

Mating Disruption – an Areawide Approach to Controlling the Borer Complex in cherry



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Borer Complex

- Pest complex consists of three species:

- Peachtree borer



- Lesser peachtree borer



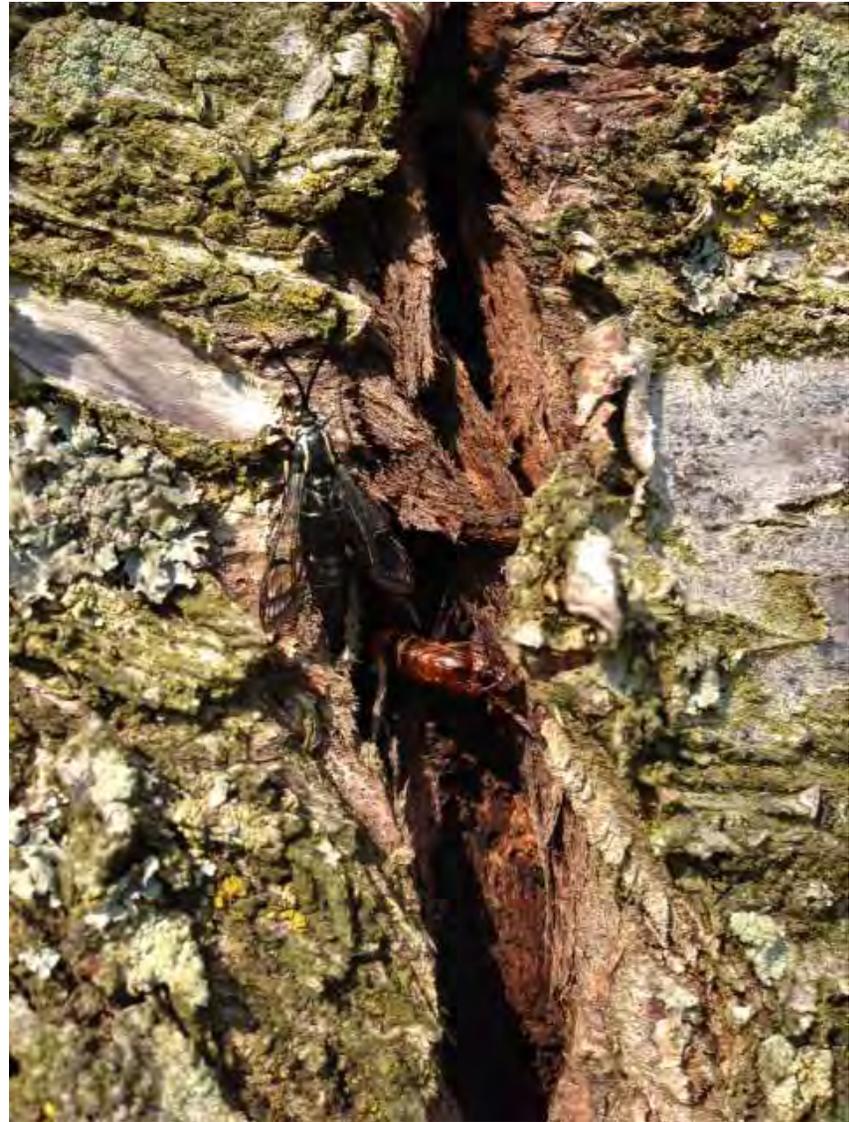
- American plum borer



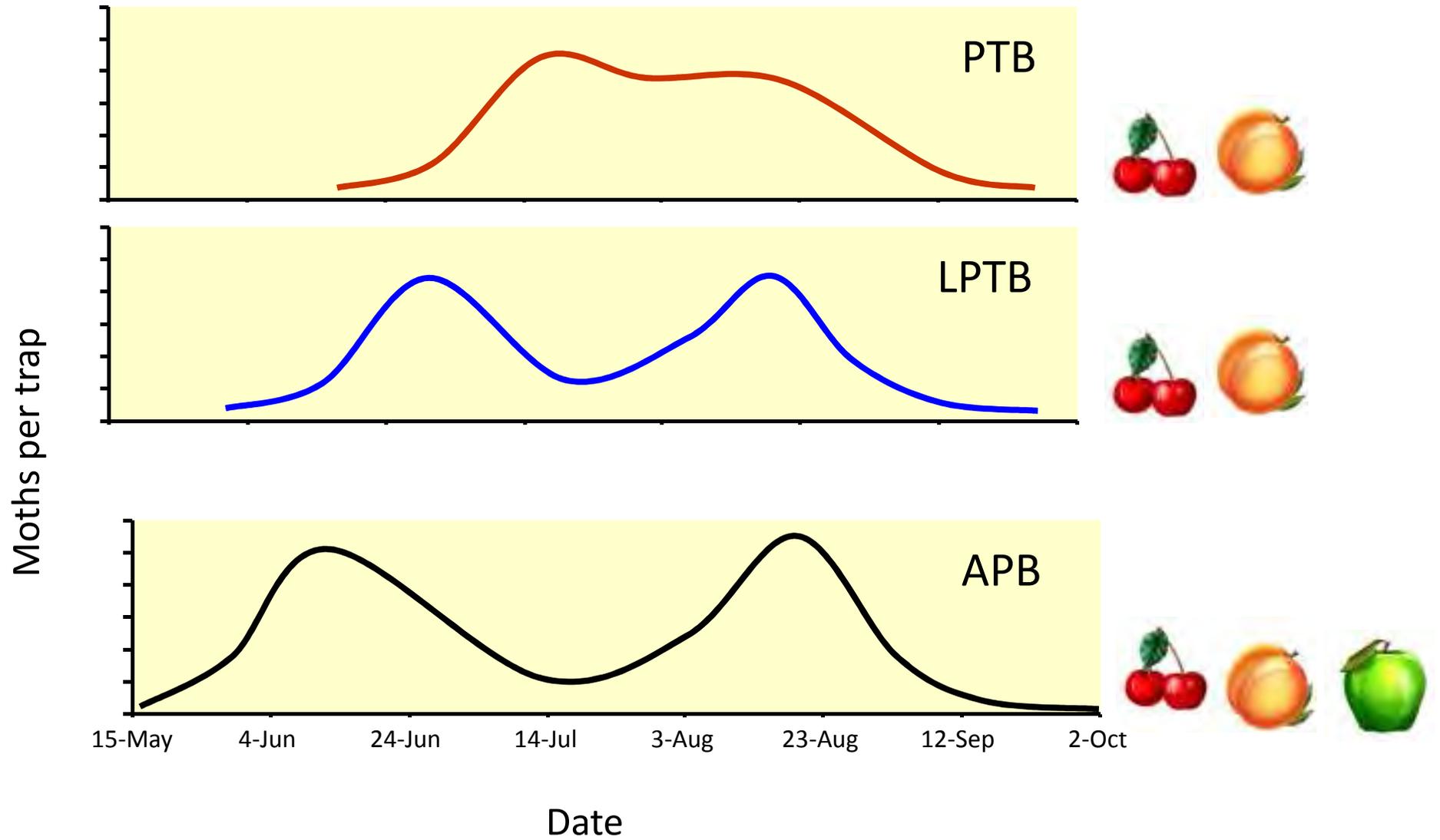
- Most MI cherries are harvested mechanically and shakers can cause damage to trunks
- Trunk damage increases potential for borer egg laying
- Borers have become a major pest to cherries
 - APB does not need damage to bore into trunks



