

Mating Disruption for Management of Pecan Nut Casebearer and Hickory Shuckworm

- **Ted Cottrell**

- USDA, Agricultural Research Service
- Southeastern Fruit & Tree Nut Research Laboratory
- 21 Dunbar Road, Byron, GA 31008
- Ted.Cottrell@usda.gov



Pecan Nut Casebearer (PNC)

- An early season pest of pecan.
- Pecan is the only host plant for this insect.
- 3-4 generations/season but the 1st generation does most economic damage.
- Western growing regions may suffer economic damage from later generations.



Hickory Shuckworm (HSW)

- HSW attacks pecan from June through harvest.
- First generation attacks hickory nuts (which set nuts earlier than pecan).
- Few pecans are infested with HSW before June.



Hickory Shuckworm (HSW)

➤ Adult emergence from overwintered pecan shucks

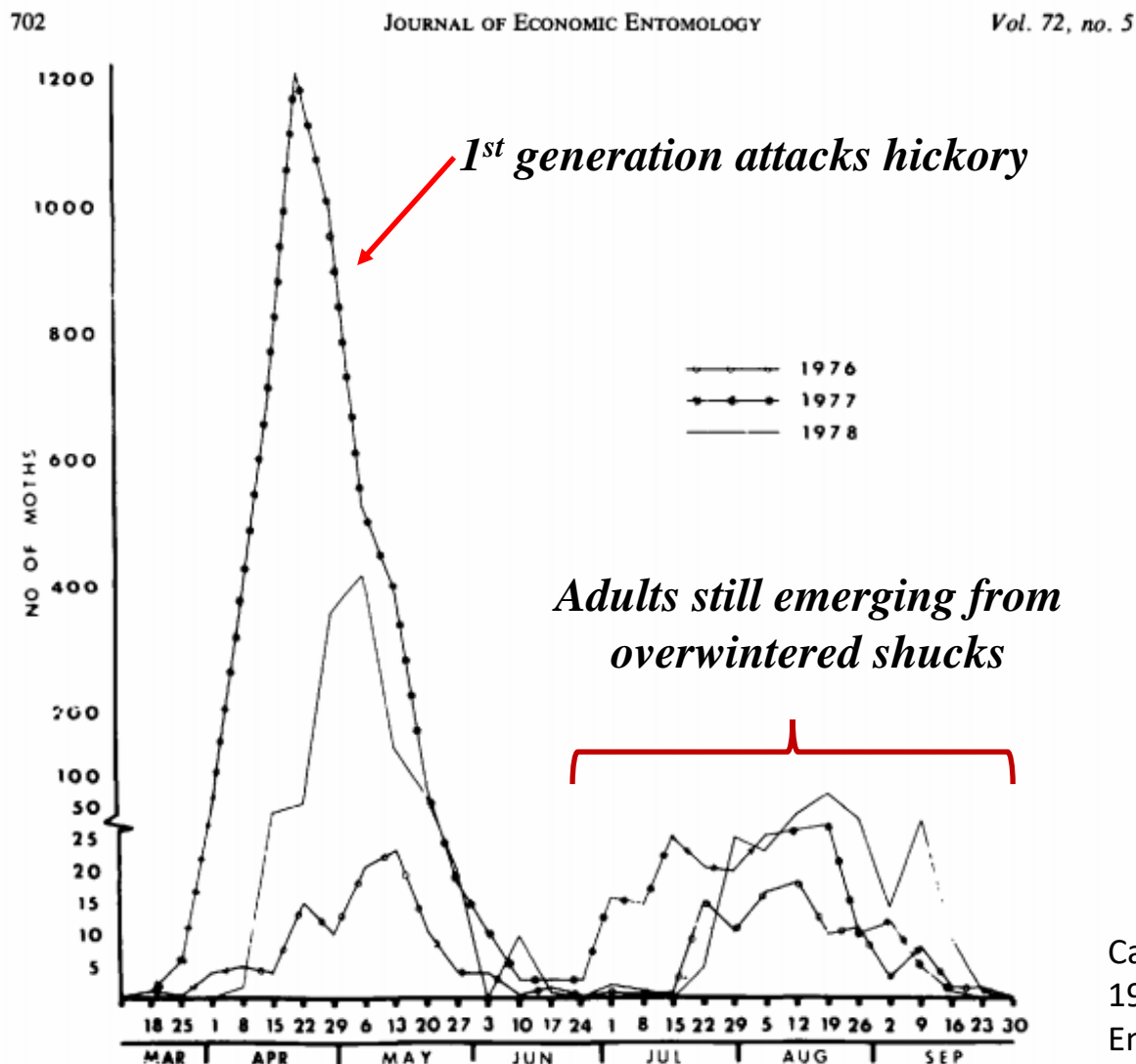


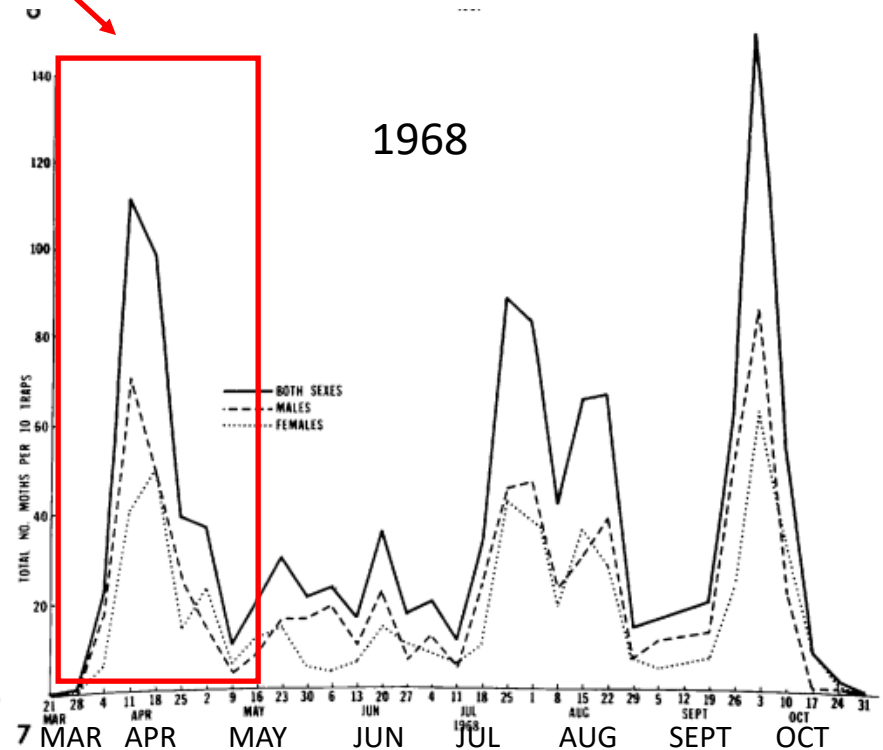
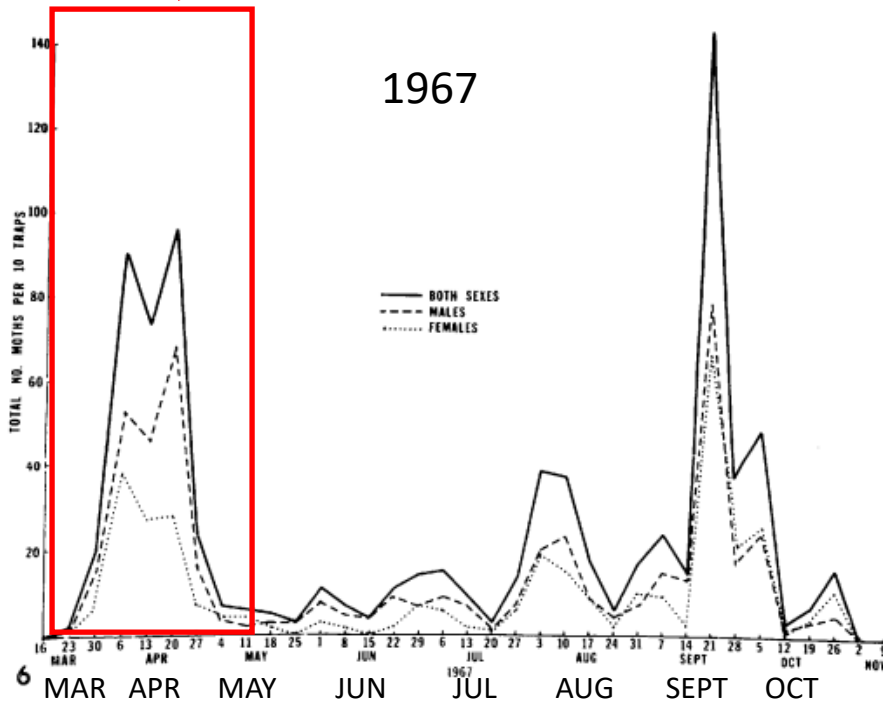
FIG. 1.—Hickory shuckworm moths emerging weekly from overwintering pecan shucks, 1976–78.

