



Sanitation and Monitoring for the Hibiscus Bud Weevil

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Integrated Pest Management (IPM) tactics

- *Monitoring*

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Integrated Pest Management (IPM) tactics

- *Monitoring*
- Genetic control
 - *Bt* crops, sterile male releases



Integrated Pest Management (IPM) tactics

- *Monitoring*
- Genetic control
 - *Bt* crops, sterile male releases
- Biological control
 - **Augmentative and Classical:** obtaining and applying natural enemies of pests to the crop of interest
- Chemical control



Integrated Pest Management (IPM) tactics

- *Monitoring*
- Genetic control
 - *Bt* crops, sterile male releases
- Biological control
 - **Augmentative and Classical:** obtaining and applying natural enemies of pests to the crop of interest
- Chemical control
- **Cultural control**
 - Altering planting date to break the pest's cycle
 - **Sanitation**



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Sanitation



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Sanitation Experiment

Sanitation Experiment



- 8 tunnel tents
 - 14 x 8 x 6 feet (L x W x H)



Sanitation Experiment



- 8 tunnel tents
 - 14 x 8 x 6 feet (L x W x H)
- Placed 10 “Painted lady” hibiscus plants ~ 1 foot apart



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Sanitation Experiment



- 8 tunnel tents
 - 14 x 8 x 6 feet (L x W x H)
- Placed 10 “Painted lady” hibiscus plants ~ 1 foot apart
- Infested each plant with 1 male and 1 female HBW (15 June 2022)
 - 20 weevils per tent



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Sanitation Experiment



- Four tents were assigned as Sanitation
- Four tents were assigned as No Sanitation
- Sampled once per week for 9 weeks



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Sanitation Experiment



- Four tents were assigned as Sanitation
- Four tents were assigned as No Sanitation
- Sampled once per week for 9 weeks

Sanitation

- Each fallen bud was counted and removed from the floor
- The weevil eggs and larvae inside were allowed to develop into adults



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Sanitation Experiment



- Four tents were assigned as Sanitation
- Four tents were assigned as No Sanitation
- Sampled once per week for 9 weeks

Sanitation

- Each fallen bud was counted and removed from the floor
- The weevil eggs and larvae inside were allowed to develop into adults

No Sanitation

- Fallen buds were counted but allowed to remain on the floor
- The developing weevils were allowed to reinfest plants



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Sanitation Experiment



- Sampling (in all tents):
 - Up to 5 healthy buds were removed from tents (maximum 1 per plant)
 - Number of eggs



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Sanitation Experiment

- Questions



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Sanitation Experiment



- Questions
- Is the level of infestation different between Sanitation and No Sanitation tents?



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Sanitation Experiment



- Questions
- Is the level of infestation different between Sanitation and No Sanitation tents?
- How many weevils are we preventing from infesting plants by removing buds from Sanitation tents?



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Sanitation Experiment



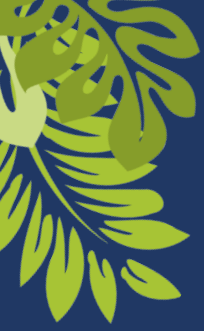
- Questions
- Is the level of infestation different between Sanitation and No Sanitation tents?
- How many weevils are we preventing from infesting plants by removing buds from Sanitation tents?
- Are the number of fallen buds different between Sanitation and No Sanitation tents?



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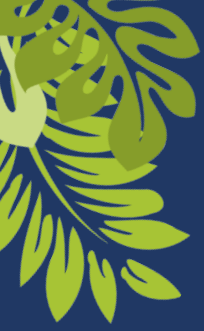
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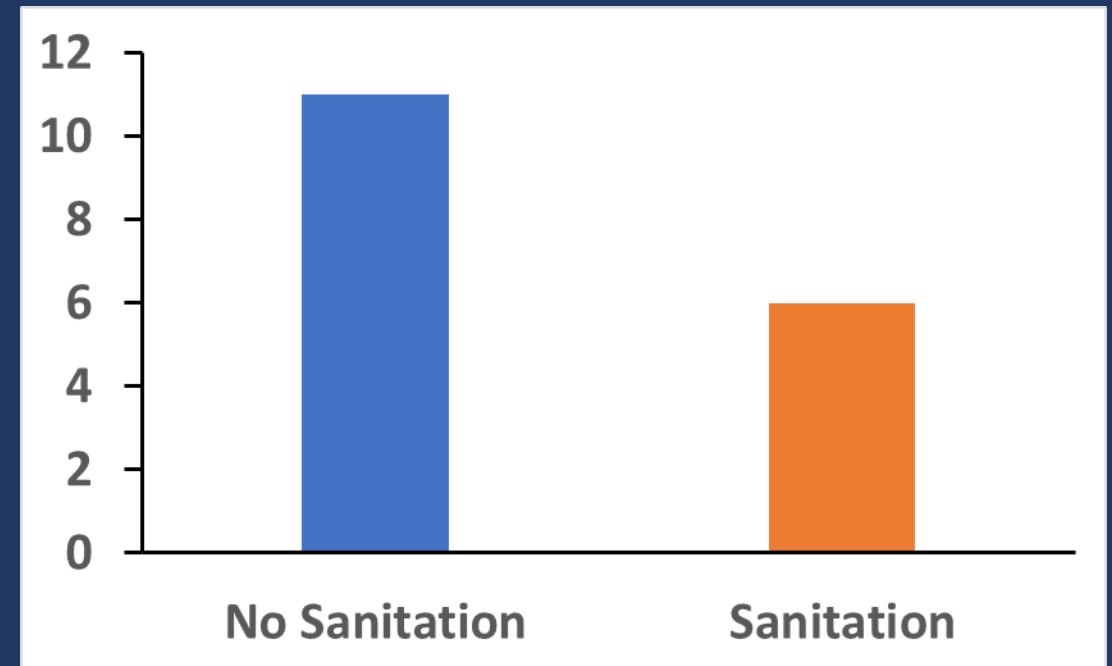
Is the level of infestation different between Sanitation and No Sanitation tents?

- Healthy buds
 - Number of eggs



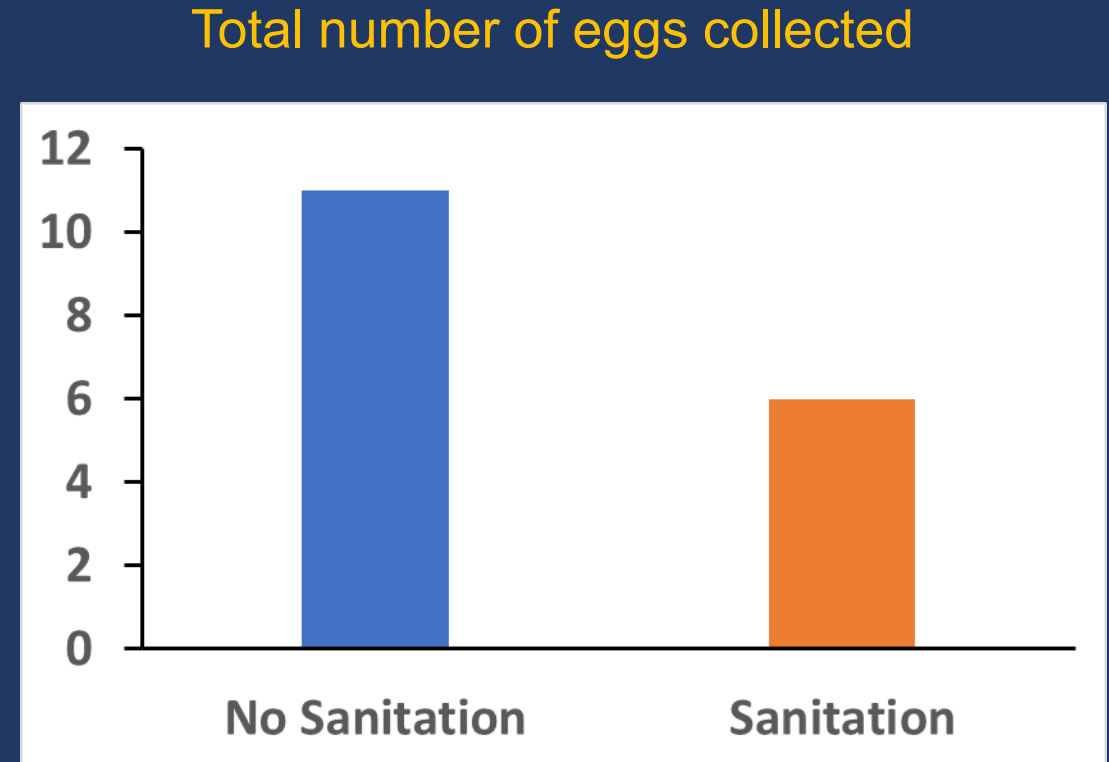
Is the level of infestation different between Sanitation and No Sanitation tents?