- All three species have similar lifecycles
 - Larval stage causes the primary damage
- Controlling all species can be difficult because they are active at different times throughout the season



Flight period



Control Options

- Primary control strategy:
 - Trunk sprays with OP chlorpyrifos (Lorsban)
 - EPA is reviewing OP use
 - Reviews can be a first step phase down
- Pheromone mating disruption
 - Only available for PTB and LPTB
 - Preliminary work suggests mating disruption not effective in small blocks (10A)



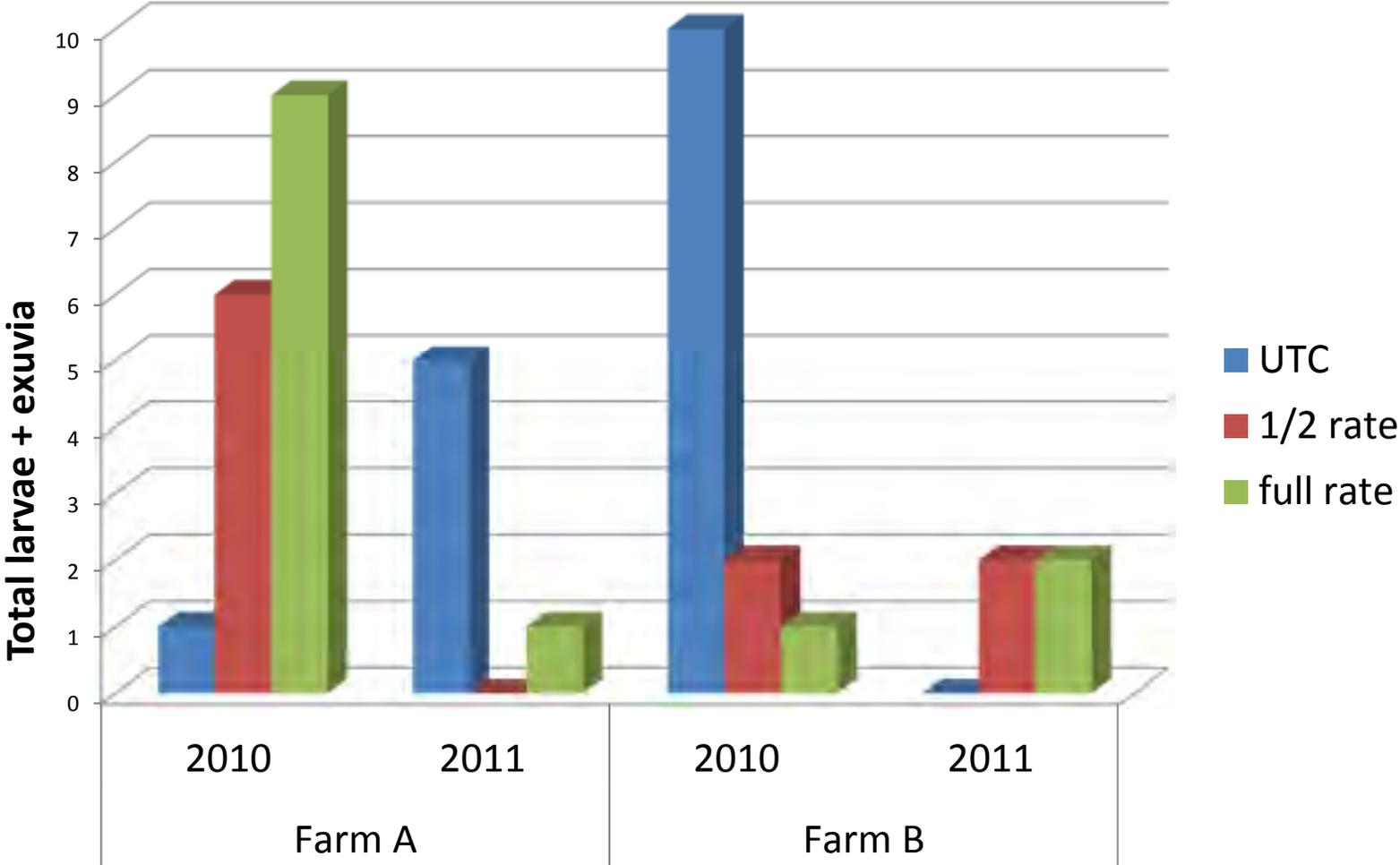
Preliminary Trial with Borer MD

- Three year trial (2009-2011)
- Two farms, **10 acre** blocks divided into 3 sections:
 - UTC, ½ rate of MD, full rate of MD
- Trapped for all three borers in '09,'10, and '11
- Trunk sampled 3x per season in '10 and '11