Calcote and Hyder.
1979. J. Econ.
Entomol. 72: 701-702.

Hickory Shuckworm (HSW)

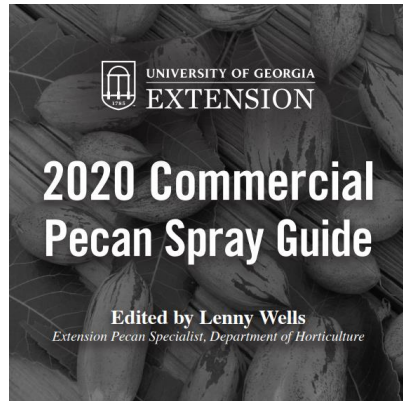
➤ Adults captured in light traps

1st generation attacks hickory



Management of Pecan Nut Casebearer & Hickory Shuckworm

- Timing of insecticide application to closely coincide with egg hatch is critical because larvae tunnel into nuts.



Pecan Nut Casebearer	<i>chlorpyrifos</i> 4E Lorsban, Chlorphos
	<i>methoxyfenozide</i> Intrepid 2F
	<i>spinosad</i> Spintor 2SC
	<i>diflubenzuron</i> Dimilin 2L
	<i>clothianadin</i> Belay
	<i>methoxyfenozide + spinetoram</i> Intrepid Edge
	<i>tolfenpyrad</i> Apta
	<i>abamectin + cyantraniliprole</i> Minecto Pro

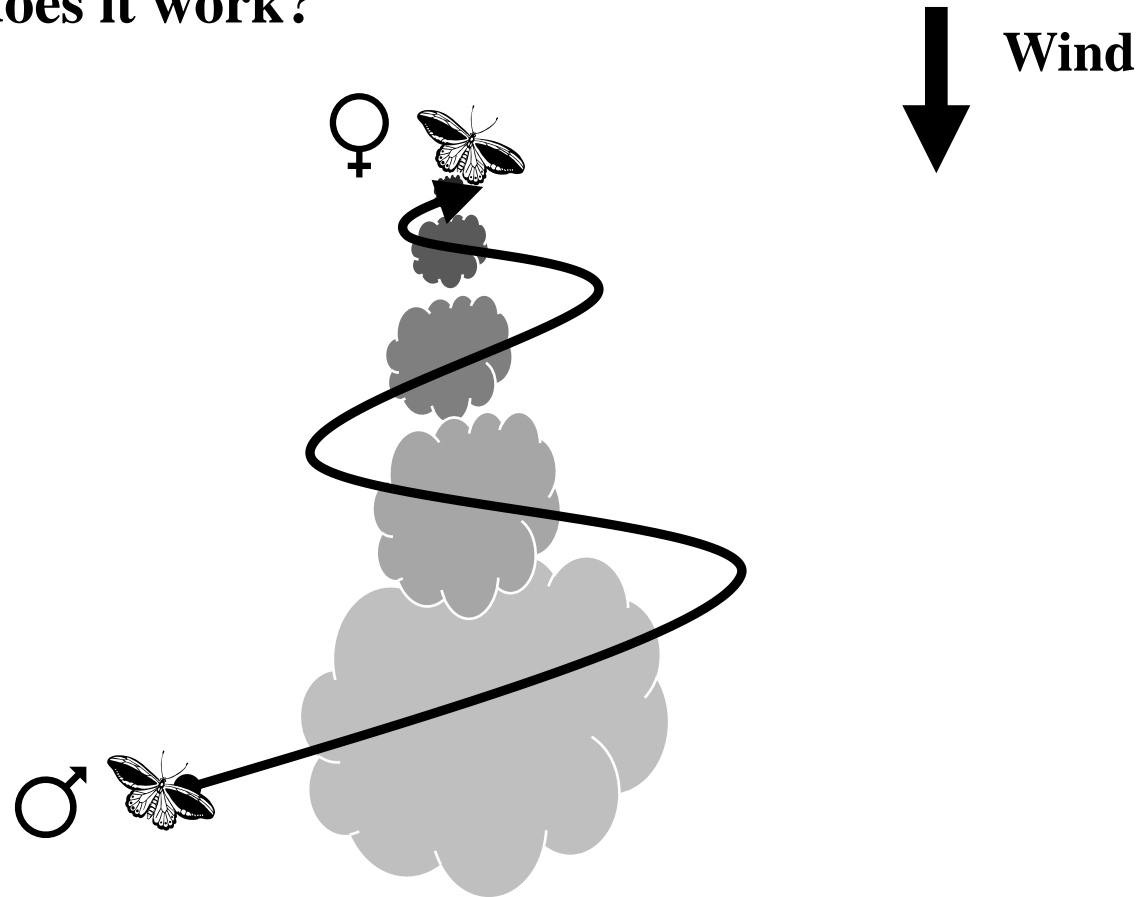
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	<i>methoxyfenozide + spinetoram</i> Intrepid Edge
	<i>tolfenpyrad</i> Apta
	<i>abamectin + cyantraniliprole</i> Minecto Pro
	<i>chlorantraniliprole + lambda-cyhalothrin</i> Besiege

