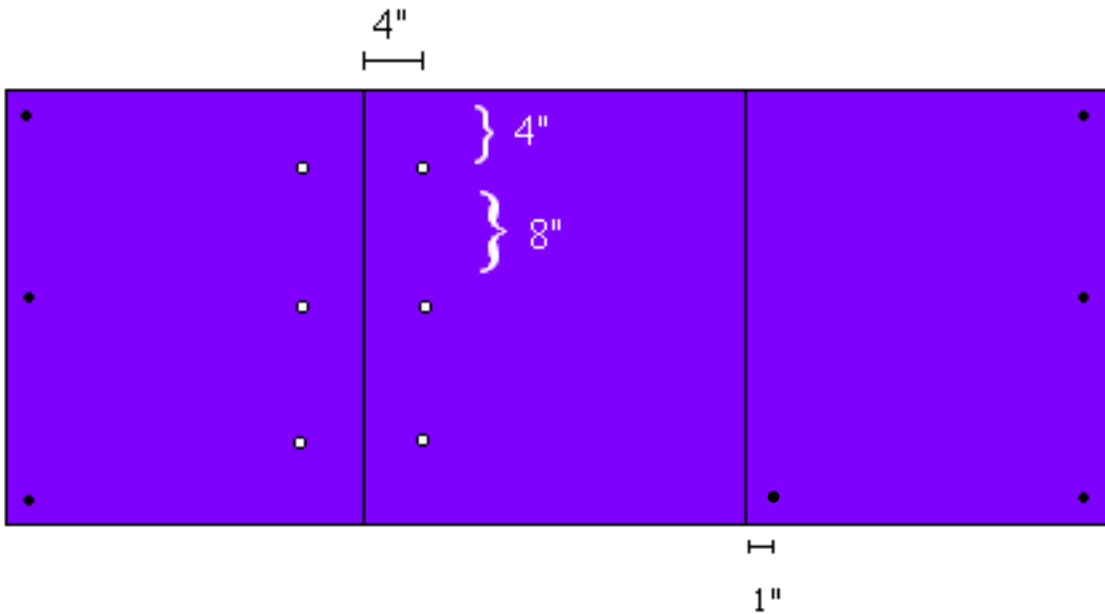
**Figure 2:**

Using a permanent marker and ruler, divide the panel into 3 sections, each 16" wide.

**Figure 3:**

Using a utility knife and straight edge, score the panel length-wise by cutting through the top layer of the panel so that it folds easily along the score line. Do NOT cut all the way through the plastic. When folded, the cut layer should be facing outward.





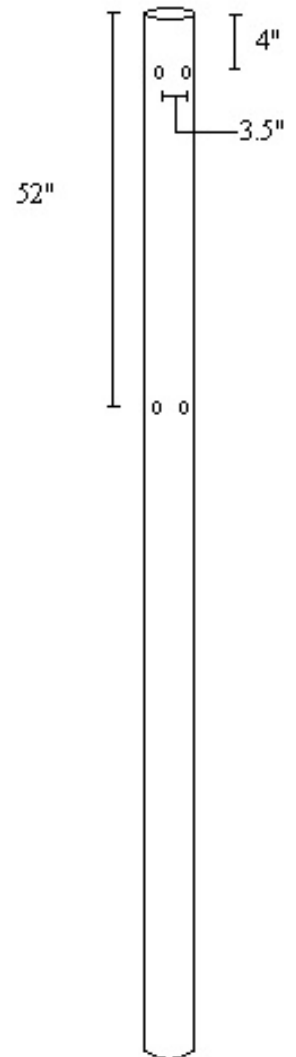
**Figure 4:**

On either side of the left-hand score line, use a  $\frac{1}{2}$ " drill bit to drill two holes, each 4" from the top of the panel and 4" from the score line.

Drill a second pair of holes 12" from the top of the panel and 4" from the score line.

Drill the 3rd pair of holes 20" from the top of the panel and 4" from the score line.

On the right side of the right hand score line, use a  $\frac{1}{4}$  inch drill bit to drill one hole 1" from the bottom of the panel and 1" from the score line. This hole will be used for hanging the bait.



## Step Two: Pipe Preparation

**Figure 5:**

Using a  $\frac{1}{2}$ " drill bit, drill a pair of holes 4" from the top of the pvc pipe and 3  $\frac{1}{2}$ " apart. The holes should be aligned.

Drill a second pair of holes, 3  $\frac{1}{2}$ " apart, and 52" from the top of the pipe.

### Step Three: Construction of DD Trap

**A.** Use the large (21" long) zip ties to attach each panel to the pvc pipe. Place 1 zip tie in each of the three holes on the left-hand side of the left score line on the panel. Feed the top zip tie horizontally through the top pair of holes in the pipe and through the adjacent hole on the right side of the score line on the panel. This can be a little tricky, but you will get the hang of it after 1 or 2 traps. Close the zip tie and tighten.

**B.** Feed the 2 remaining zip ties around the pipe and through the corresponding holes on the panel. Close the zip ties and tighten. **Be sure zip ties are not twisted when closed.**

**C.** Fold the panel into a triangular prism around the pipe and close using 3 of the small (7" long) zip ties. **The cut layer of the score line should be facing out when properly assembled (See Figure 3).**

Repeat for the second panel.



Figure 6 A-C: Trap construction steps

## Step Four: Set up of DD Trap

Use the t-post pounder to install a t-post into the desired location. A 5 ft tall t-post works best for a person between 5'6" and 6'0".

