

Managing flatheaded borers in nursery production without insecticides

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The Problem: *Chrysobothris* spp. Flatheaded Borers

- Native insects with ubiquitous distribution covering the entire continental United States and extending into Canada
- One larva can girdle a nursery tree within one season
- Ruins the economic quality of surviving nursery trees
- *Chrysobothris femorata*, *Chrysobothri mali* and closely related species
- Genus has a wide host range, with some species overlap and specialization



Natasha Wright, Cook's Pest Control,
Bugwood.org



James Solomon, USDA Forest Service,
Bugwood.org

The Problem in Tennessee: *Chrysobothris femorata* complex

- Hosts: red and silver maple, apple, cherry, peach, apricot, plum, oaks, American basswood, redbud and dogwood, etc.
- Up to 50% damage on maples in nursery production (pers. observation)
- Newly transplanted/drought stressed trees are more susceptible
- Usually lays eggs on south (sunny) side of the tree in the first 20 cm; larval damage concentrated on south side



Damage Symptoms

Photo by Nadeer Youssef



Larvae develop mainly in the cambium and sapwood.

Photo by Axel Gonzalez



Feeding tunnels packed with frass.

Photo by Nadeer Youssef



Characteristic "D" shape hole after emerging.

Video by Axel Gonzalez



Adults are metallic olive-gray to brown with oval shape (0.3-06")



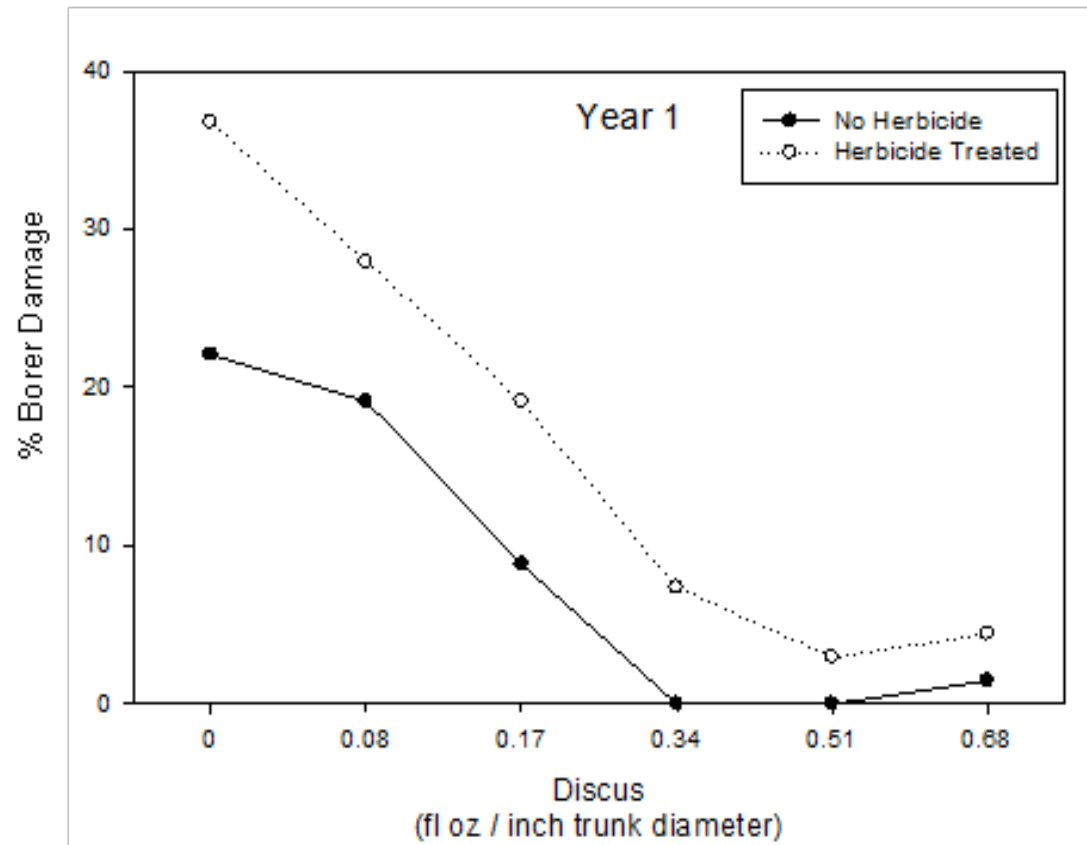
Current Best Practices

- Recommend keeping tree rows clean with pre- and post-emergent herbicide
- Treat newly transplanted trees with imidacloprid (3-year protection) or dinotefuran (1-year protection) soil drenches



Are there any alternative management options?

