Trials of Verbenone Repellents to Prevent Black Stem Borer Infestations in Apples

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Xylosandrus germanus – Black Stem Borer

"Ambrosia Beetle" (Curculionidae: Scolytinae)

2.5 mm in length

Female drills a hole ~1mm in diameter, and hollows out a channel into heartwood of (usually small) physiologically stressed trees.

larva/pupa in brood chamber

Damage

- Discoloration and blistering of bark
- Compressed sawdust toothpicks from adult tunneling
- Tree's vascular system shuts down: wilting/dieback/death

Trapping

- Inverted juice bottle traps, with rectangular openings cut in side panels
- Baited with AgBio ethanol lures
- Hung 2-3 feet off the ground
  - Placed on edge of woods next to orchard
  - Also in interior of orchard
  - Traps checked weekly

2017 Control Trial – Trunk Sprays/Repellents

- potted/flooded nursery apple trees; placed inside or alongside of woods adjacent to commercial orchards – 3 sites
- individual ethanol lures additionally affixed to each tree
- Trts (applied May 10) replicated on 6 trees, grouped together at each site, one group per treatment per site; 30 m separation
  - Lorsban Advanced (chlorpyrifos); 1.5 qt/100 gal, Solo backpack
  - SPLAT Verb (verbenone) repellent; 35 g/tree, caulking gun
    - anti-aggregation pheromone component of certain bark beetles
    - repels pine beetles in forest stands; also, *X. germanus* in field trials
  - Lorsban Advanced followed by SPLAT Verb
  - SPLAT "A", "B", and "C" experimental verbenone formulations
  - Disrupt Micro-Flake VBN (verbenone); 4 g/tree, brushed on with Micro-Tac adhesive
  - Lorsban Advanced followed by Disrupt Micro-Flake VBN
  - Blank flakes
  - Untreated Check
- Preliminary evaluation July 5; final eval Aug 29 – trunk dissections