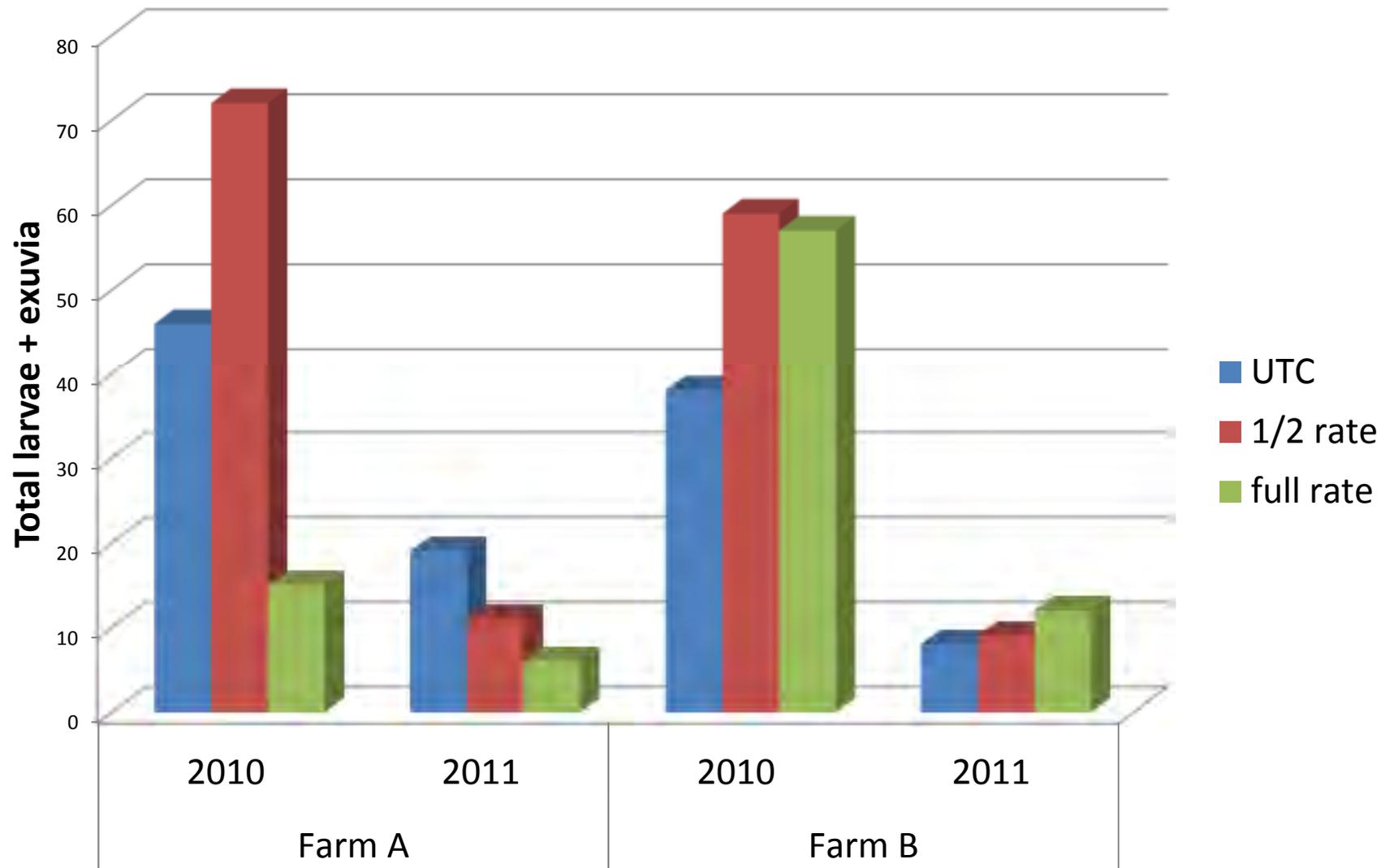
Trap shutdown in treated areas

| | | Season-long trap catch | | | | | |
|------|-----------|------------------------|------|------|--------|------|------|
| | | Farm A | | | Farm B | | |
| | | 2009 | 2010 | 2011 | 2009 | 2010 | 2011 |
| LPTB | UTC | 14 | 6 | 20 | 97 | 56 | 3 |
| | 1/2 rate | 0 | 1 | 0 | 0 | 3 | 0 |
| | full rate | 0 | 1 | 0 | 0 | 0 | 0 |
| GPTB | UTC | 3 | 2 | 13 | 54 | 28 | 5 |
| | 1/2 rate | 0 | 0 | 0 | 0 | 0 | 0 |
| | full rate | 0 | 0 | 0 | 0 | 0 | 0 |
| APB | UTC | | 55 | 70 | | 208 | 277 |
| | 1/2 rate | | 44 | 37 | | 133 | 185 |
| | full rate | | 65 | 55 | | 145 | 156 |

