



ENTOMOLOGICAL  
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TENNESSEE  
STATE UNIVERSITY  
College of Agriculture



## Management of Flatheaded Appletree Borers Using Cover Crops in Woody Ornamental Production Systems

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# Red maple (*Acer rubrum* L.)

- One of the most common ornamental plants in eastern North America.
- Rapid growth rate.
- Resistance to extreme soil-moisture conditions.
- Sparkling fall colors.







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## The Flatheaded appletree borer (FHAB)

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- Serious pest throughout the United States.
- One larva can girdle a tree within one season.
- Ruins the economic quality of the nursery trees.
- Cultivars that show stress symptoms are more likely to be attack.
- *Chrysobothris femorata* ?

Order: Coleoptera  
Family: Buprestidae

# Damage symptoms (first 40 cm)

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

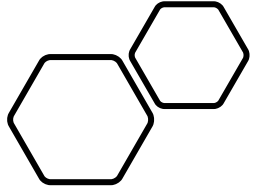


Characteristic "D" shape hole after emerging.

Video by Axel Gonzalez

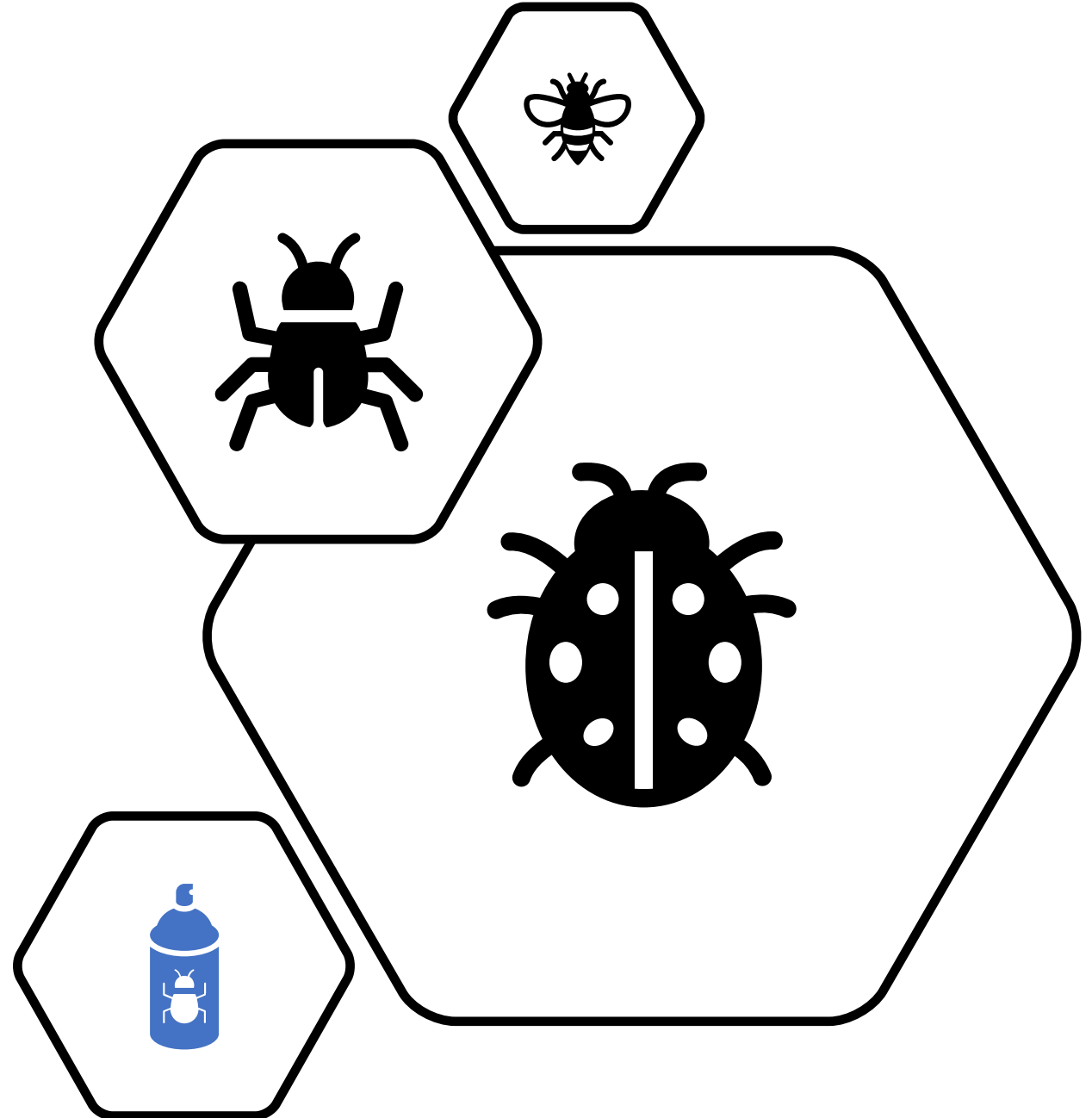


Adults are metallic olive-gray to brown with oval shape



## The imidacloprid insecticides are the standard treatment for FHAB

- The seasonality of adult borer flights and egg deposition.
- Issues with insect resistance.
- They are broad spectrum products that kill beneficial insects at the same time.
- Increased demand for organic and sustainable production.







# Study Design (2019-2020)

1. Herbicide (Bare)

2. Mulch Mat

3. Cover Crop


4. Early Kill Cover Crop

- Four replicates
- 400 trees
- SAS version 9.4; SAS Institute, Cary, NC



# Winter Cover Crop

- Tolerate adverse environmental conditions
- Fast seed germination and emergence period
- Low cost of establishment



Crimson clover  
(*Trifolium incarnatum* L)



Triticale (x *Triticosecale*)



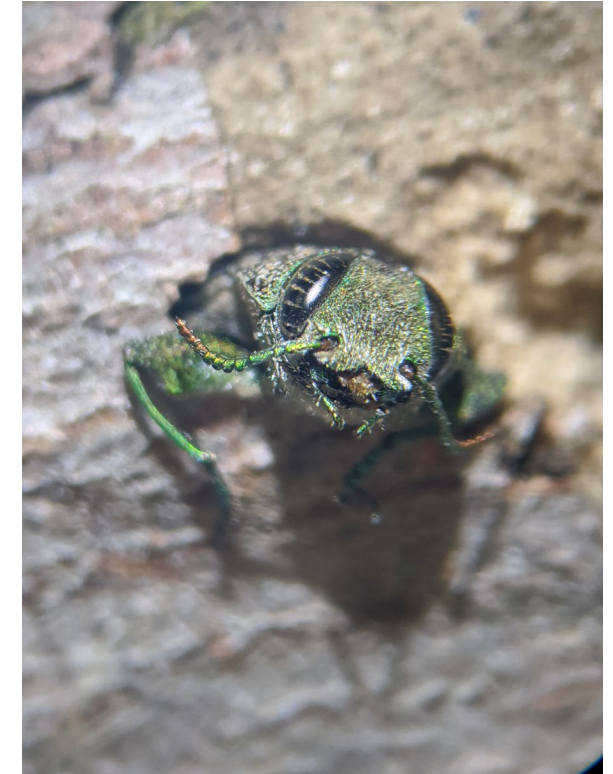
# FAB Evaluation



Trees were rated annually in October and April of the following year.