Management of Pecan Nut Casebearer & Hickory Shuckworm

Mating Disruption: A different approach to pest management

- A strategy aimed at preventing mating by the target pest species. Typically, saturation of a crop with a synthetic sex pheromone reduces the number of males finding females.
- Less mating = fewer offspring = less damage.
- Synthetic sex pheromones used in mating disruption usually are not attractive to males of the target species.
 - Application of the non-attractive isomer of the sex pheromone does not draw in large numbers of males.
 - Traps baited with the attractive isomer of the pheromone can be used to trap males.
- Mating disruption is used on numerous pest species attacking fruits, vegetables, row crops and forests.

How does it work?

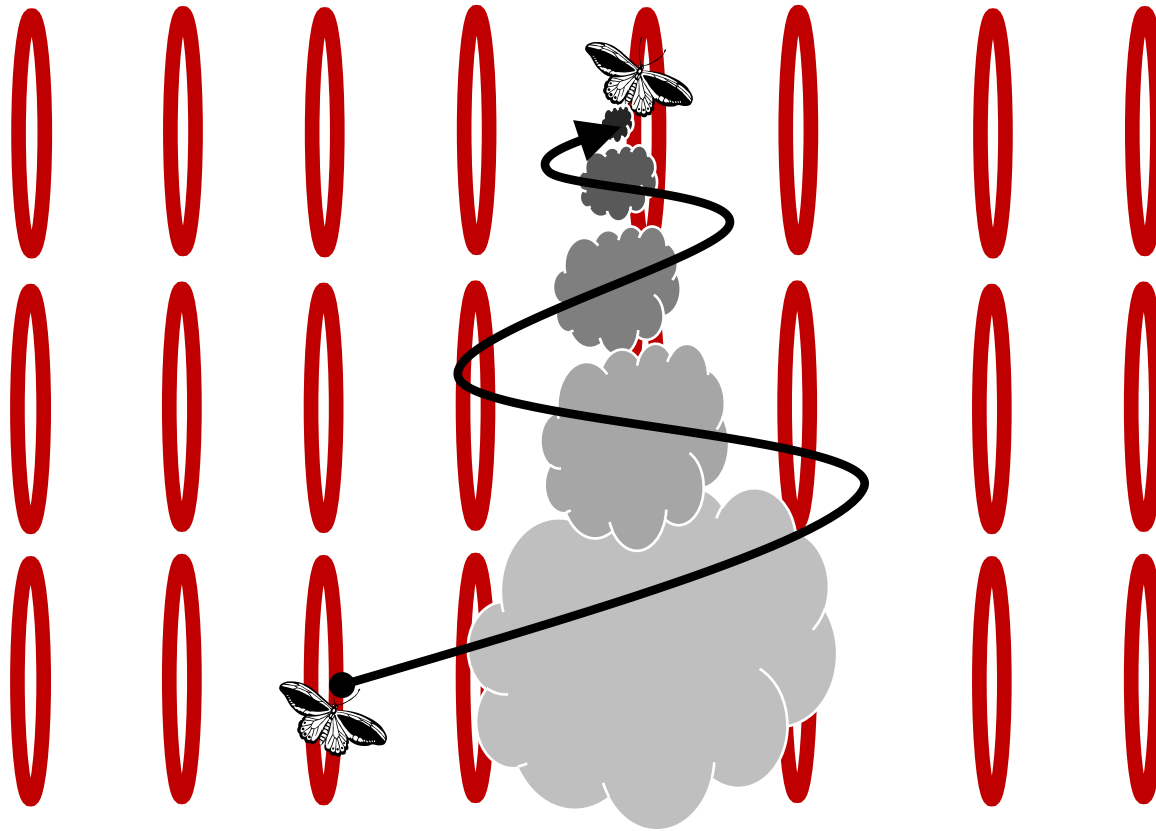


Males follow a sex pheromone plume upwind to its source, a female.