Previous research has shown that weedy plots have fewer attacks



Question 1: Can a winter cover crop reduce *Chrysobothris* attacks in red maple plantings?

Study Design (2015-2019)

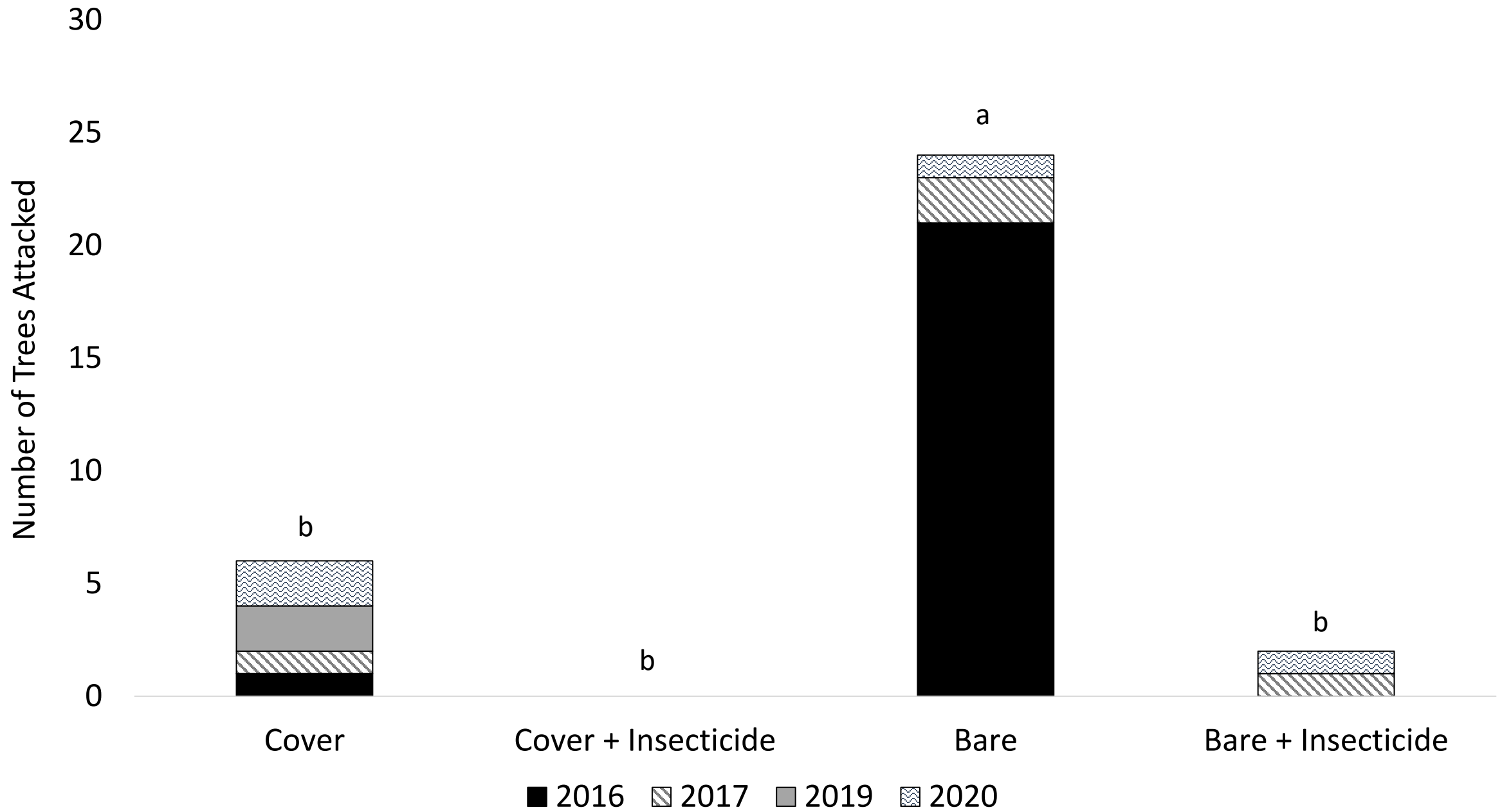
1st and 2nd Year

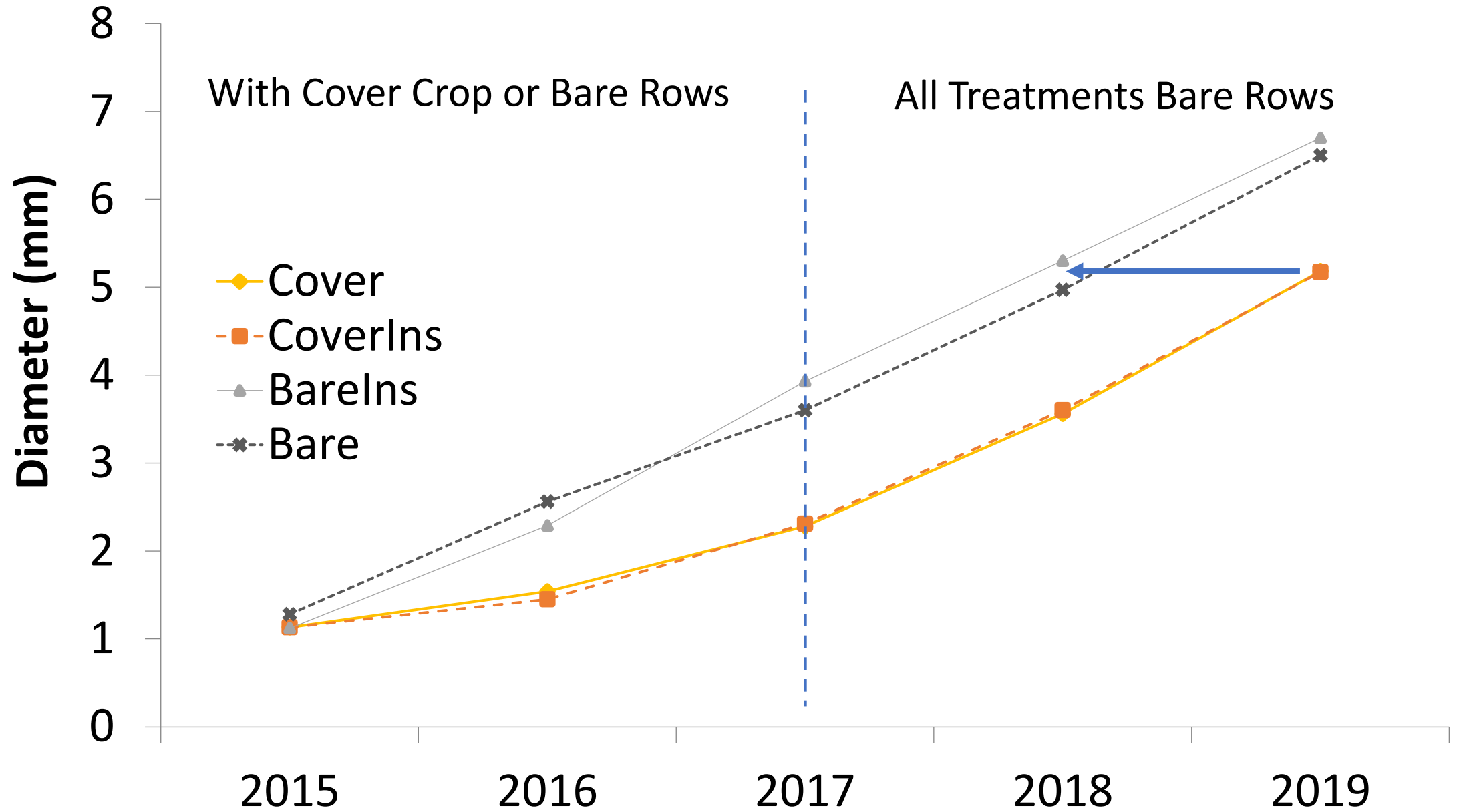
- Herbicide + Insecticide (Standard)
- Herbicide
- Cover + Insecticide
- Cover

3rd and 4th Year

- All Herbicide







Question: Can a winter cover crop reduce *Chrysobothris* attacks in red maple plantings?

Yes.

HOWEVER, there will be reduced growth of trees in first year due to competition with the cover crop. Removing cover crop following establishment had no effect on final size.

Question: Can killing the winter cover crop early reduce competition between trees and cover crop while maintaining protective effect against *Chrysobothris*?

Secondary Question: Does the herbicide treatment itself play a role in *Chrysobothris* damage?