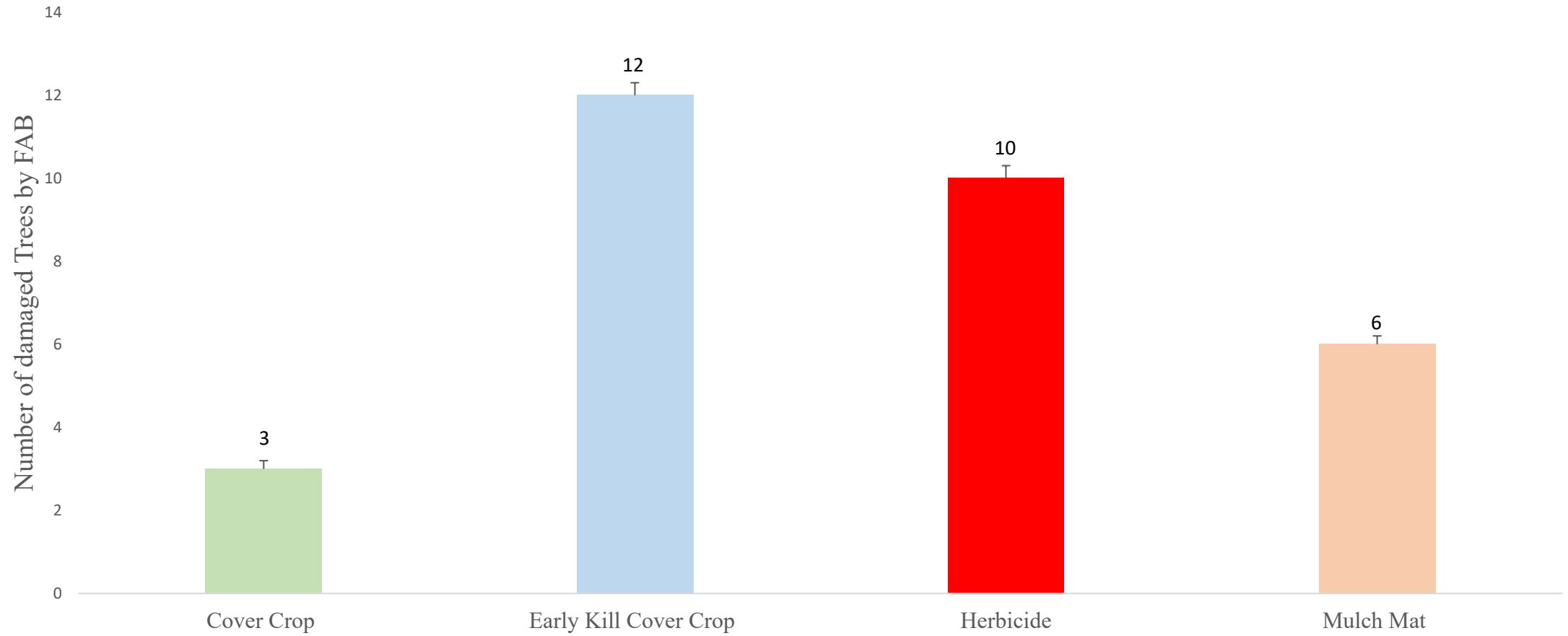
Tree logs were observed from April to June.