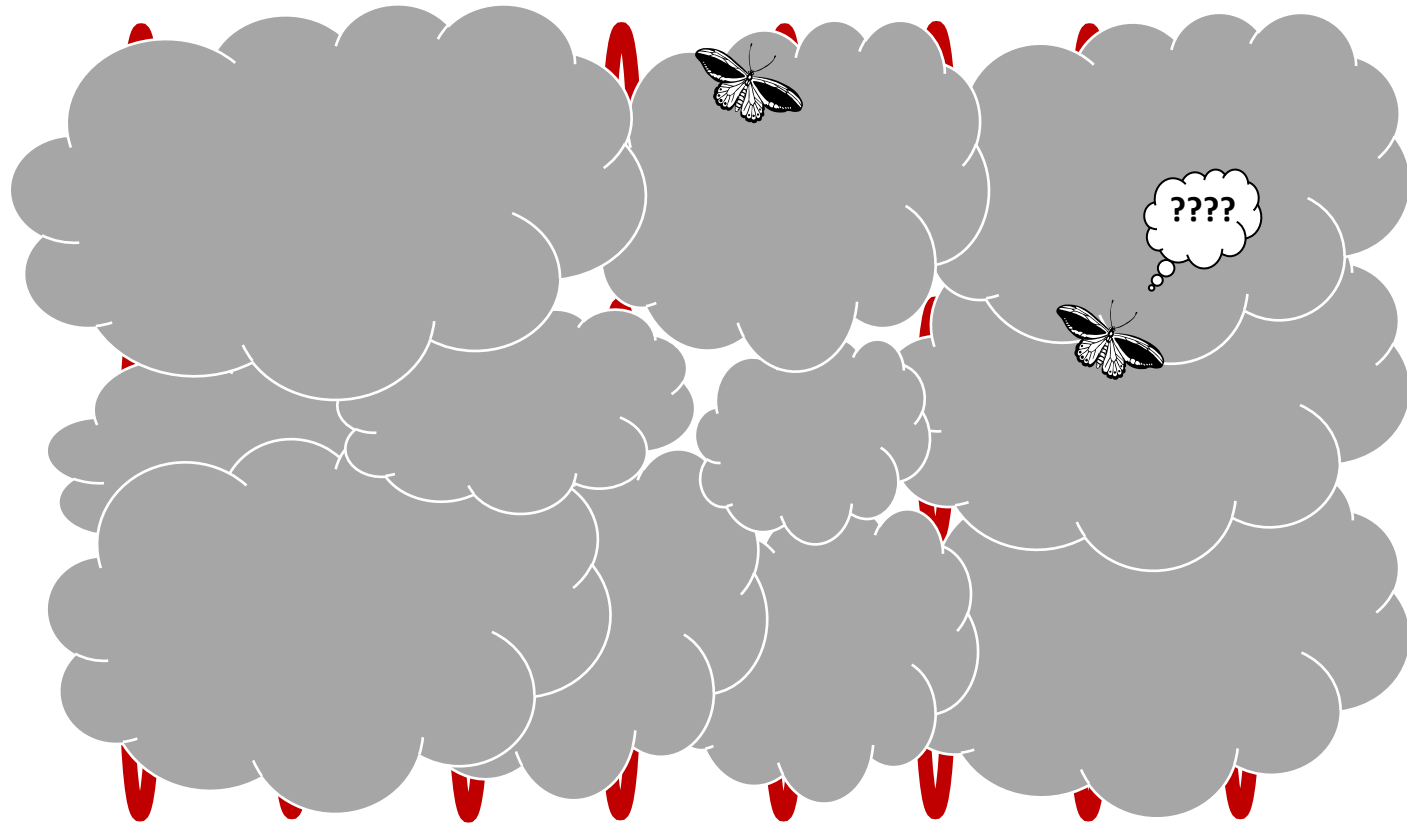


Pheromones can be released from a variety of dispensers





Application of pheromone dispensers to the crop inundates the area with pheromone and prevents males from finding the source of the pheromone.



Efficacy relies on uniform dispersion of the pheromone across the target crop because gaps in coverage allow males to find females.

Mating Disruption in Pecan Orchards

Challenges for pheromone dispensers:

➤ Tree spacing

- Older, wide-spaced orchards
- Orchards with skips
- *How many dispensers/acre?*



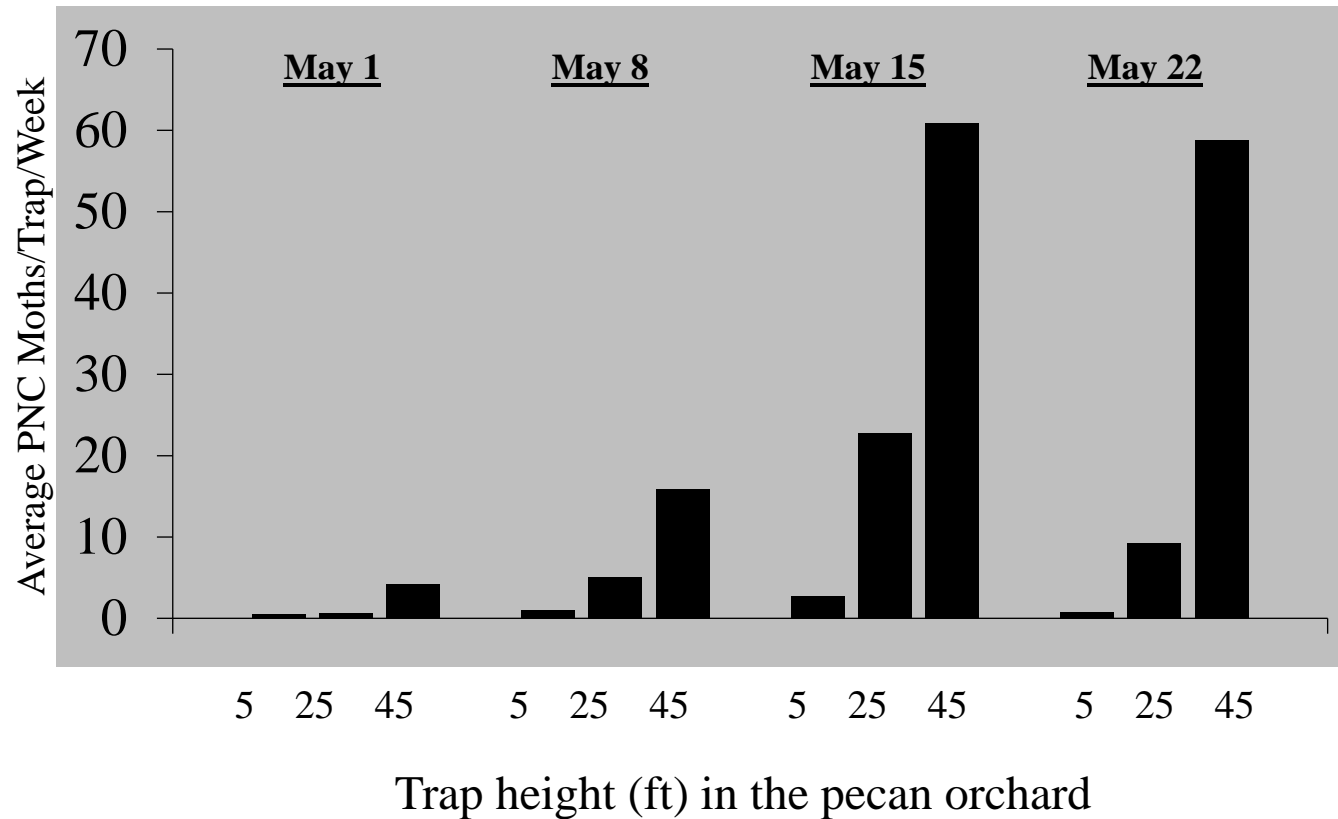
➤ Tree height

- Older orchards with tall trees
- *How high should dispensers be placed in the canopy?*



Will Tall Pecan Trees Affect Mating Disruption?

Traps placed higher in the canopy capture more moths!



Objective: Place mating disruption dispensers at different heights in pecan trees to determine if mating disruption of PNC can be achieved.

PNC and HSW Mating Disruption Study: 2018 and 2019

Pheromone trap height



50 ft →

35 ft →

20 ft →

5 ft →



Study was done from late April through May; traps checked weekly; nut damage sampled in early June.

Treatments replicated 4X using 2.5-acre plots for each treatment.

Only showing data for PNC Mating Disruption Trial



MD dispenser and nut sample height

← 50 ft

or

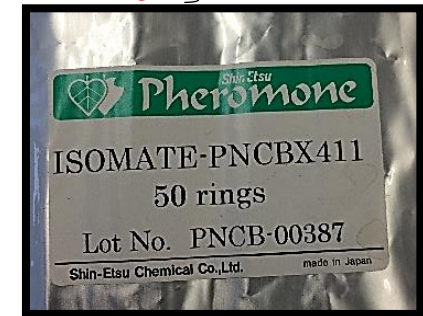
← 35 ft

or

← 20 ft



39 in.