Methods & Materials

applying trunk sprays

EtOH lures

Micro-Flakes

SPLAT

flooding pot to stress trees

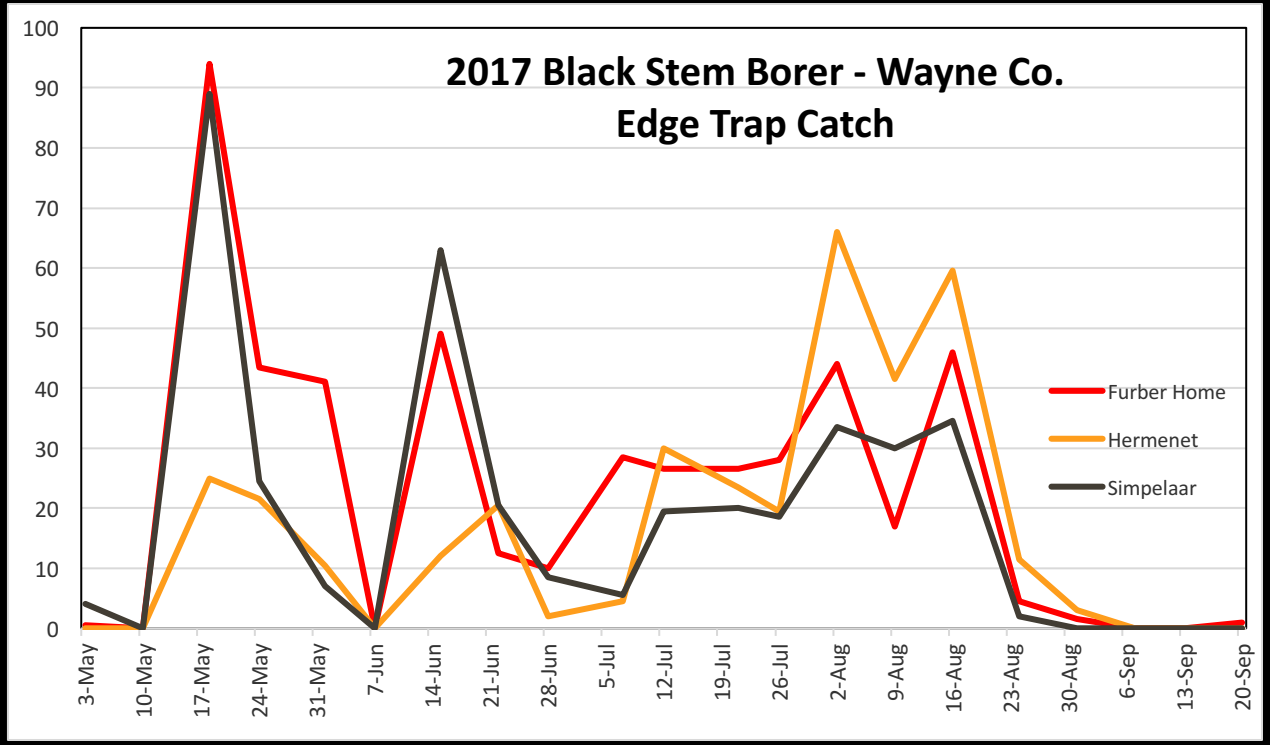

adult
males


adult
females


brood

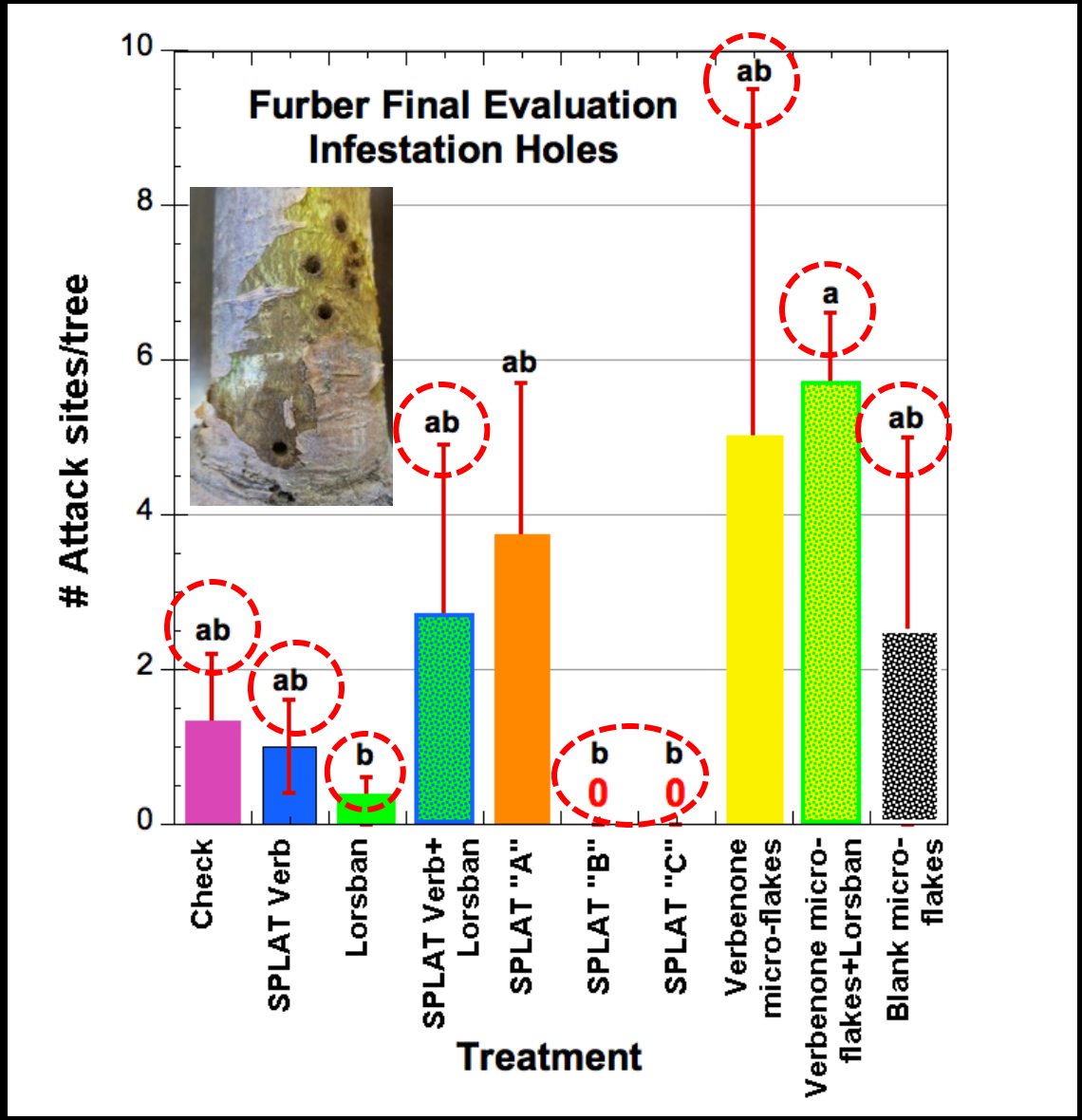
Results

- Preliminary Evaluation: **NO** infestations or injury at 2 of the sites, marginal damage at the 3rd site (1 damaged tree in SPLAT Verb trt, 1 in Check)
- Final Evaluation: Only 1 site with measurable levels of damage in treatments
- Cause of low infestations not known; fairly high numbers of adults caught in traps at trial sites
  - possible that extremely rainy weather in June & July interfered with normal infestation behavior of beetles