Trunk samples for PTB larvae + exuvia



Trunk samples for LPTB larvae + exuvia



Area-wide Approach

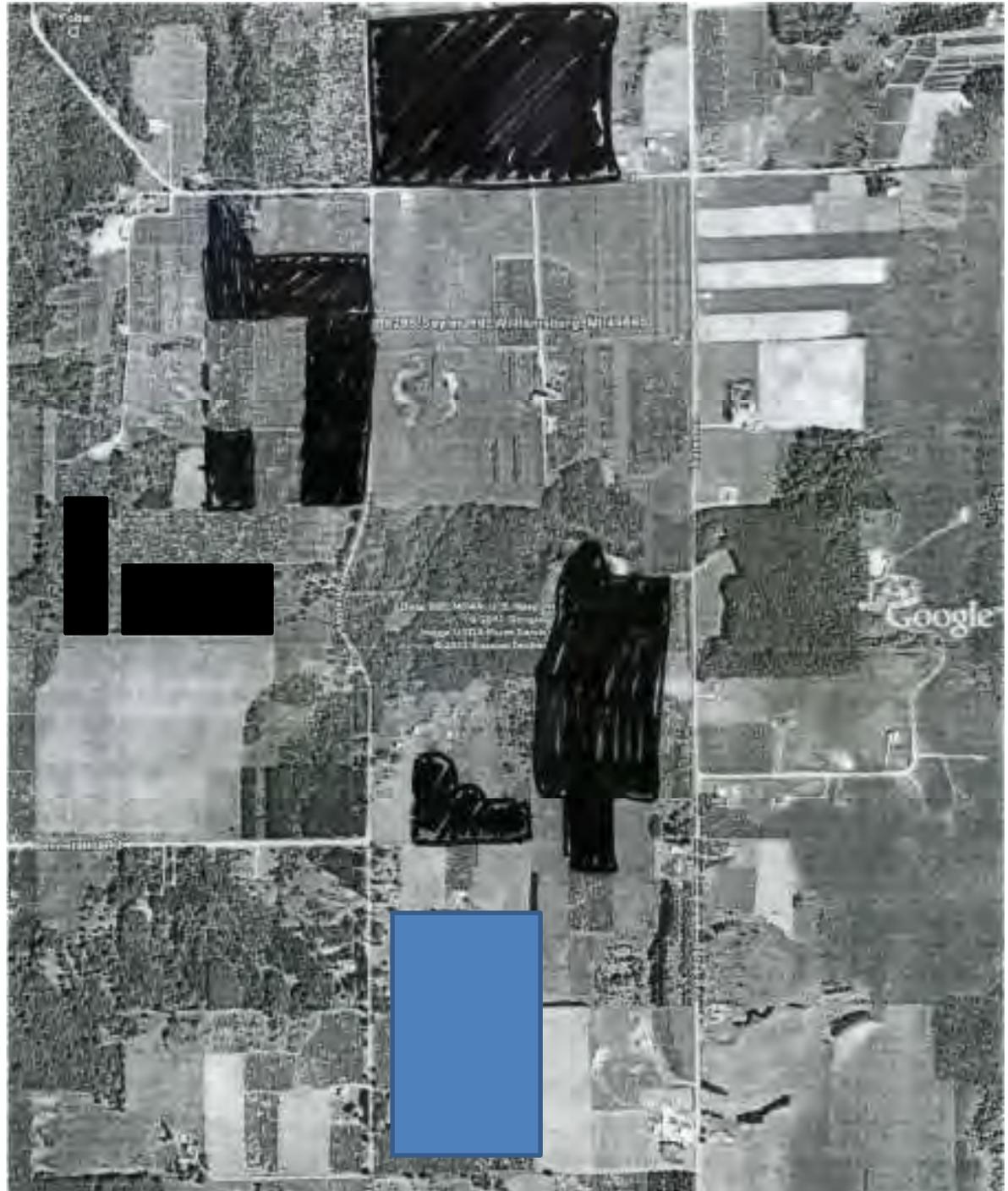
- Three year study (2011 – 2013)
- Conducted on 3 farms
 - In sweets and tarts
- Disrupted majority of contiguous stone fruit acreage
 - 60 acres on Farm A
 - 66 acres on Farm B
 - 60 acres on Farm C
 - 30 acres UTC on farm B



Areawide Borer Mating Disruption Map

Treated Area = Black (~150
acres)

Untreated Area = Blue (~30
acres)



Methods

- Hang pheromone ties
- ~ May 1
- 150 ties/acre
- Treated area:
 - 34 baited traps for APB, LPTB, and PTB
- UTC
 - 18 baited traps for 3 species
 - Traps were located adjacent to treated area (6), halfway into UTC block (6), and at furthest edge of UTC block (6)



Methods, cont.

- Traps checked weekly from May 15 to Sept. 15
- Larval sampling conducted 3x per season
 - Invasive yet non-destructive sample of trunk, lower scaffolds and graft union
 - #’s of APB, LPTB and PTB larvae, exuvia, and pupae were recorded