To apply Pestick, lean the assembled trap on the t-post, as shown in Figure 7. The top panel can be supported by the top of the t-post, as shown. Wear disposable latex gloves to apply the Pestick. Use an ordinary 4" wide paint brush from your local hardware store to liberally apply Pestick\* to all three outer faces of each panel. Keep in mind that Pestick is much thicker than paint and will not spread as easily, but with some effort you can make a little bit go a long way! A one-gallon can covers approximately 10 traps. When finished, slide the bottom of the pvc pipe over the t-post (t-post will no longer be visible). The t-post provides plenty of support for the DD trap even in high winds. Guy wires or additional support are not necessary.

\* Note that Pestick does not come off easily and ruins clothes. It will stick to anything and everything. If it gets into your hair, liberal amounts of conditioner will remove it.

## Step Five: Baiting the DD Trap

Traps are baited with a Leaf Blend hanging from the bottom of the upper panel, and a Bark Blend hanging from the bottom of the lower panel.

The Leaf Blend (**LB**) consists of 2 bubble caps of the green leaf volatile cis-3-hexenol and can be ordered from ConTech International( <http://www.contech-inc.com/>). The Bark Blend (**BB**) consists of one pouch of manuka oil and can be ordered from Synergy Semiochemicals (<http://www.semiochemical.com/>).



Figure 7: Applying Pestick



**LB**



**BB**



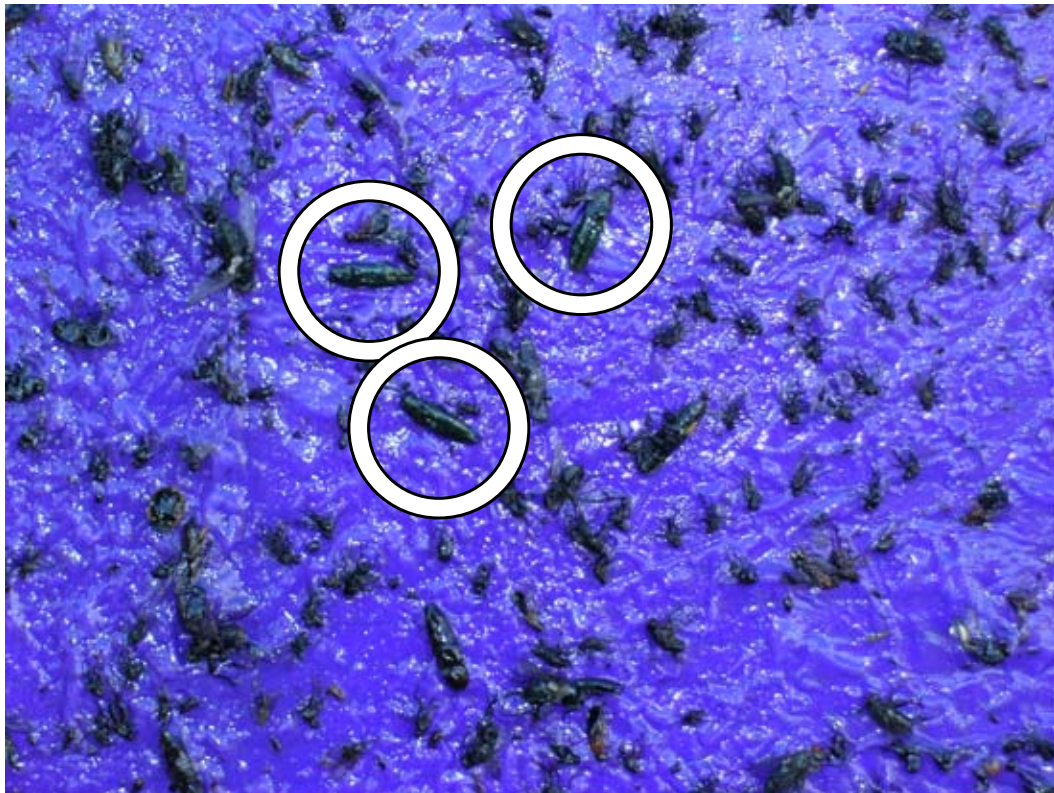
Figure 8: Baiting the trap

## Follow Up: Checking the Traps for EAB Beetles

### Materials:

- Disposable latex gloves
- Forceps
- 2"x3" ziplock specimen bags
  - polyethylene, 2 ml thick
  - can be purchased through [esupplystore.com](http://www.esupplystore.com) ([http://www.esupplystore.com/2x3quot-Zip-Bags-2-mil-1000ct\\_p\\_366-226.html](http://www.esupplystore.com/2x3quot-Zip-Bags-2-mil-1000ct_p_366-226.html))

We recommend that the traps be checked weekly for beetles. Wearing disposable latex gloves, remove the trap from the t-post by lifting the pvc pipe straight up and off the t-post. Prop the inner face of the upper panel on the t-post as previously shown, so that one face on both the top and bottom panels are exposed. Use a pair of forceps to pull off any suspect EAB you find. Specimen bags can be used to store beetles. Rotate the pvc pipe to examine the three faces on each panel for suspect beetles.



**Figure 9:** Various species of insects such as flies and click beetles tend to get caught on the traps. It takes a keen eye to spot an EAB. For example, there are three EAB (circled) in the photo of the panel above. You may wish to have a photo reference available the first few times you check the traps. Happy Trapping!