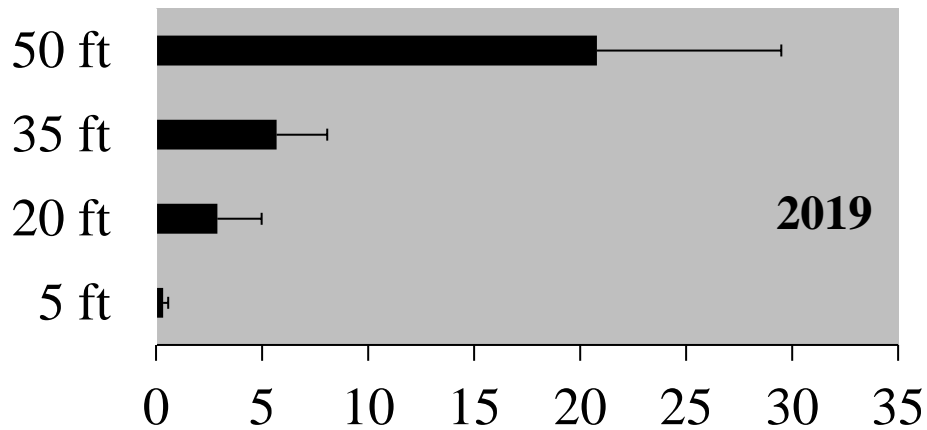
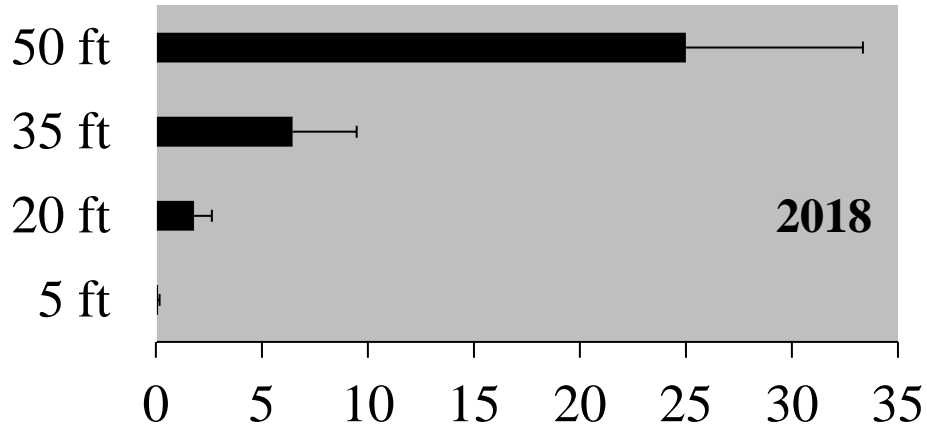


MD dispensers were applied at 24 per acre. One application per season.

2018 and 2019 PNC Mating Disruption Study



Trap Capture – *No Mating Disruption*



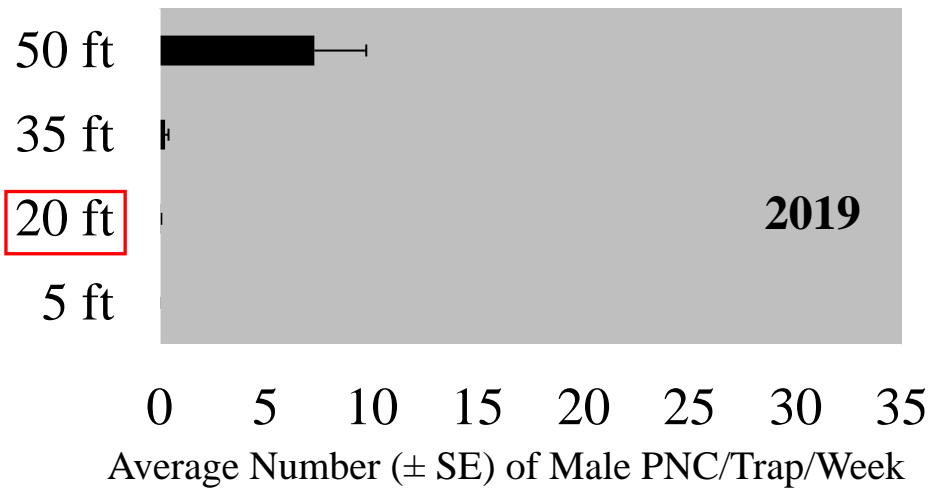
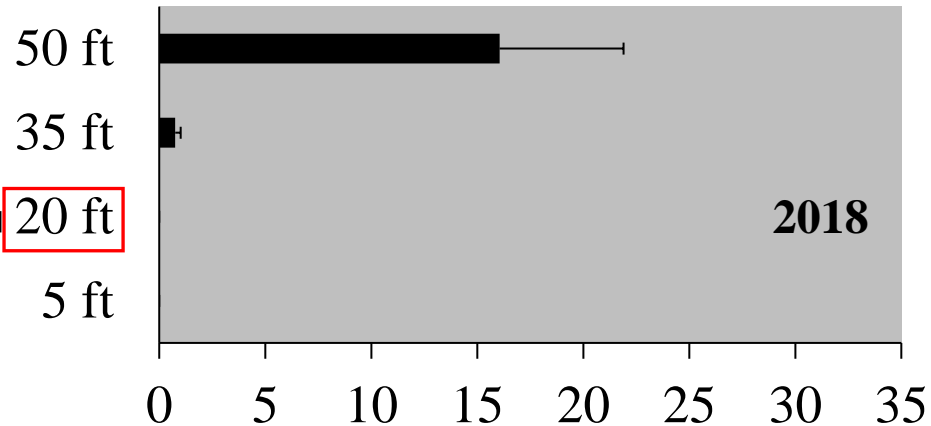
Average Number (\pm SE) of Male PNC/Trap/Week

Keep trap capture data between years in mind when I show nut damage data.