Larva



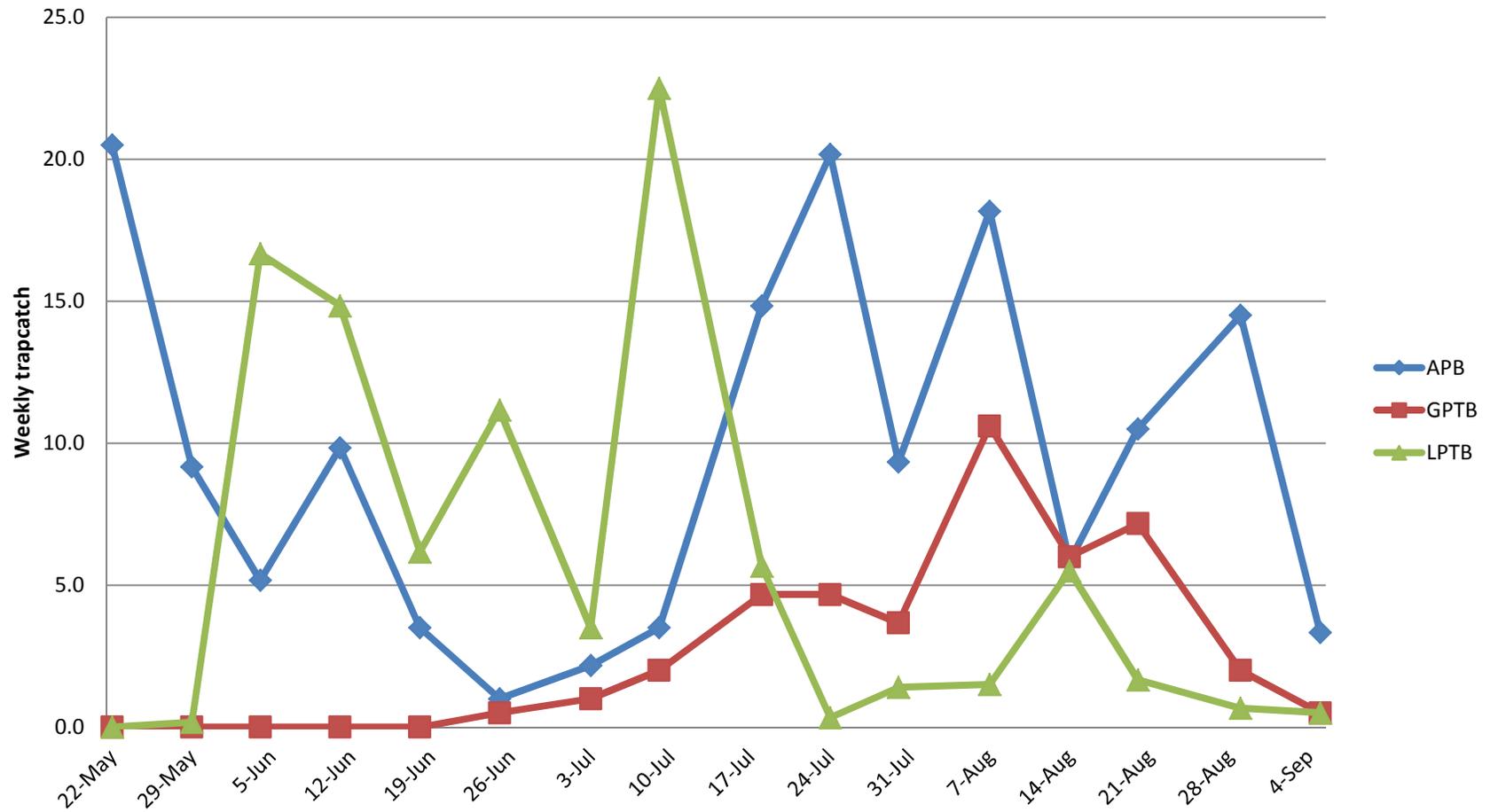
Pupa



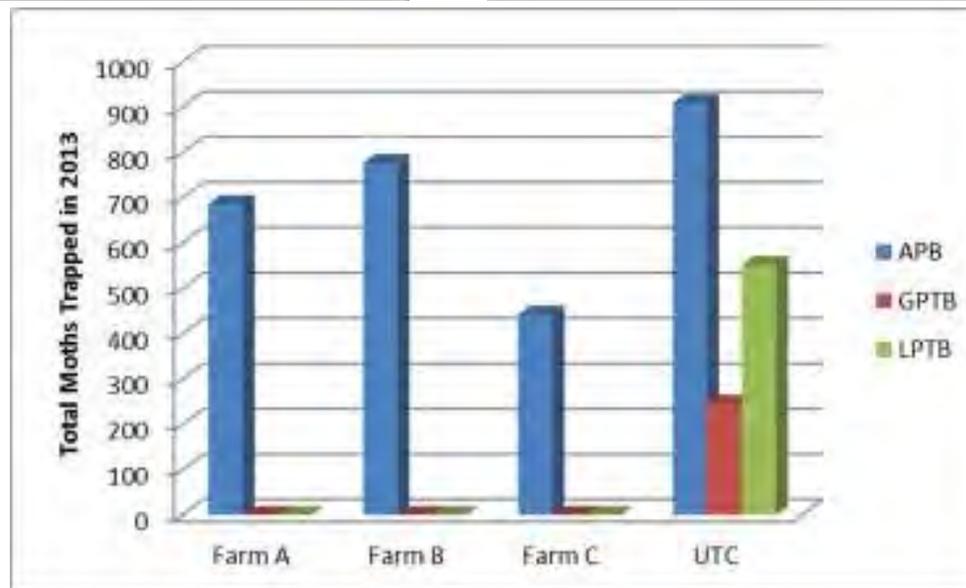
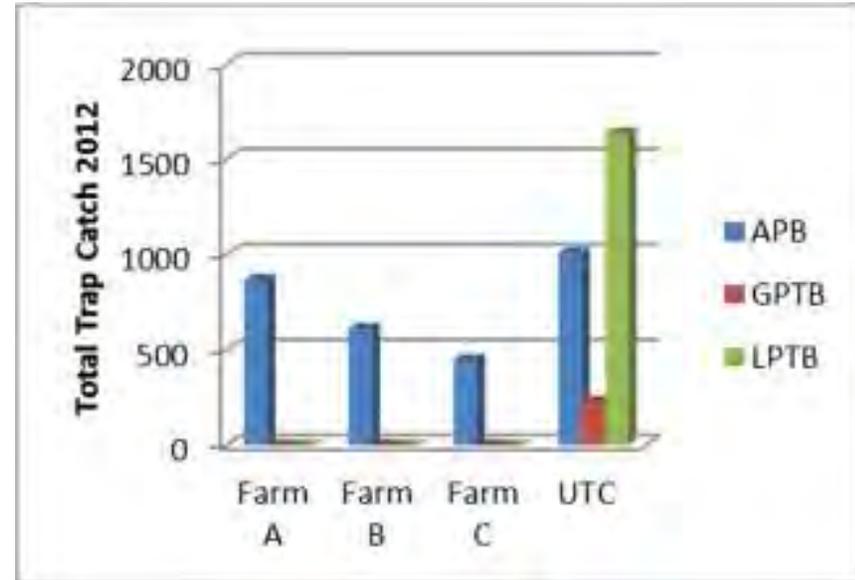
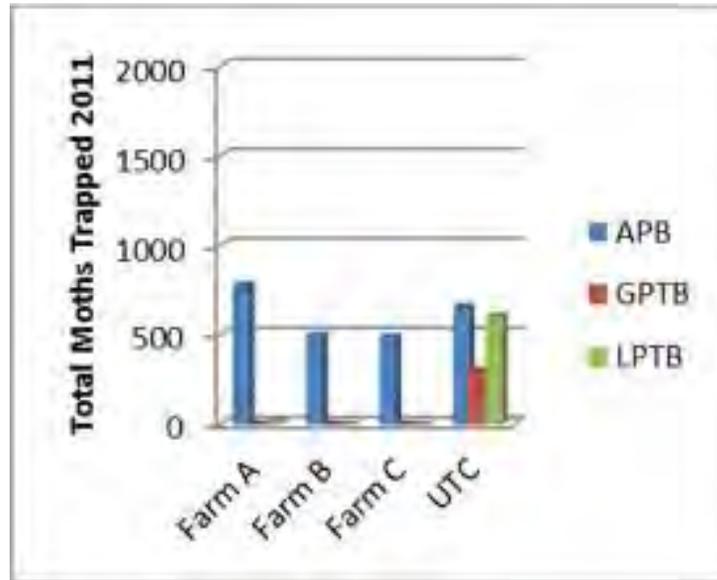
Adult