Study Design (2018-2020)



Herbicide



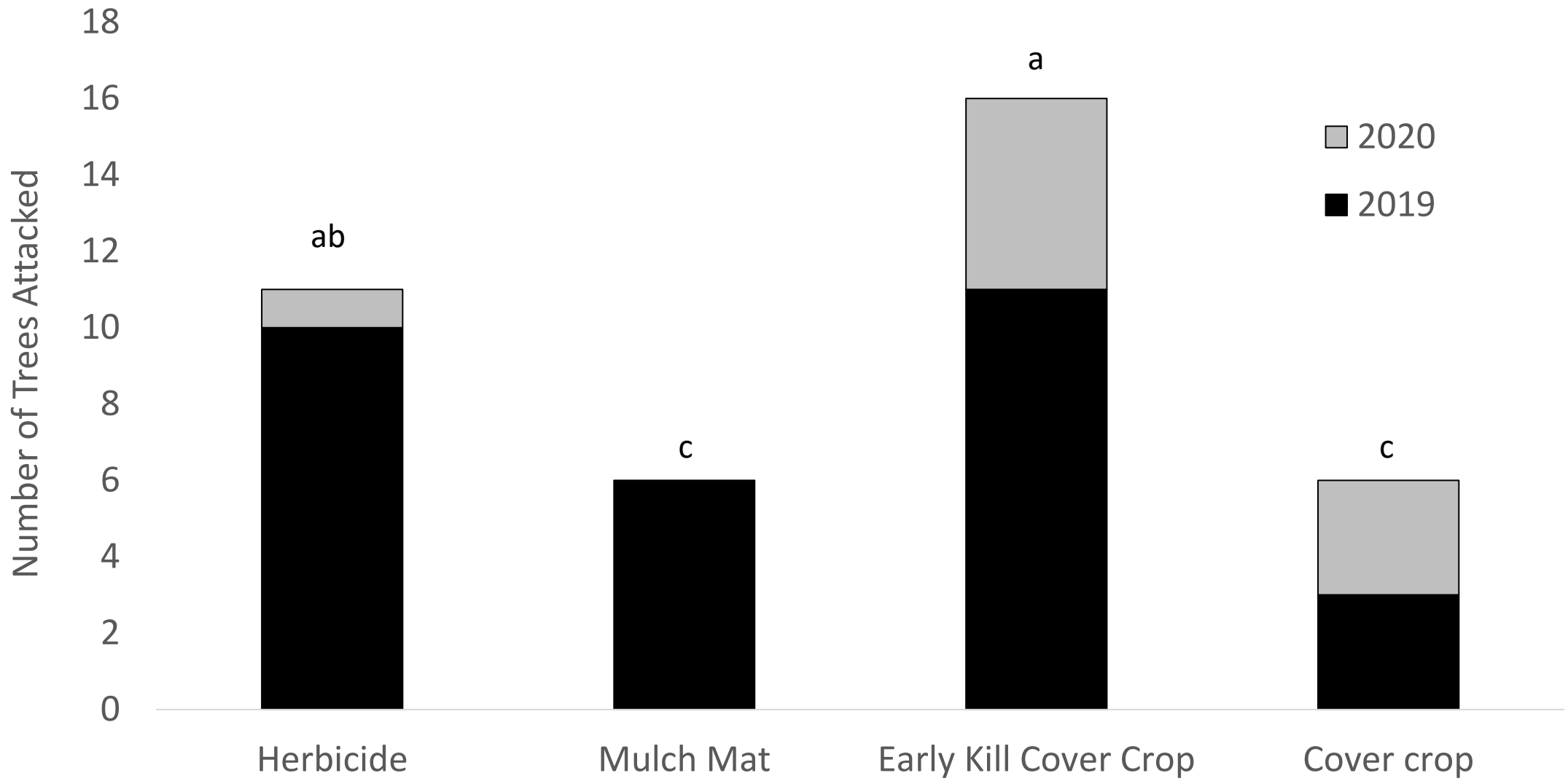
Mulch Mat

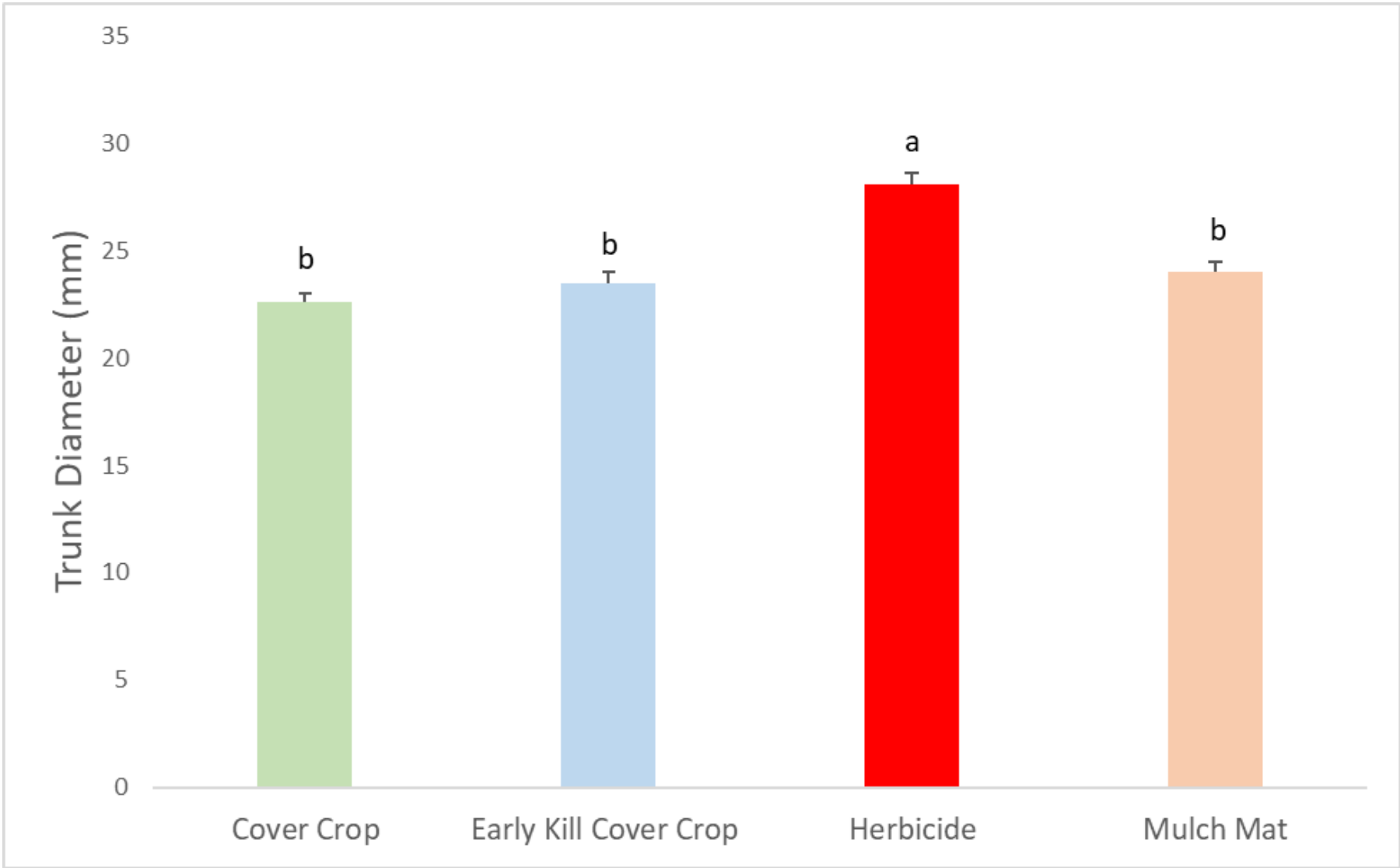


Cover Crop



Early Kill
Cover Crop





Question: Can killing the winter cover crop early reduce competition between trees and cover crop while maintaining protective effect against *Chrysobothris*?

No. Killing the cover crop in early May resulted in the highest amount of damage. Also, it did not improve growth!

Secondary Question: Does the herbicide treatment itself play a role in *Chrysobothris* damage?

*The herbicide treatment had more attacks than mulch mat. Also, the early kill cover crop treatment trended higher than the herbicide treatment. There could be an effect of herbicide (trunk damage, smell of dying foliage) that makes trees more attractive to *Chrysobothris*.*

Grower Recommendations for Cover Crop Use Based on Current Findings

- Transplant new liners into cover crop fields in fall or spring
- To mitigate growth loss – irrigate first year transplants
- Allow cover crop to senesce naturally over summer
- Cover crop plots can be transitioned to bare row in final year of production

Future Directions and Research Goals

- Herbicide timing and MOI on *Chrysobothris* attacks
- Irrigation impact on growth of new transplants in cover crop plots
- Larger-scale cover crop plots
- *Chrysobothris* parasitoids present in cover crop systems
- Companion plant concept in landscape



Labena grallator (1)



Phasgonophora sulcata (1)



Eusandalum spp (30)

Acknowledgements

Anthony Witcher

Victoria Deren

Vivek Ojha

Megan Winkler

Faith Womack

Milan Panth

Kripa Dhakal

Funding for this work came from Evans-Allen project (1017798), Southern SARE (OS17-101, LS18-287) and the Specialty Crop Research Initiative (2020-51181-32199)



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Questions?