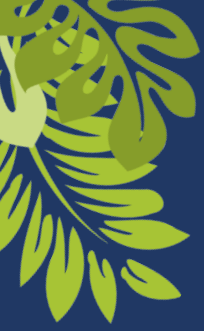
Total number of eggs collected



Is the level of infestation different between Sanitation and No Sanitation tents?

- 11 eggs in No Sanitation tents
- 6 eggs in Sanitation tents





Is the level of infestation different between Sanitation and No Sanitation tents?

- YES!
- More eggs were found in No Sanitation tents

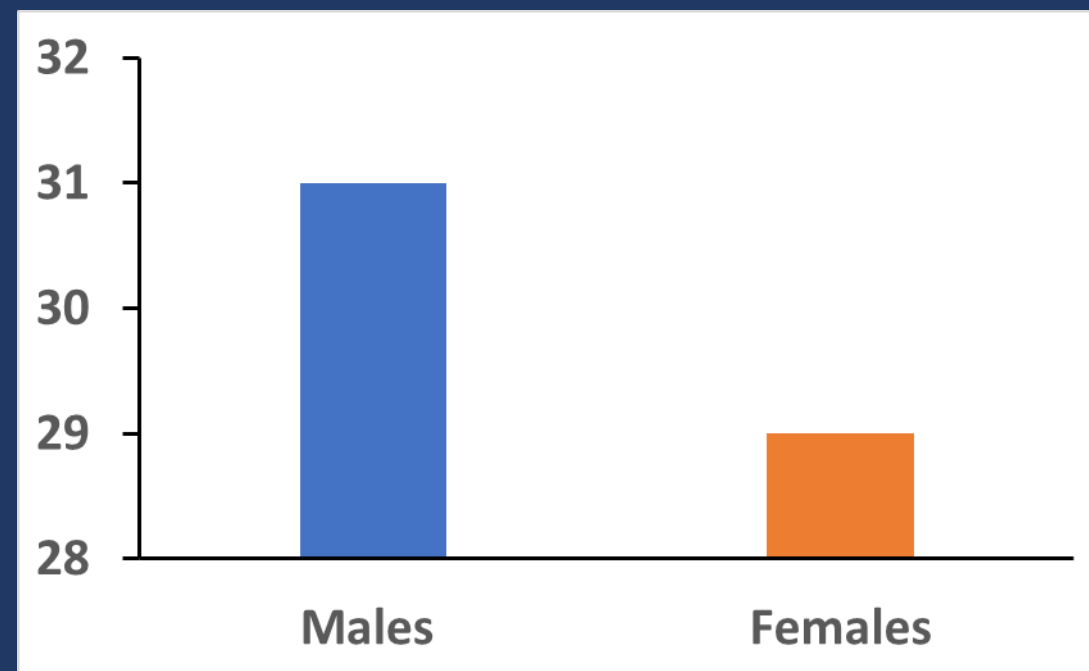


How many weevils are we preventing from infesting plants by removing buds from Sanitation tents?

- The number of weevils that emerge from fallen buds collected in the Sanitation tents

How many weevils are we preventing from infesting plants by removing buds from Sanitation tents?

Number of weevils emerging from fallen buds



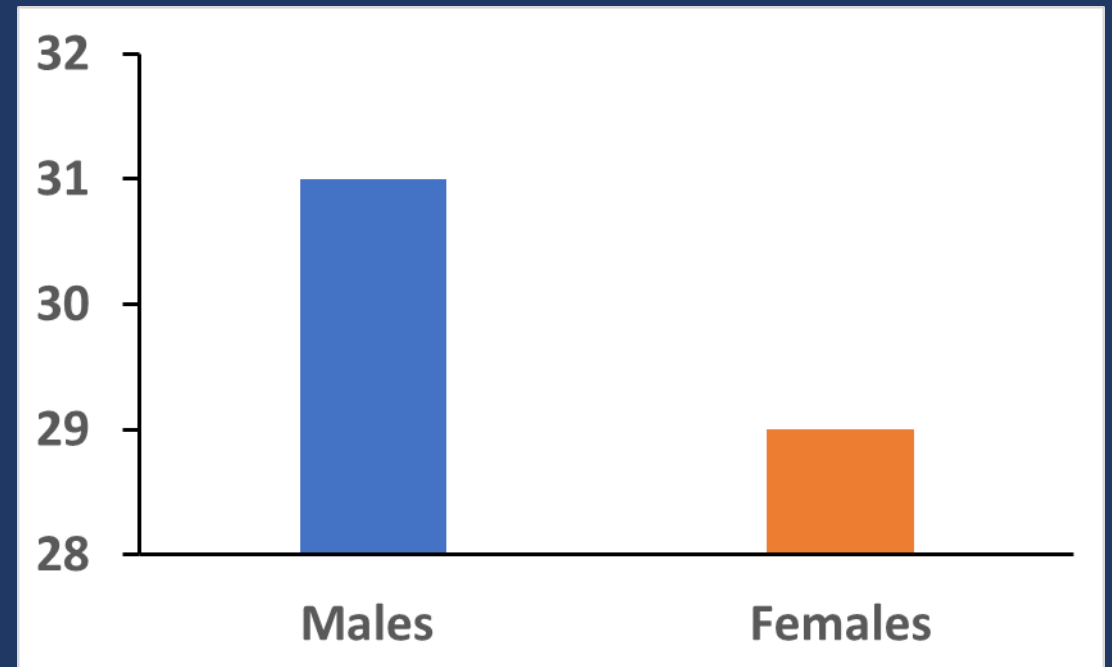
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How many weevils are we preventing from infesting plants by removing buds from Sanitation tents?