Adults of FAB emerged on March 28th

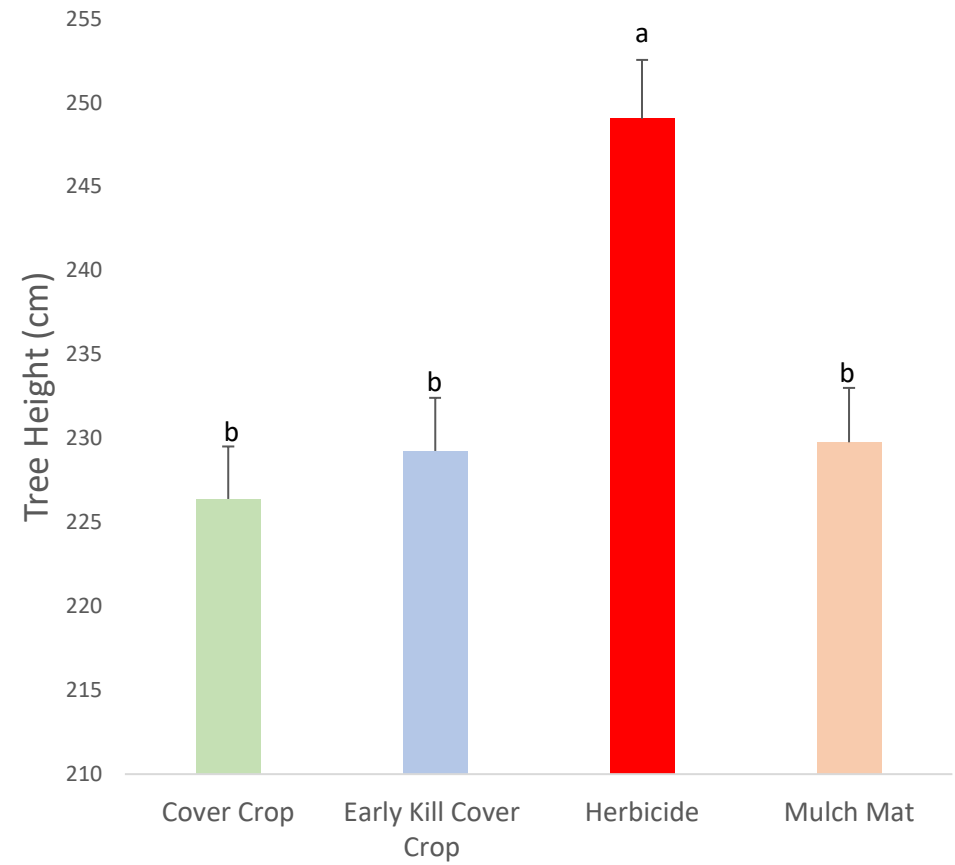
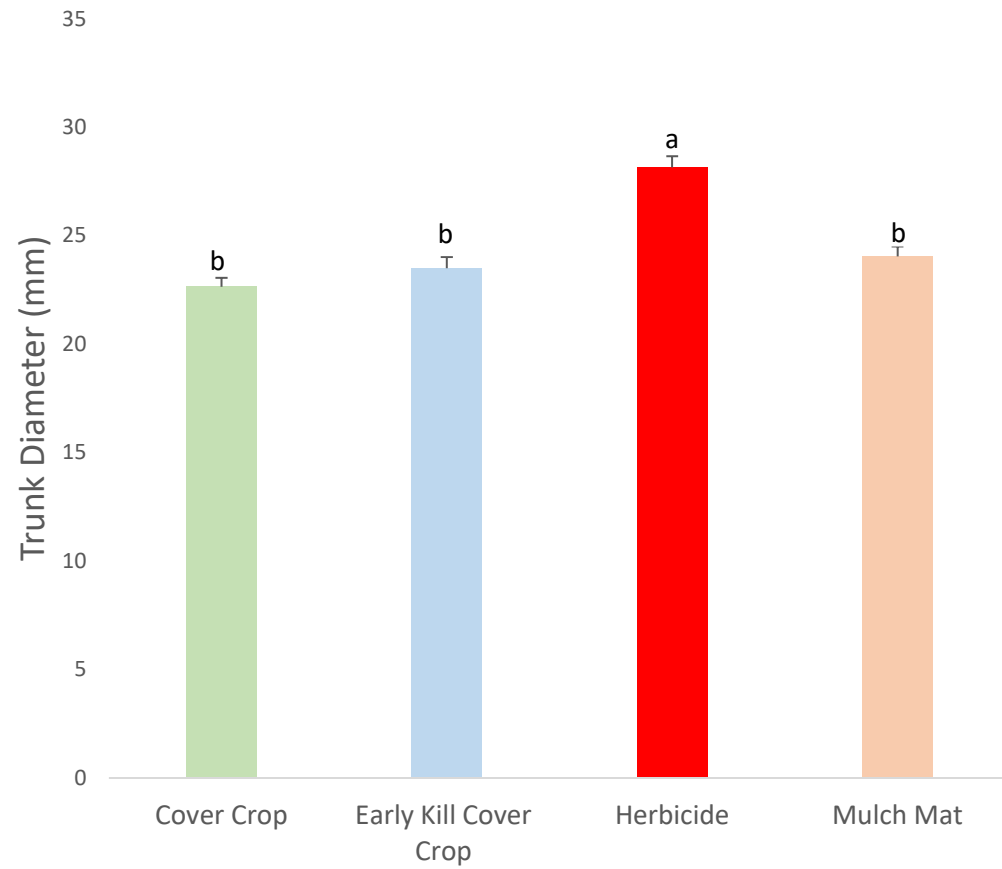


# Tree Attacks





# Tree Growth







Parasitoid species were collected mostly from Cover Crop treatments.



*Labena grallator* (1)



*Phasgonophora sulcate* (1)



*Eusandalum spp* (30)



# Conclusions

- Cover crops have the potential to host parasitoid species that can be use for controlling flatheaded bores in nursery production.
- Cover cropped trees grew more slowly, and the competition is still a problem even in the Early Kill Cover Crop treatment.
- Additional management techniques are required to mitigate the growth disparities between trees grown with cover crops and standard methods

# Acknowledgements

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A close-up photograph of a field of red clover flowers. The flowers are in various stages of bloom, showing their characteristic cylindrical, spike-like structure. The leaves are bright green and trifoliate. The background is filled with more of the same plants, creating a dense field of red and green.

Questions?

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