Exuvia

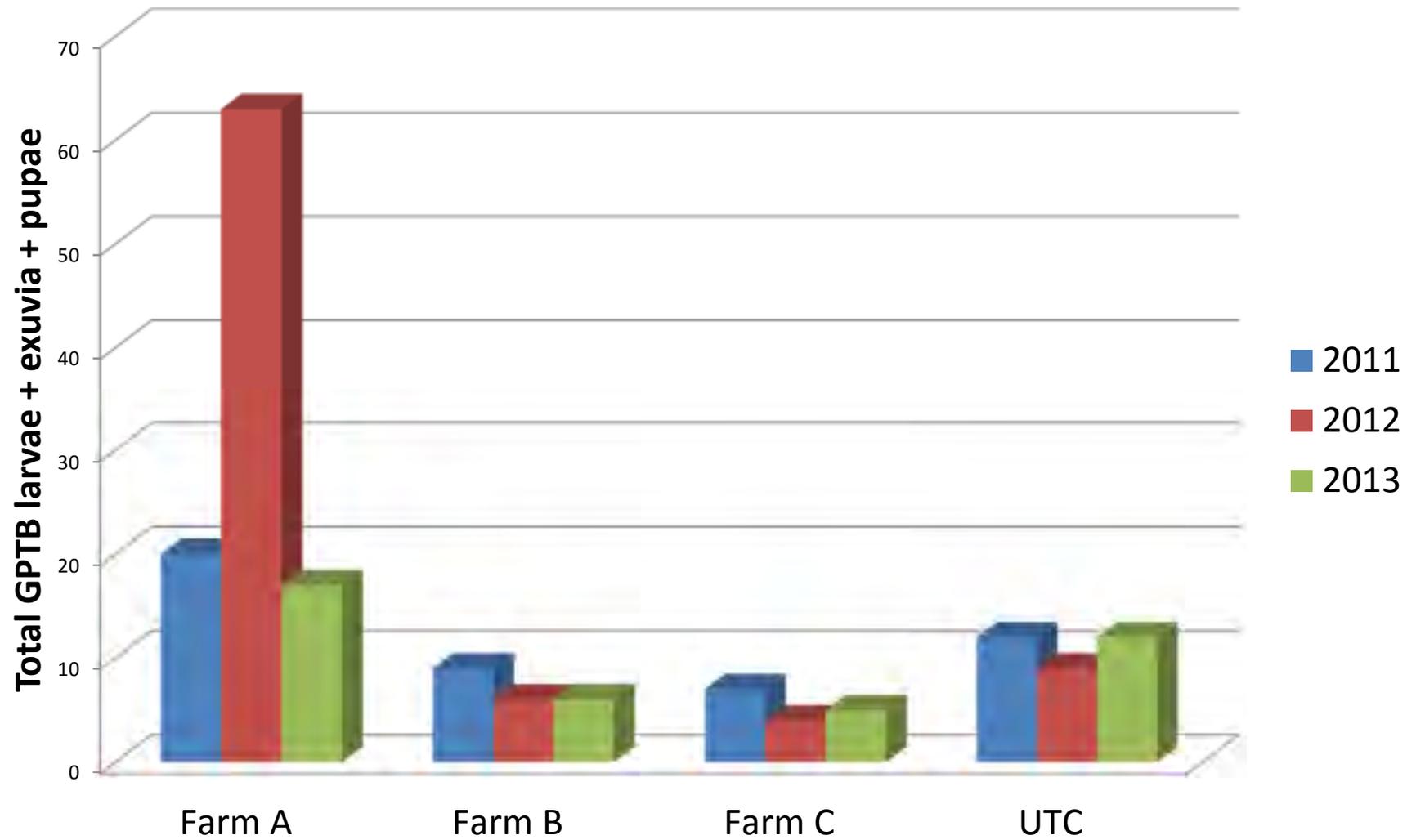
2013 flight pattern in the UTC