- 60 weevils from 4 tents
 - 15 weevils per tent
 - 1.5 weevils per plant
- Only infested once with 2 weevils per plant on 15 June 2022

Number of weevils emerging from fallen buds





**Are the number of fallen buds different
between Sanitation and No Sanitation
tents?**

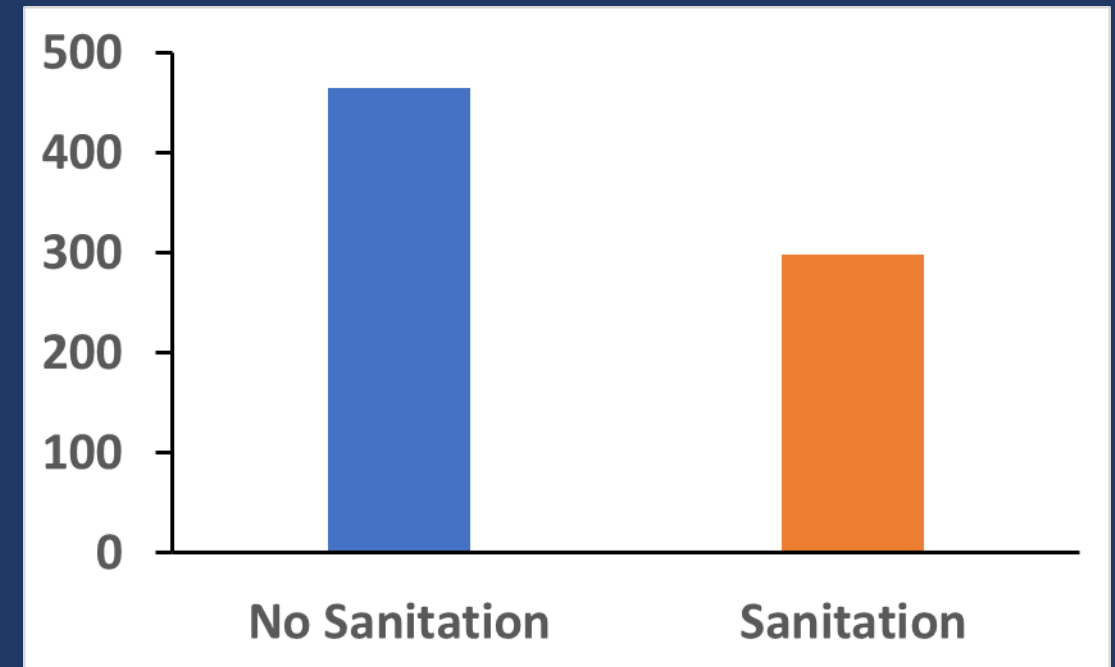
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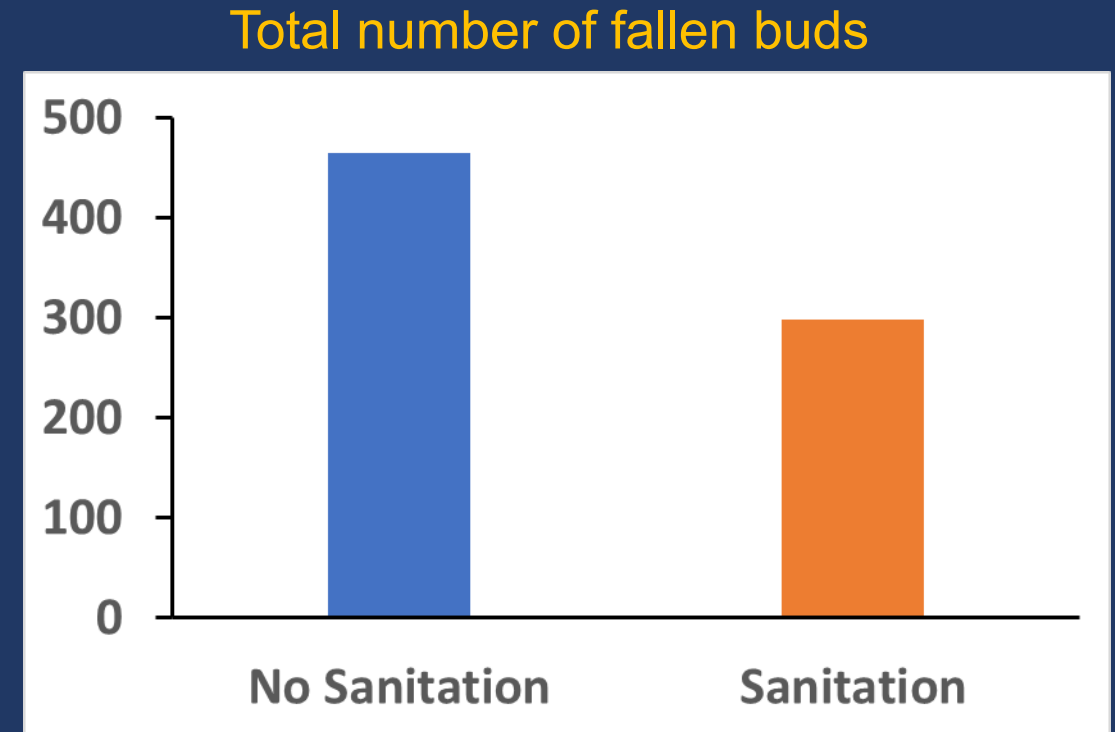
Are the number of fallen buds different between Sanitation and No Sanitation tents?

Total number of fallen buds



Are the number of fallen buds different between Sanitation and No Sanitation tents?

- YES!
- 464 fallen buds in No Sanitation tents
- 298 fallen buds in Sanitation tents
- 1.5 times more fallen buds in No Sanitation tents





Summary

- Is it important to conduct sanitation practices in hibiscus production?
- YES!



Summary

- Is it important to conduct sanitation practices in hibiscus production?
- YES!
- More HBW eggs were found in healthy buds in No Sanitation tents
- More fallen buds were found in No Sanitation tents



Summary

- Is it important to conduct sanitation practices in hibiscus production?
- YES!
- More HBW eggs and larvae were found in healthy buds in No Sanitation tents
- More fallen buds were found in No Sanitation tents
- Sanitation efforts prevented at least 1.5 weevils per plant from reinfesting hibiscus plants
- You can and should use sanitation practices in combination with other management practices
 - Biological control
 - Chemical control



Integrated Pest Management (IPM) tactics

- *Monitoring*

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Integrated Pest Management (IPM) tactics

- *Monitoring*





HBW Monitoring

- Which trap type and trap height is most effective for capturing HBW adults?



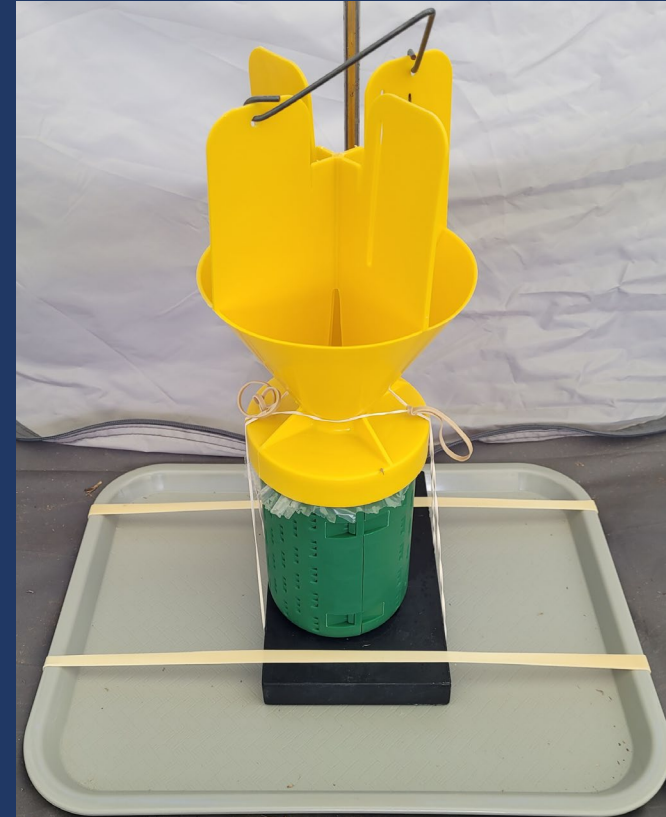
HBW Monitoring

- Which trap type and trap height is most effective for capturing HBW adults?
- Three trap types