2018 and 2019 PNC Mating Disruption Study

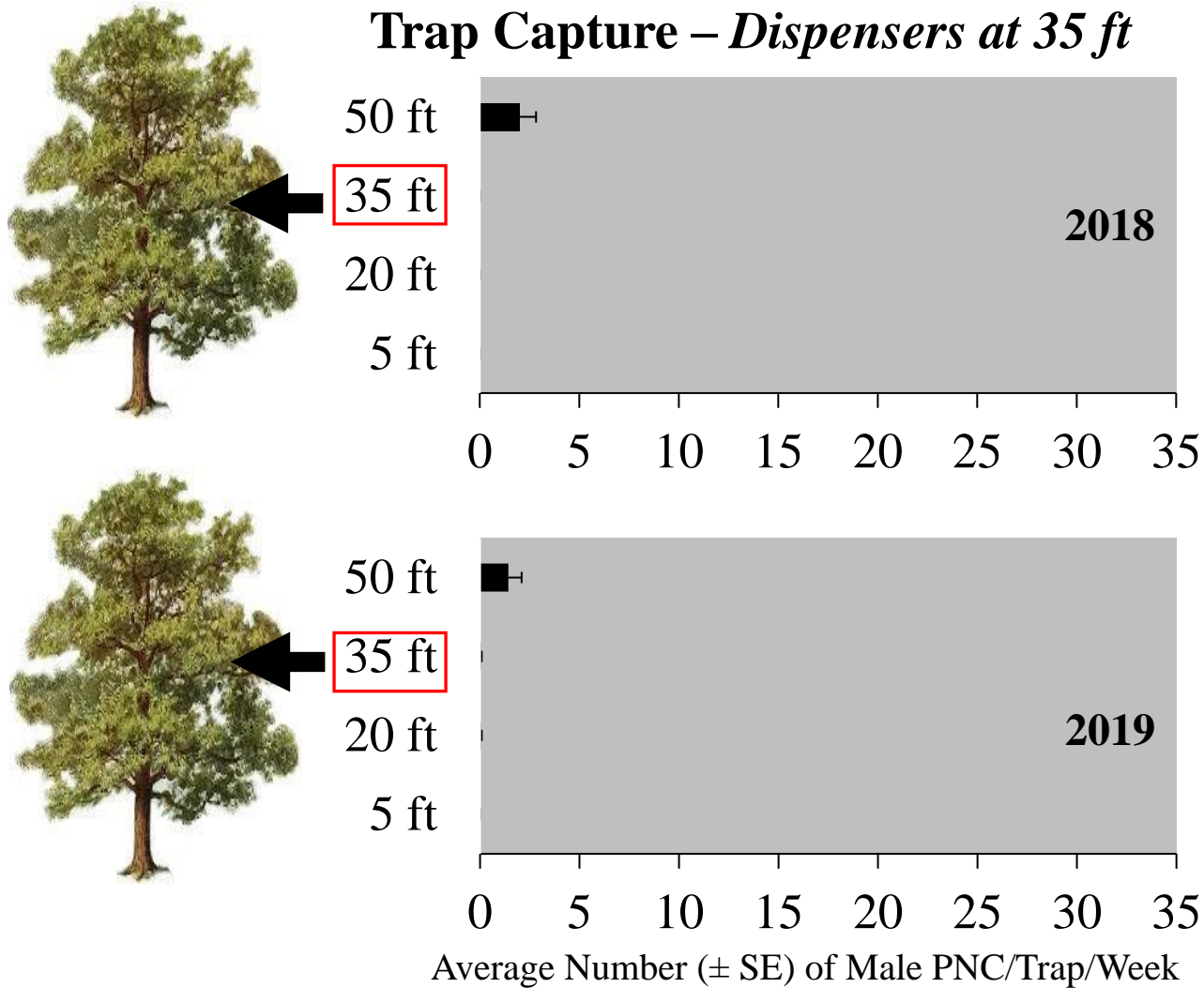


Trap Capture – *Dispensers at 20 ft*

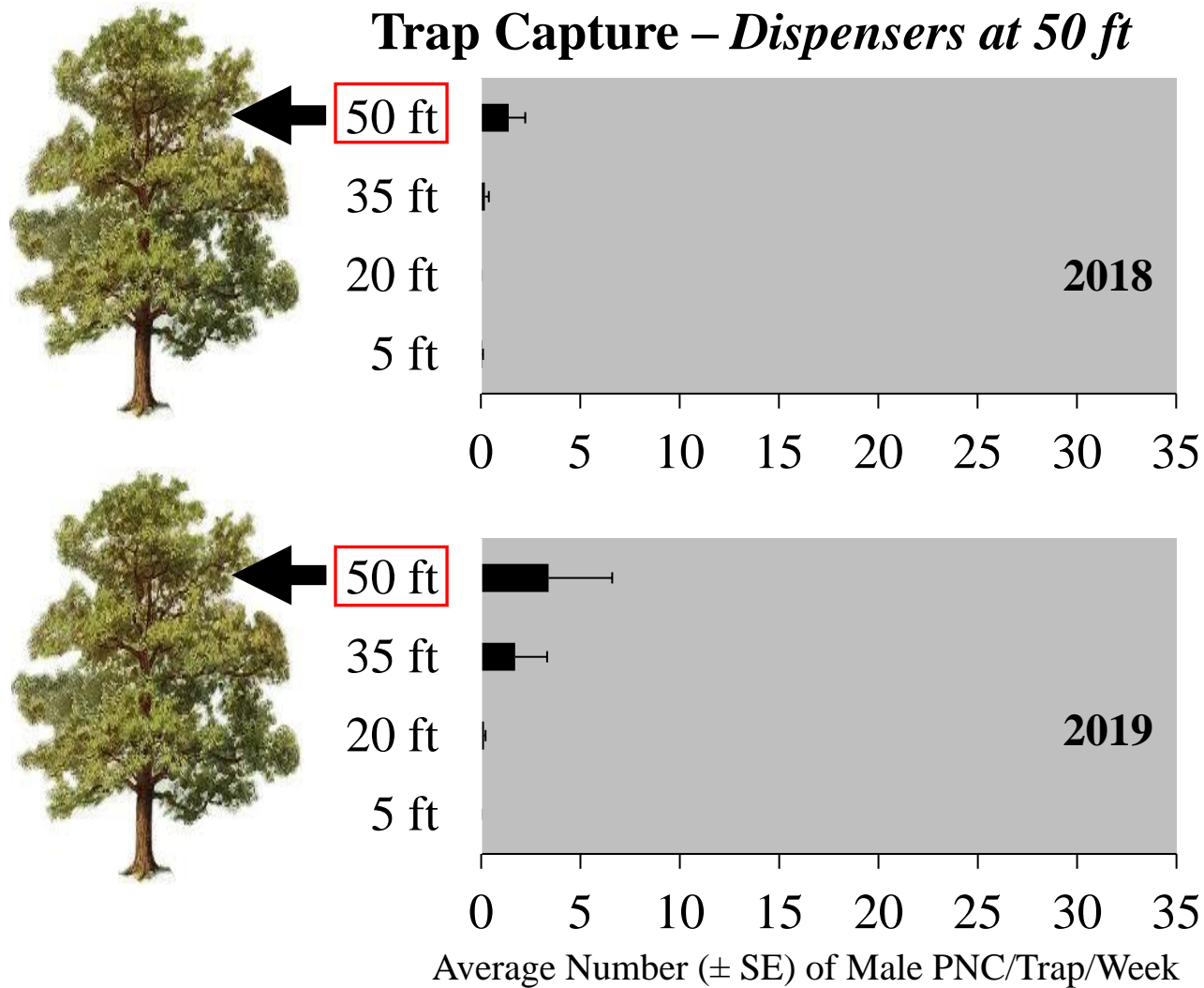


Average Number (\pm SE) of Male PNC/Trap/Week

2018 and 2019 PNC Mating Disruption Study



2018 and 2019 PNC Mating Disruption Study