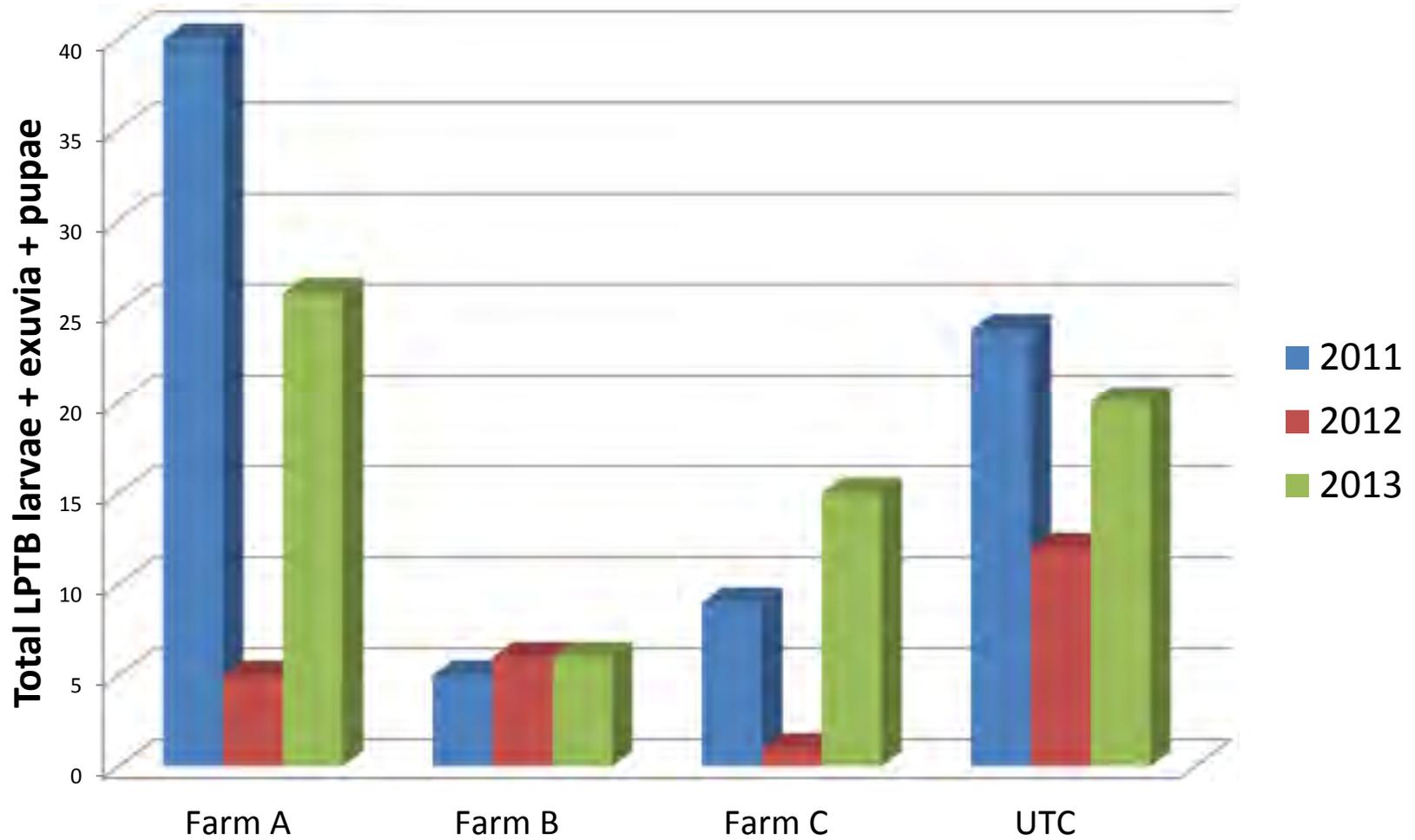
Moths Trapped 2011 - 2013



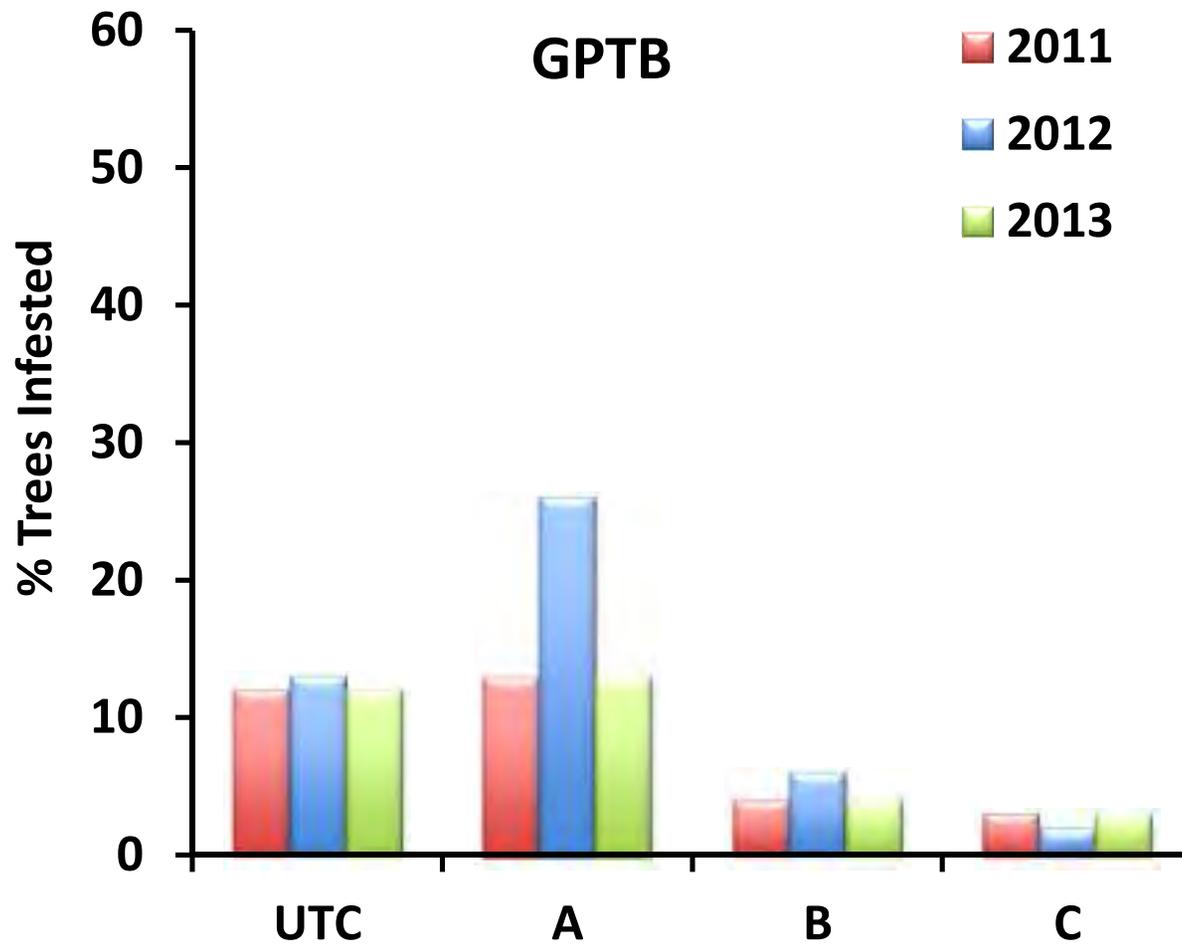