HBW Monitoring

- Which trap type and trap height is most effective for capturing HBW adults?
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HBW Monitoring

- Which trap type and trap height is most effective for capturing HBW adults?
- Three trap types
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 - Sticky trap





HBW Monitoring

- Which trap type and trap height is most effective for capturing HBW adults?
- Three trap types
 - Japanese beetle
 - Sticky trap
 - Boll Weevil





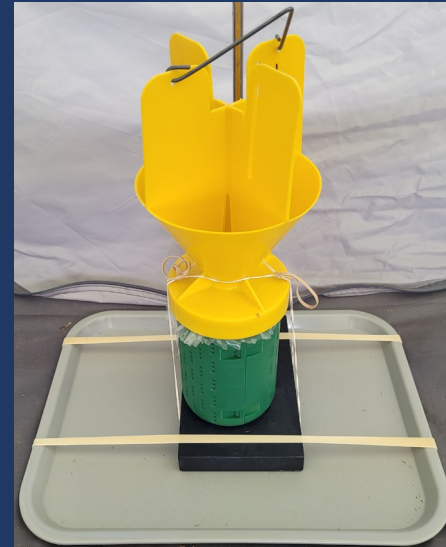
HBW Monitoring

- Which trap type and trap height is most effective for capturing HBW adults?
- Two heights



HBW Monitoring

- Which trap type and trap height is most effective for capturing HBW adults?
- Two heights
 - 0 feet





HBW Monitoring

- Which trap type and trap height is most effective for capturing HBW adults?
- Two heights
 - 0 feet
 - 2.5 feet



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HBW Monitoring

- Protocol



HBW Monitoring

- Protocol
- Conducted in tunnel tents
 - 14 x 8 x 6 feet (L x W x H)



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HBW Monitoring

- Protocol
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- Petri dish of 30 weevils
 - Half female, half male
 - Placed in the middle of the tent



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- A trap was placed at the E or W end of the tent
- Baited with a cranberry weevil lure



HBW Monitoring

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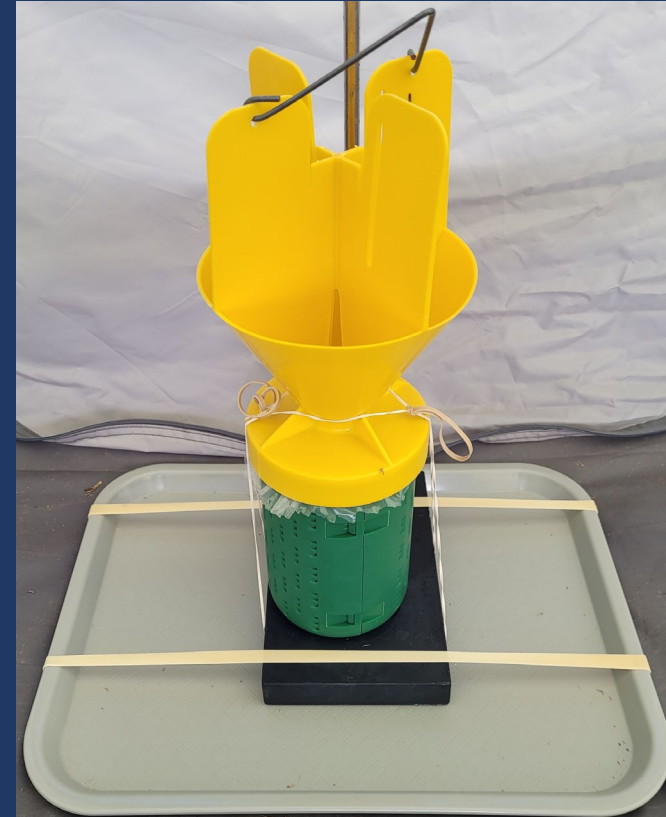
24
hours





HBW Monitoring

- Japanese beetle traps
 - Clear plastic bag
 - Filled with 5% fragrance-free soap solution (29 oz. of water)





HBW Monitoring

- Japanese beetle traps
 - Clear plastic bag
 - Filled with 5% fragrance-free soap solution (29 oz. of water)
- Sticky traps



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HBW Monitoring

- Japanese beetle traps
 - Clear plastic bag
 - Filled with 5% fragrance-free soap solution (29 oz. of water)
- Sticky traps
- Boll weevil traps