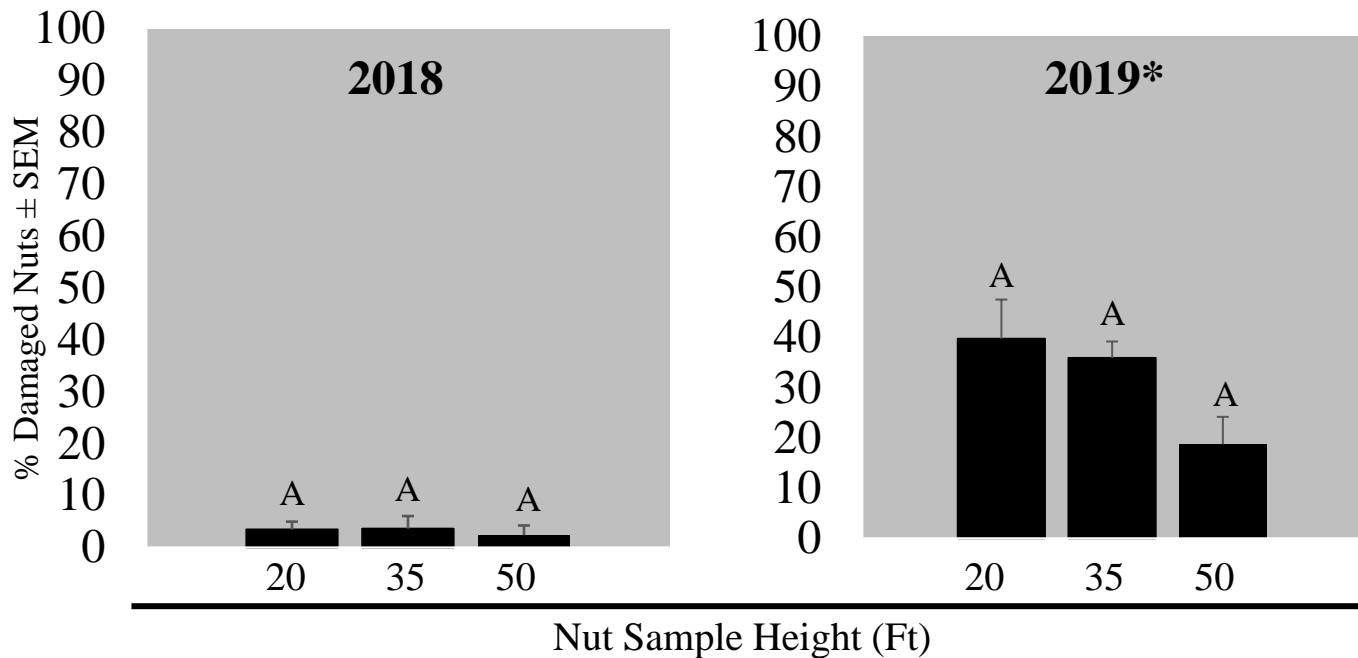
Trap capture data looks great, but then this happened.....



2018 and 2019 PNC Mating Disruption Study

Nut Injury Results

No Mating Disruption Treatment

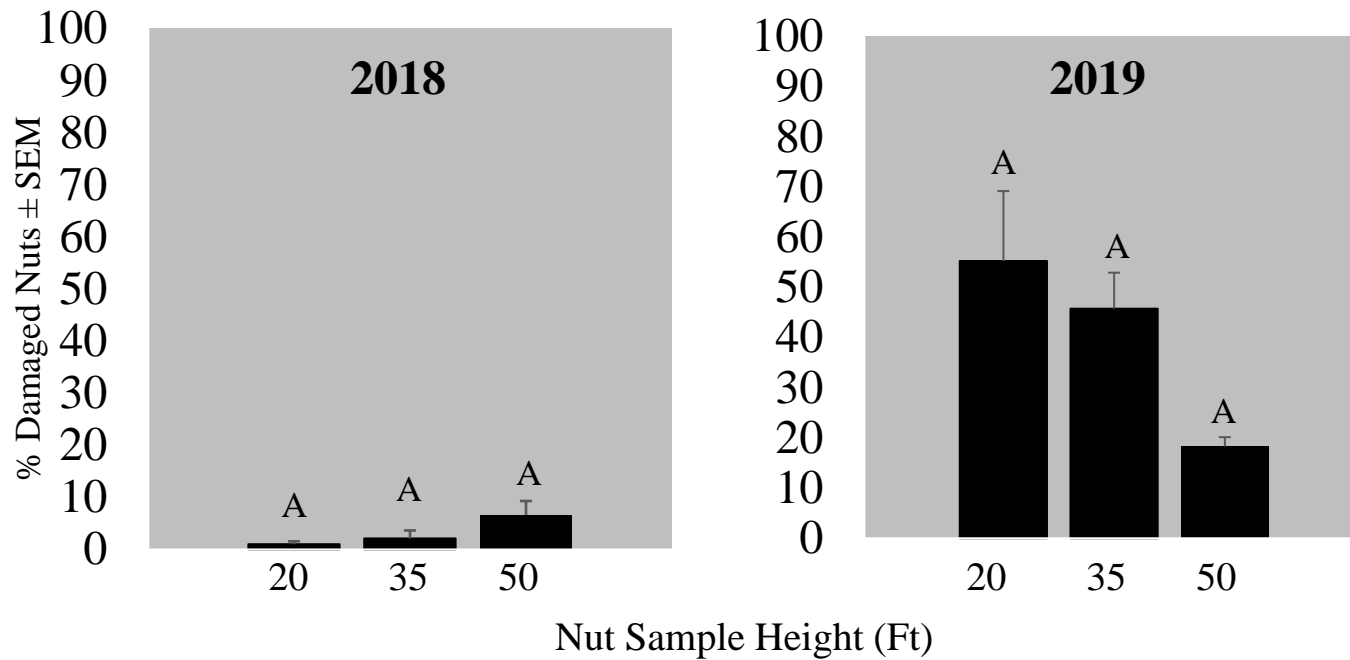


*2019 PNC damage was highest I have ever seen, but trap capture between 2018 and 2019 was similar.