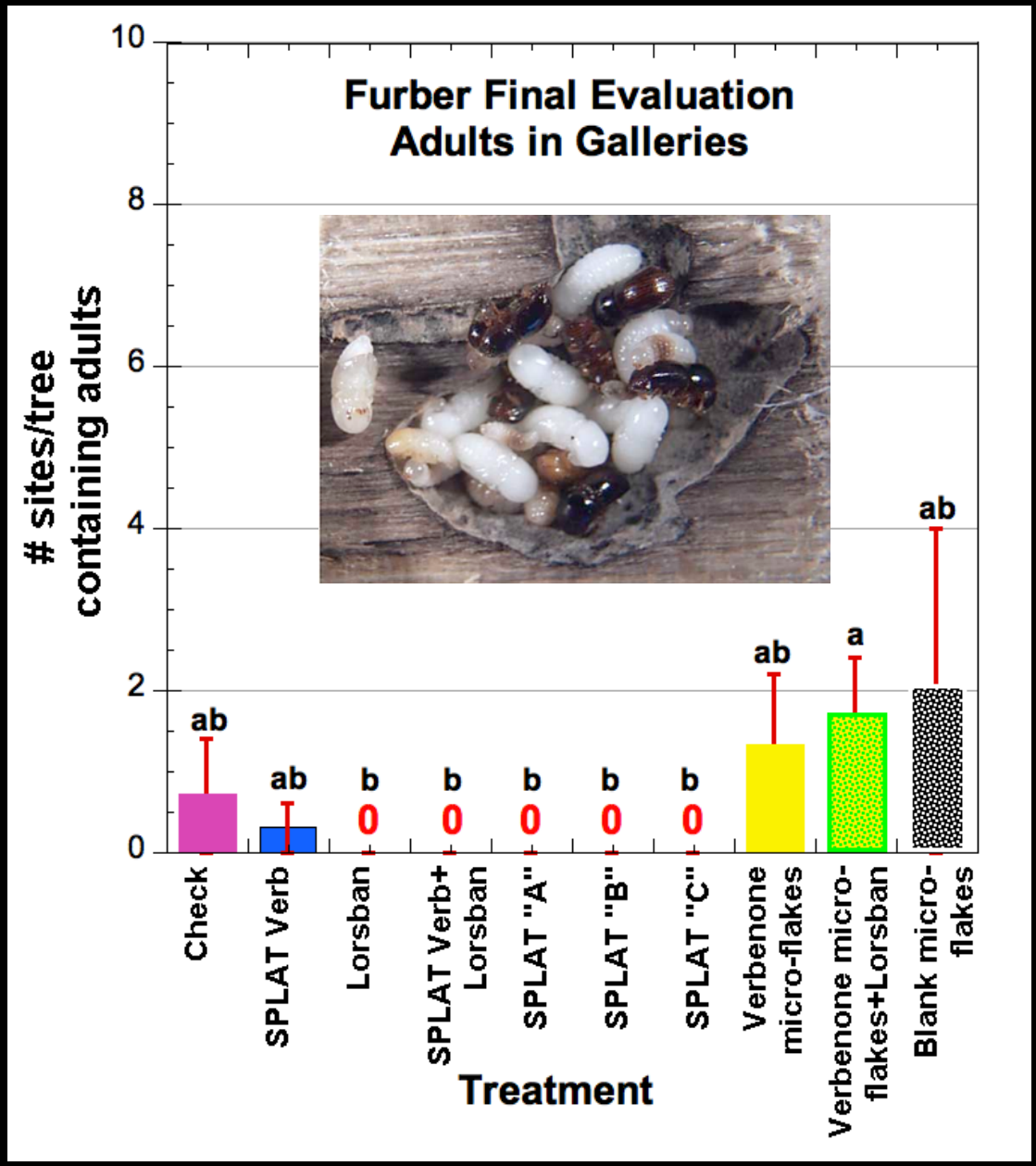
Results – Infestation Holes

- Neither of the plain verbenone treatments (SPLAT Verb or Disrupt Micro-Flake VBN) were significantly different from the Check or the Blank Flakes treatments
- Two of the experimental SPLAT formulations, SPLAT "B" and SPLAT "C", were the only treatments with zero damage
- Lorsban Advanced was statistically comparable to SPLAT "B" and "C"
- However, Lorsban in combination with either of the verbenone formulations was no better than any of the other treatments



Results – Gallery Contents

- Results were comparable for the number of sites with empty (aborted) galleries; only SPLAT "B" and "C" had zero incidence.
- For number of attack sites containing adults, results were zero for the Lorsban and all of the SPLAT formulations, with some statistical separation among treatments.
- There were no statistical differences among any of the treatments for number of attack sites containing brood.



Summary

- Overall, only the SPLAT "B" and SPLAT "C" treatments had zeroes across all infestation categories
- Indicates a measurable effect on preventing infestations of black stem borers in the test trees
- Composition of these formulations not currently being disclosed by the manufacturer for proprietary reasons
- Clear that follow-up trials on these products would be warranted in subsequent seasons

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