HBW Monitoring

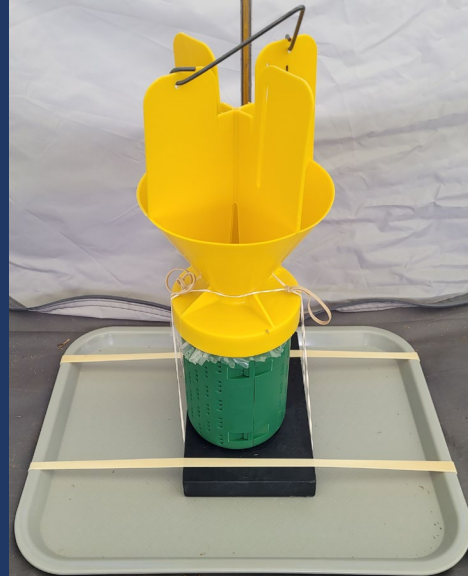
- Results



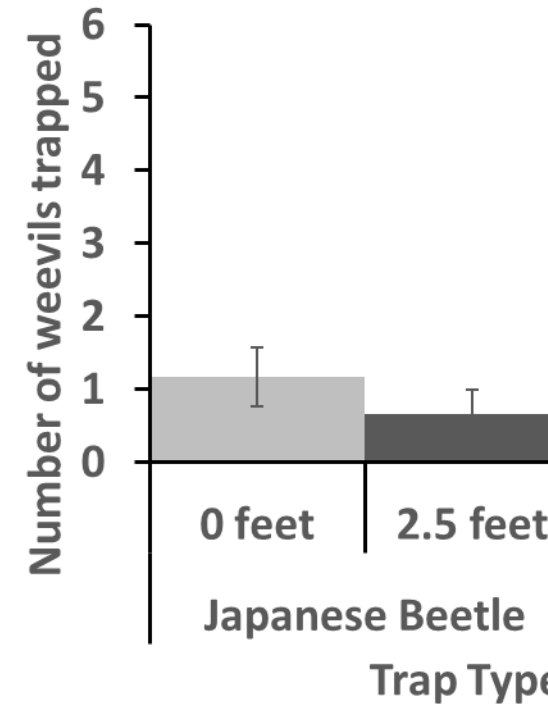


HBW Monitoring

- Results



Average number of weevils captured per trap



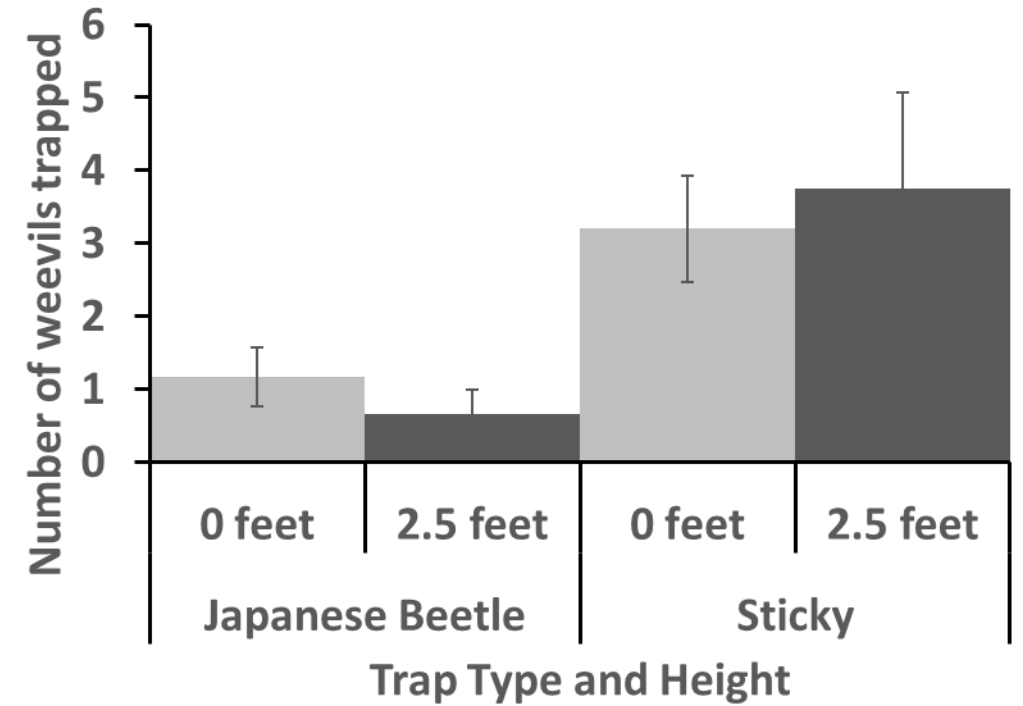


HBW Monitoring

- Results



Average number of weevils captured
per trap

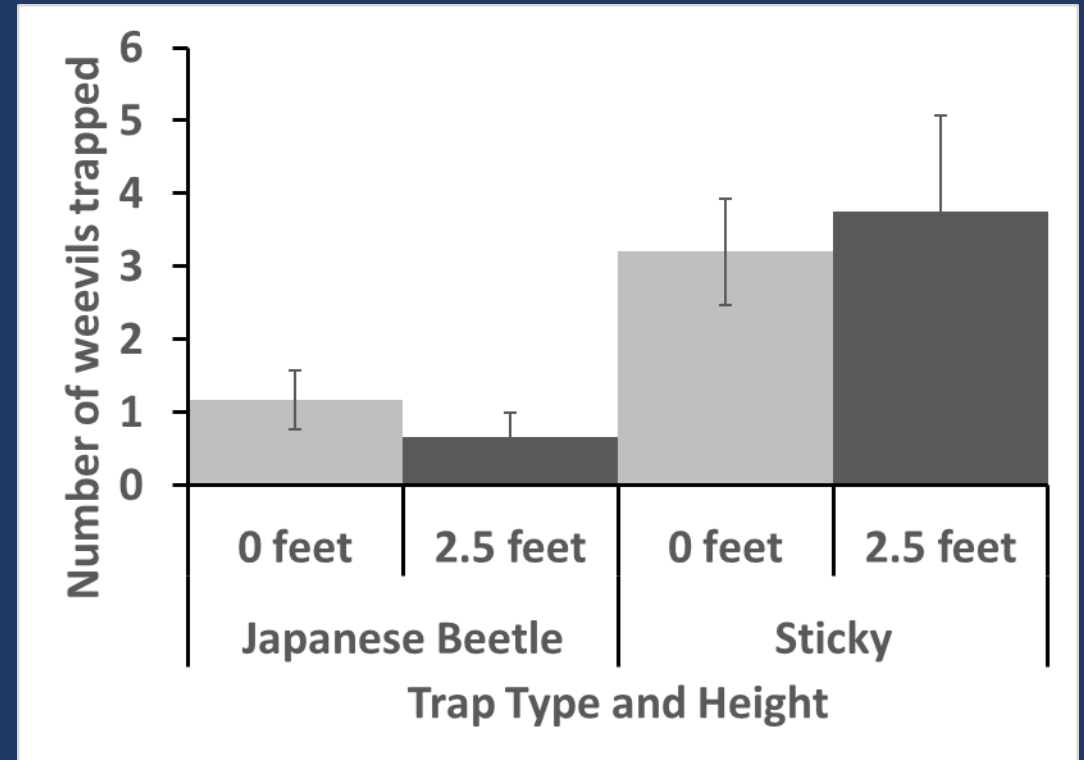




HBW Monitoring

- Results
- Sticky traps captured many more weevils than Japanese beetle traps

Average number of weevils captured per trap

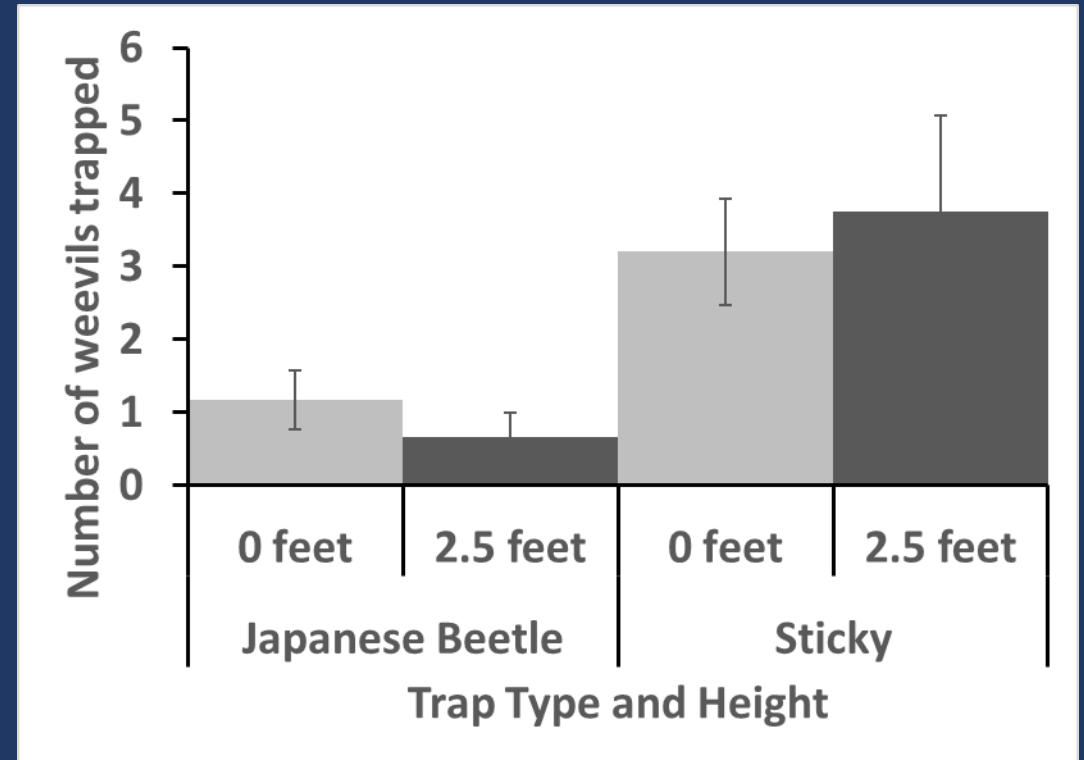




HBW Monitoring

- Results
- More weevils were captured at 2.5 feet than at 0 feet in Sticky traps