2018 and 2019 PNC Mating Disruption Study

Nut Injury Results

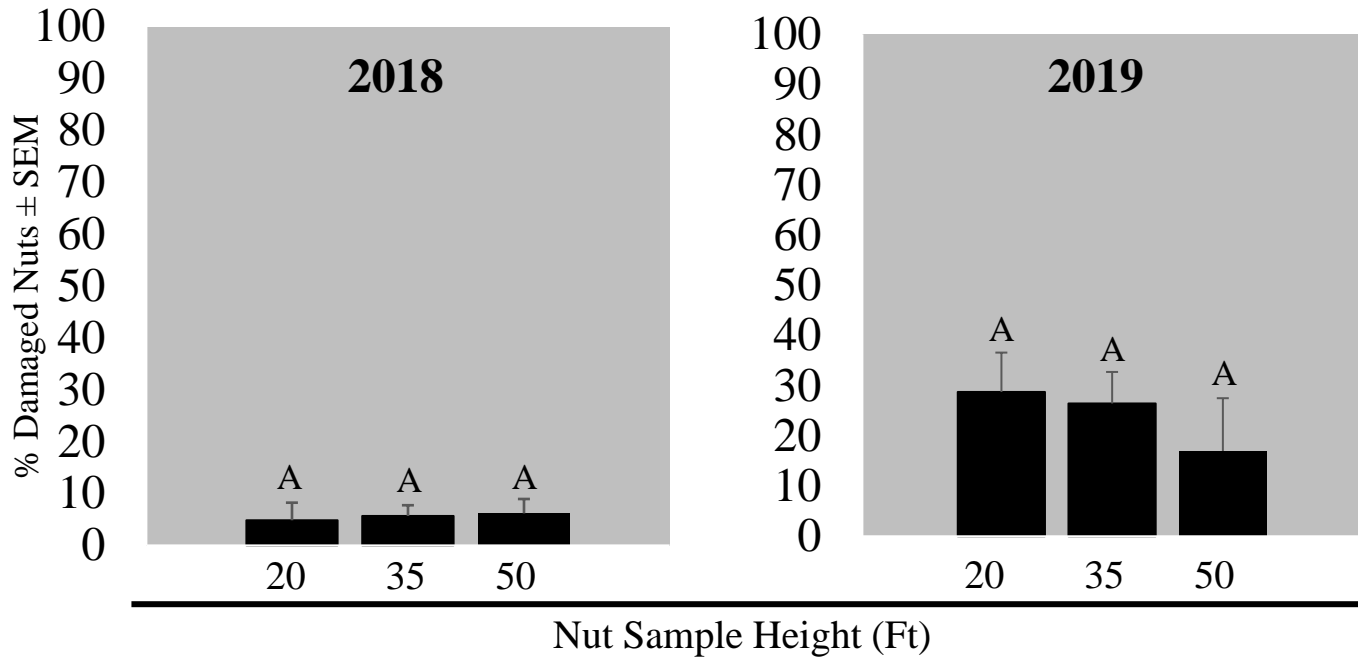
Mating Disruption – Pheromone Dispensers hung at 20 ft



2018 and 2019 PNC Mating Disruption Study

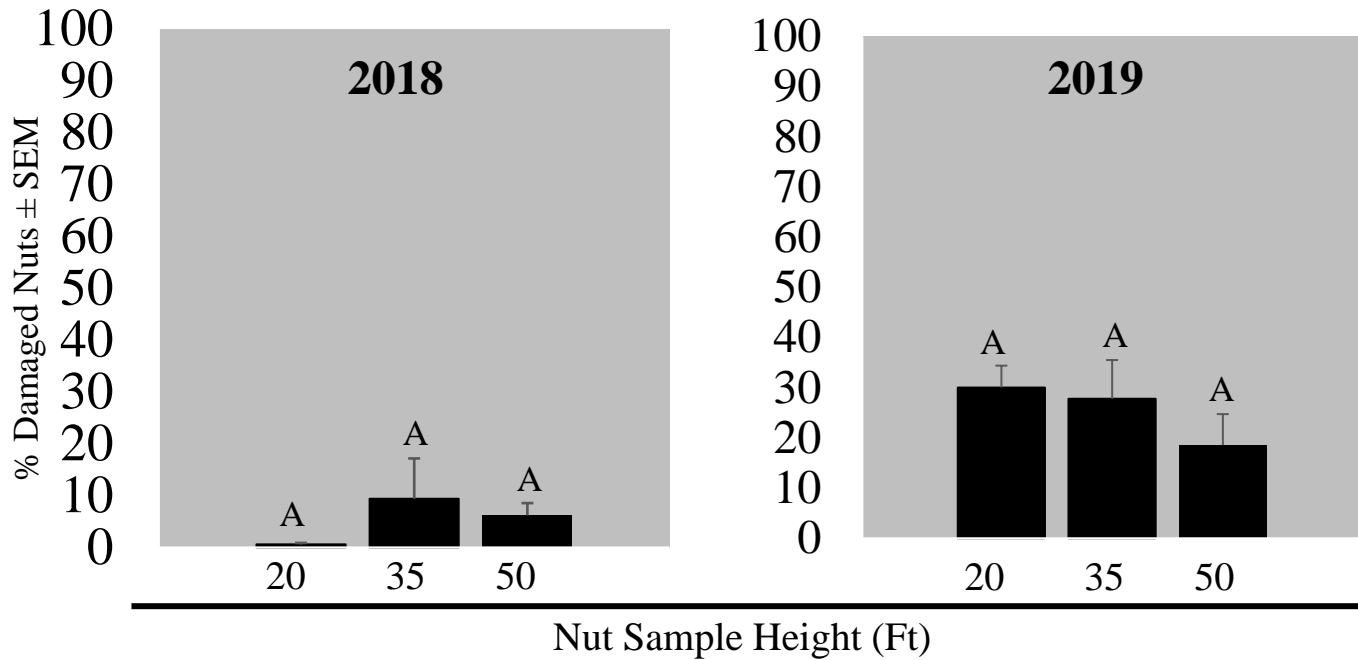
Nut Injury Results

Mating Disruption – Pheromone Dispensers hung at 35 ft



Nut Injury Results

Mating Disruption – Pheromone Dispensers hung at 50 ft



Summary

- Although PNC populations were similar during 2018 and 2019, PNC damage was much higher during 2019.
 - Hemipteran predators were noticeably lower during 2019.



Paul Langlois, Bugwood.org



Joseph Berger, Bugwood.org



Paul Langlois, Bugwood.org

- Application of ring-type mating disruption dispensers at different heights in tall trees *did affect capture* of PNC.
- Application of dispensers at any single height *did not affect* PNC nut injury.
- However, achieving *an effect on trap capture does indicate the potential to disrupt mating* but changes to the experimental design will be necessary.



Conclusion

- The best chance of mating disruption providing control of PNC and HSW in pecan orchards is with the use of a *sprayable, microencapsulated sex pheromone applied to the entire tree.*

Future Research

- Sprayable products will be tested for efficacy against the PNC and the HSW.

Acknowledgments

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