Average number of weevils captured per trap

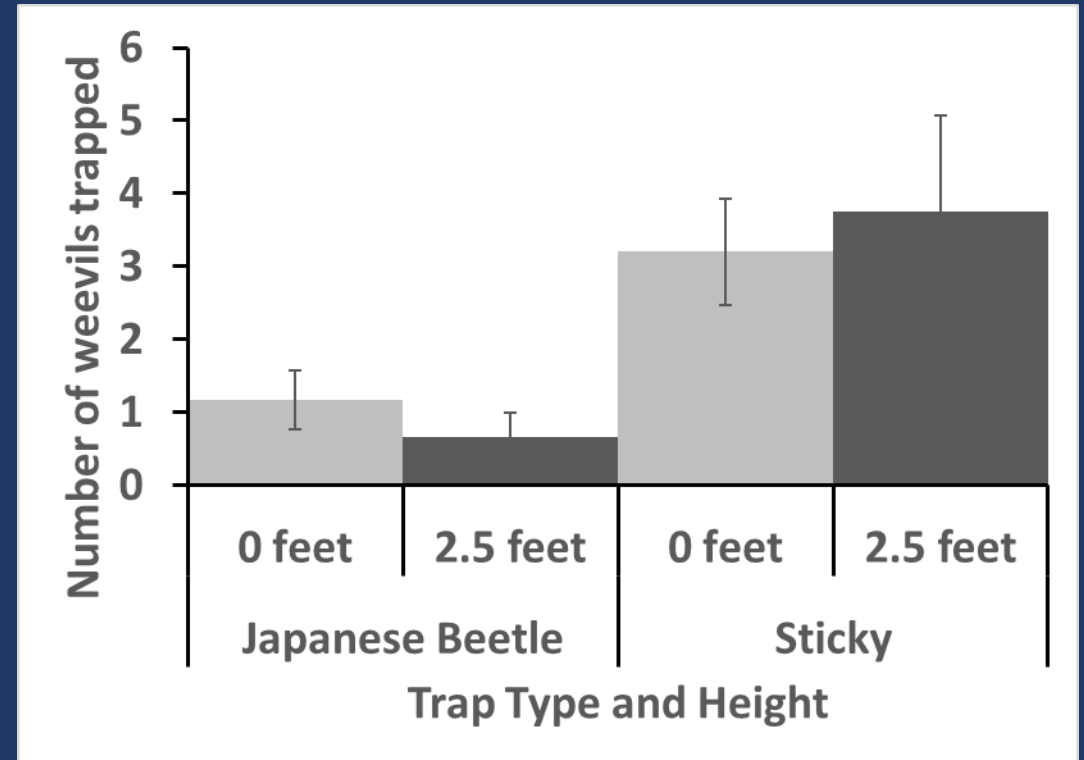




Summary

- Trap type and trap height can have an effect on the number of weevils captured
- Sticky traps at 2.5 feet caught the most weevils

Average number of weevils captured per trap





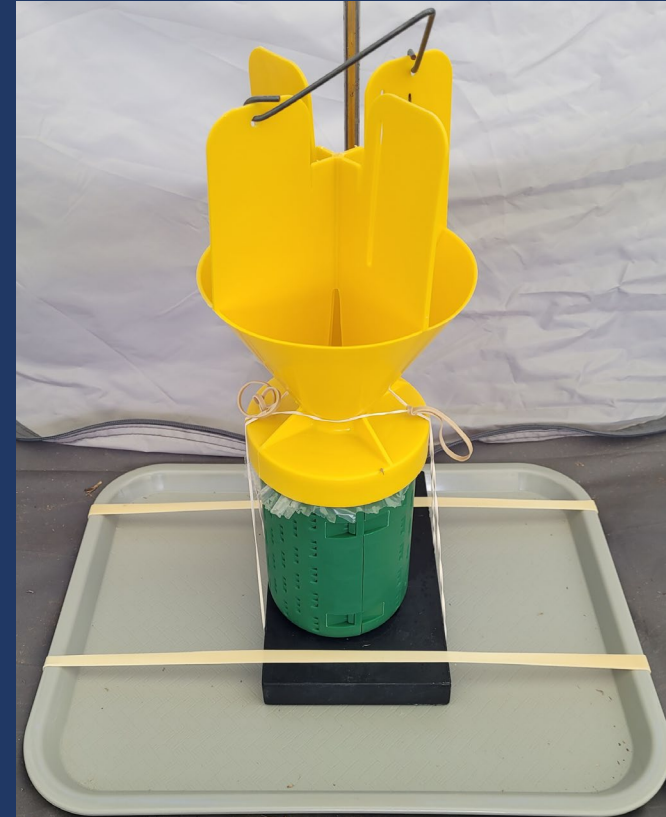
Future Steps

- Finish the current experiment →
Boll weevil traps



Future Steps

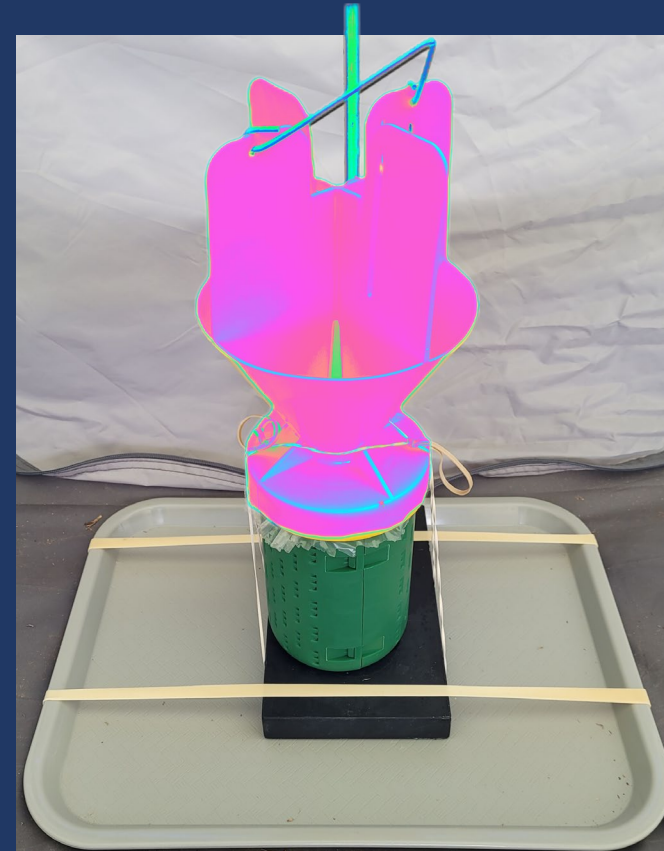
- Finish the current experiment → Boll weevil traps
- Trap color?





Future Steps

- Finish the current experiment → Boll weevil traps
- Trap color?





Future Steps

- Finish the current experiment→
Boll weevil traps
- Trap color?
- Test with other *Anthonomus*
spp. lures and/or hibiscus
volatiles

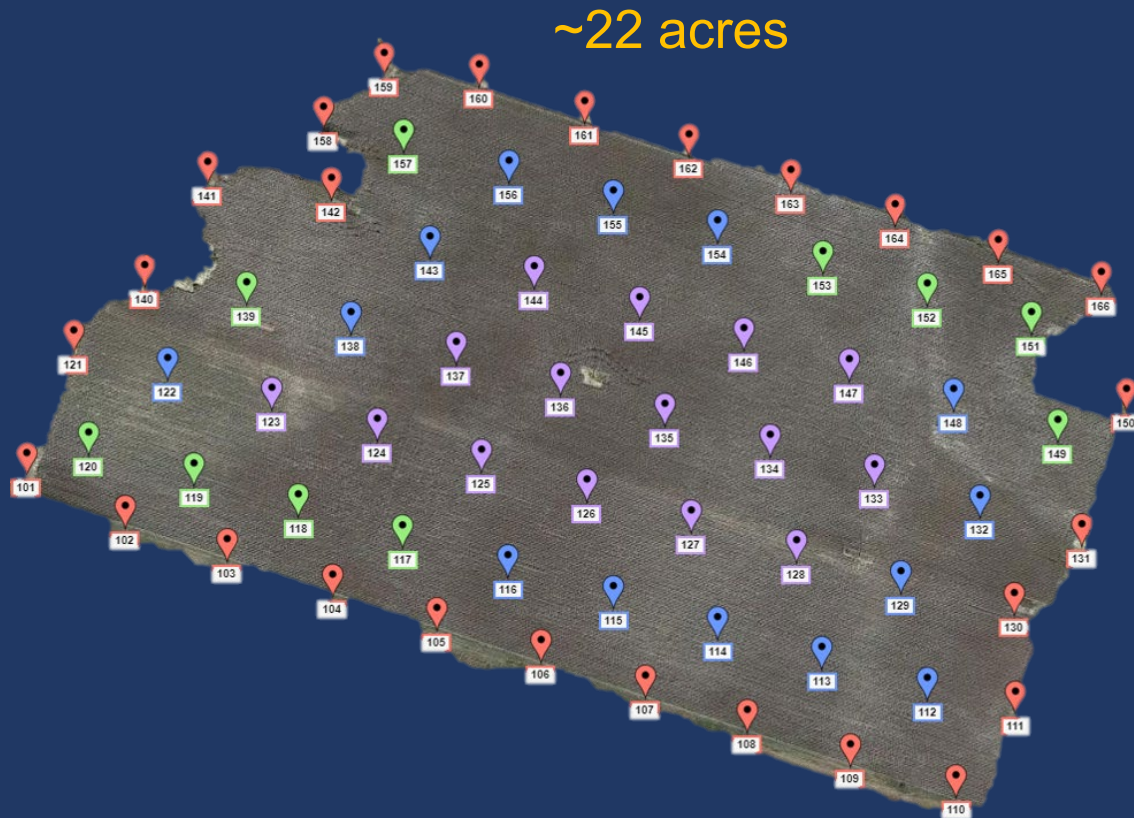


Spatial distributions of insects





Spatial distributions of insects



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Spatial distributions of insects



~22 acres



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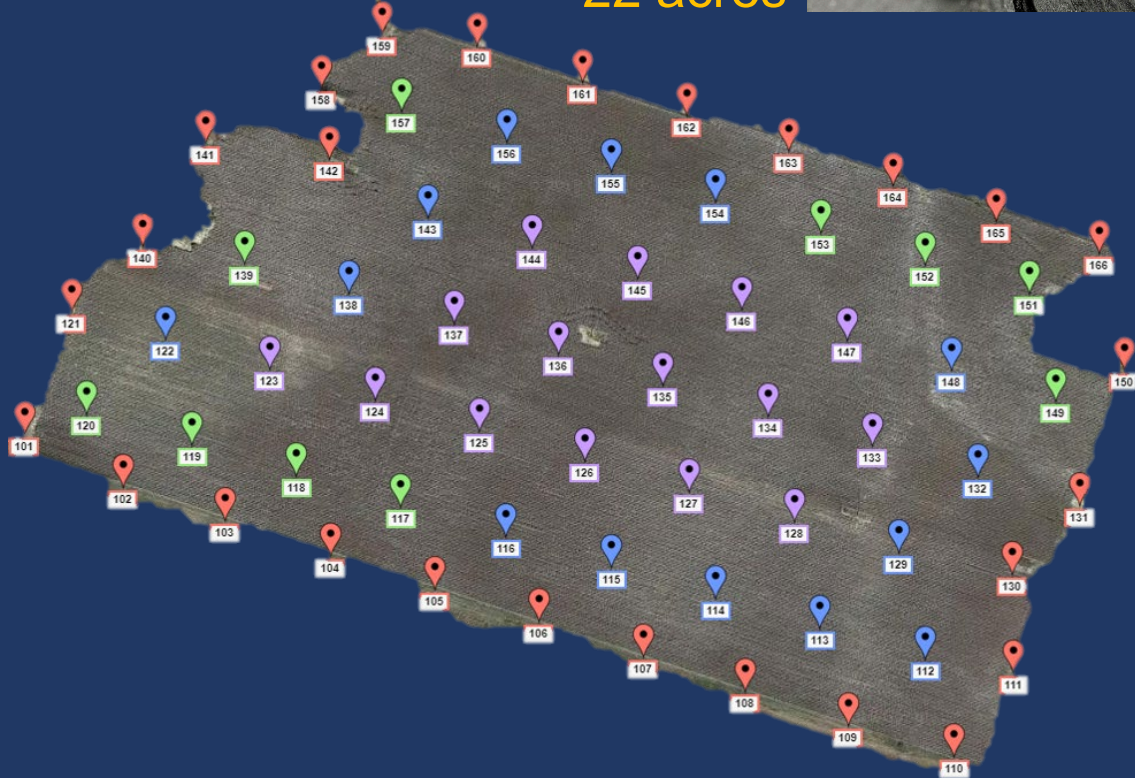
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Spatial distributions of insects



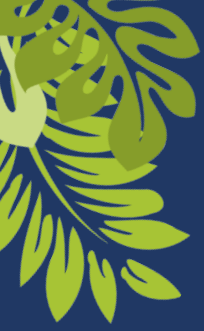
~22 acres



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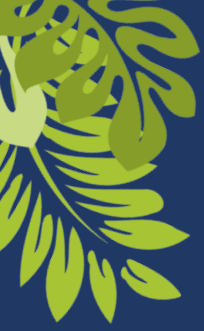
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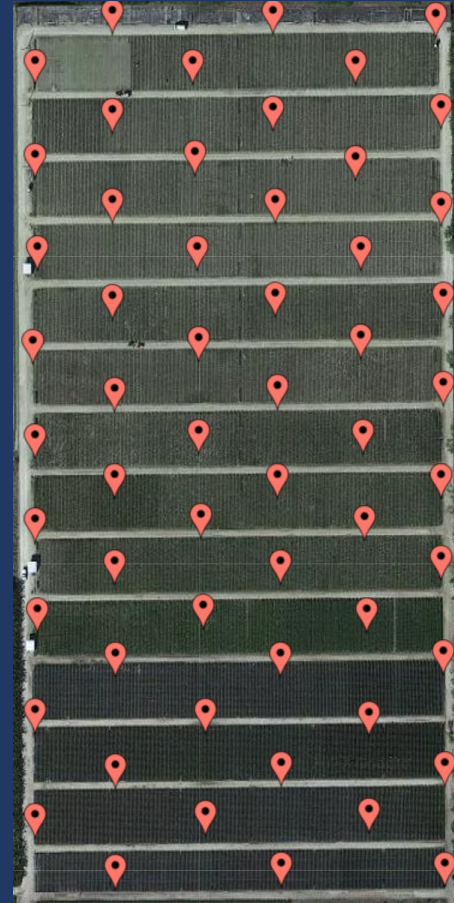


Understand the spatial dynamics of the HBW

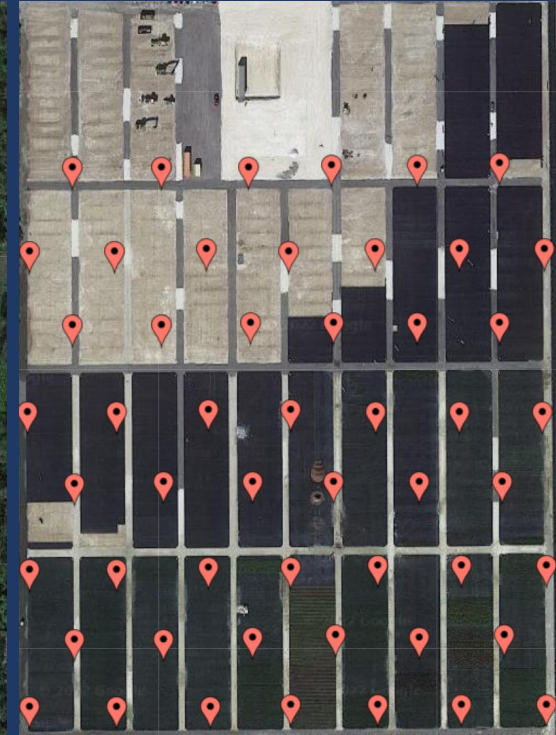




Understand the spatial dynamics of the HBW



~17 acres



~21 acres

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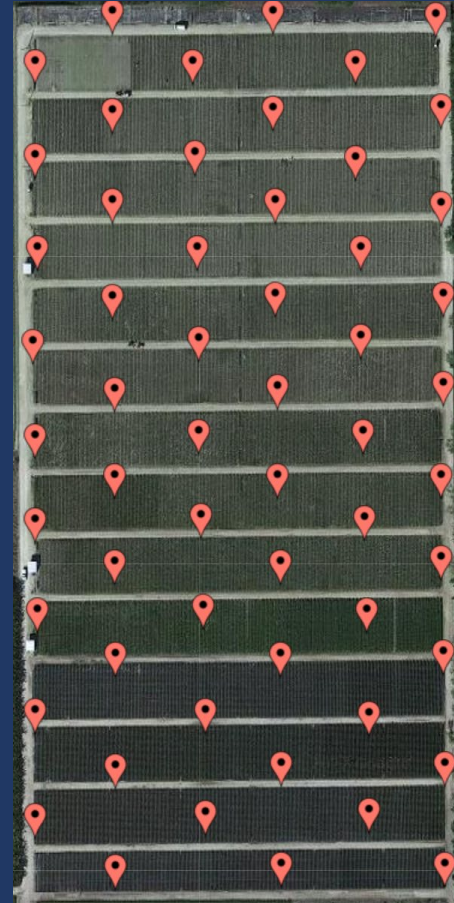
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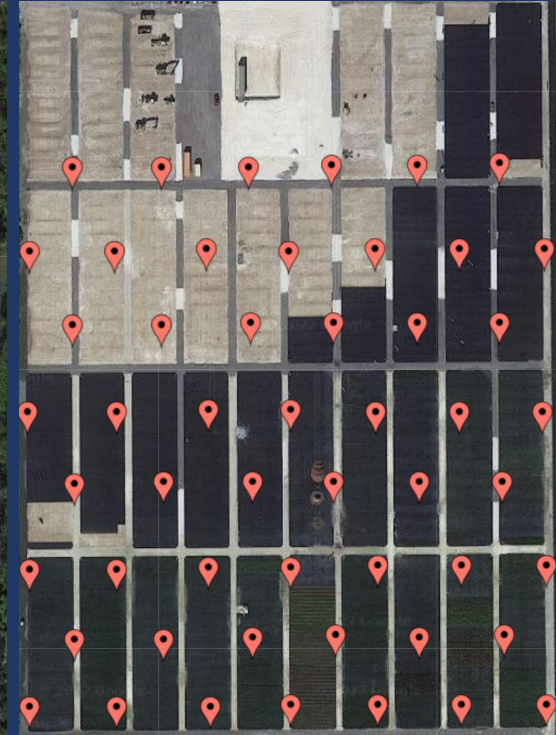


Understand the spatial dynamics of the HBW

- Correlate HBW abundance with spatial distributions of
 - Hibiscus variety
 - Hibiscus plant height
 - Temperature
 - Relative humidity
 - ...etc



~17 acres



~21 acres

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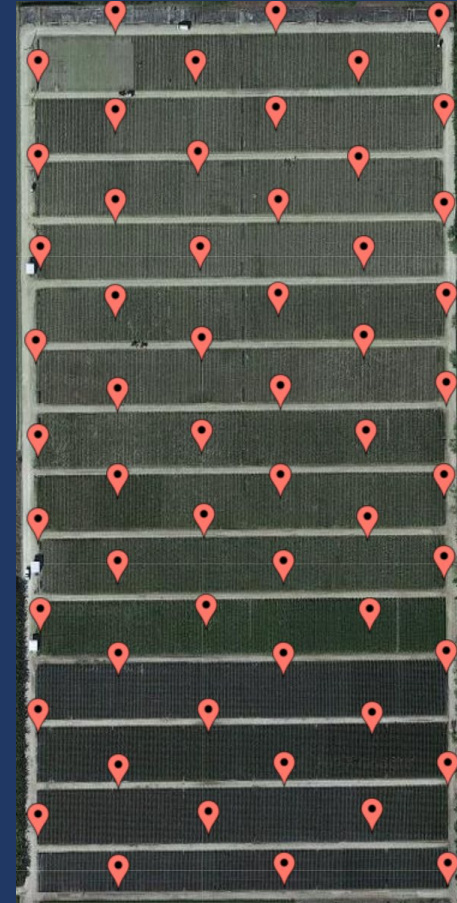
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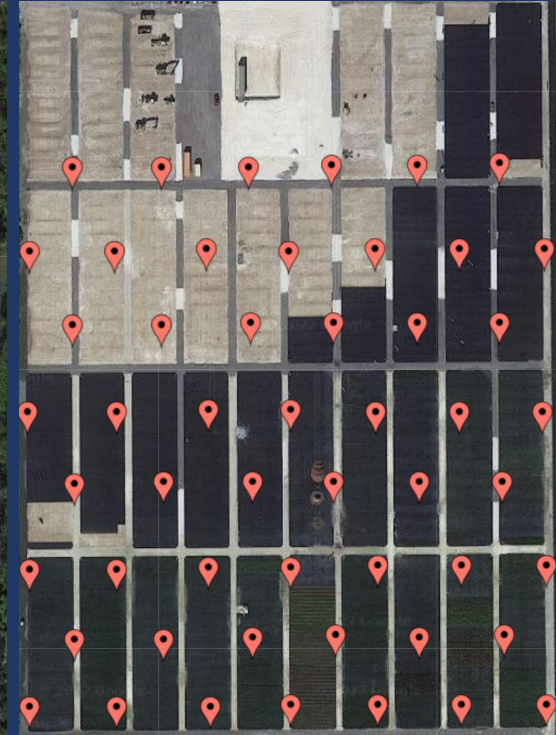


Understand the spatial dynamics of the HBW

- Correlate HBW abundance with spatial distributions of
 - Hibiscus variety
 - Hibiscus plant height
 - Temperature
 - Relative humidity
 - ...etc
- Precision agriculture
 - Apply management inputs only where they are needed



~17 acres



~21 acres

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Questions?



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