Larval Samples: PTB



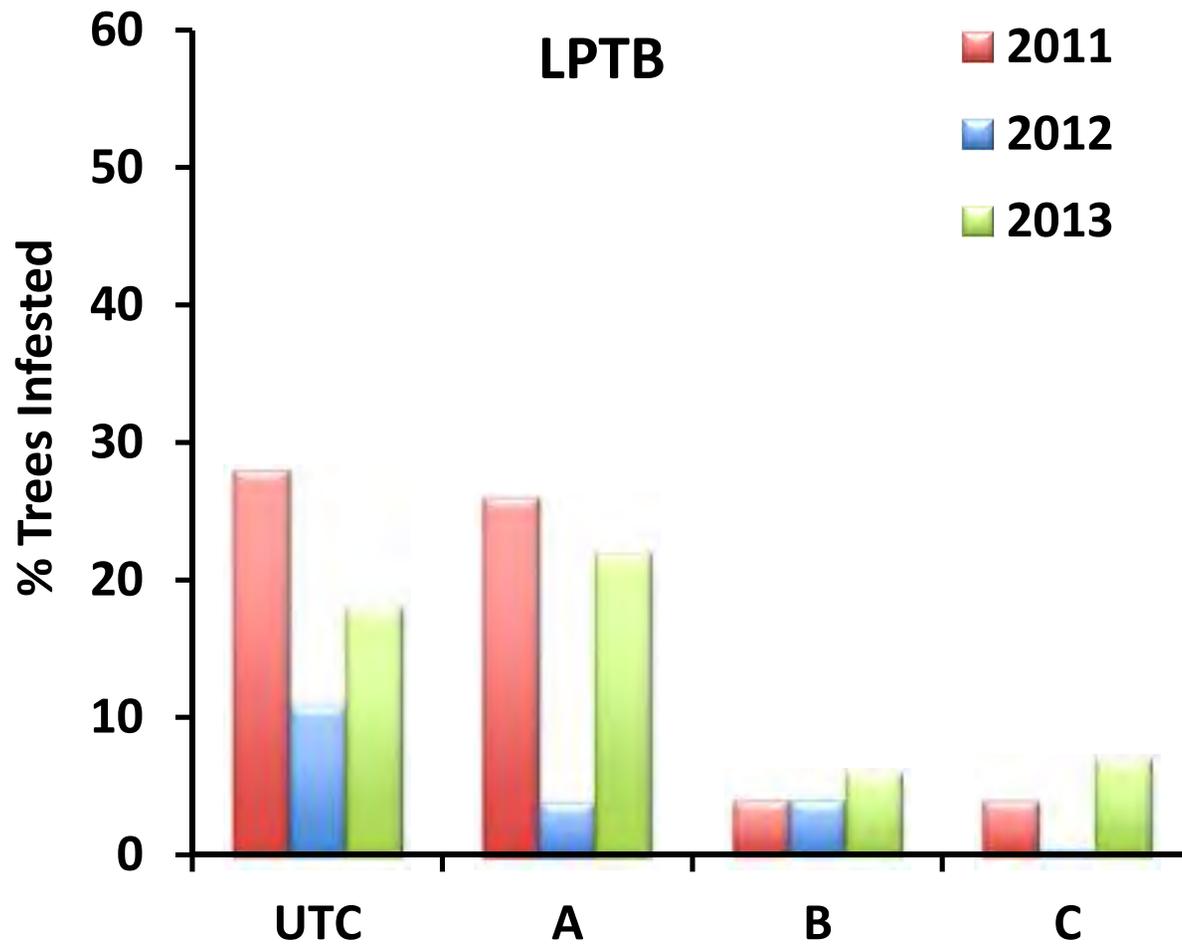
Larval Samples: LPTB



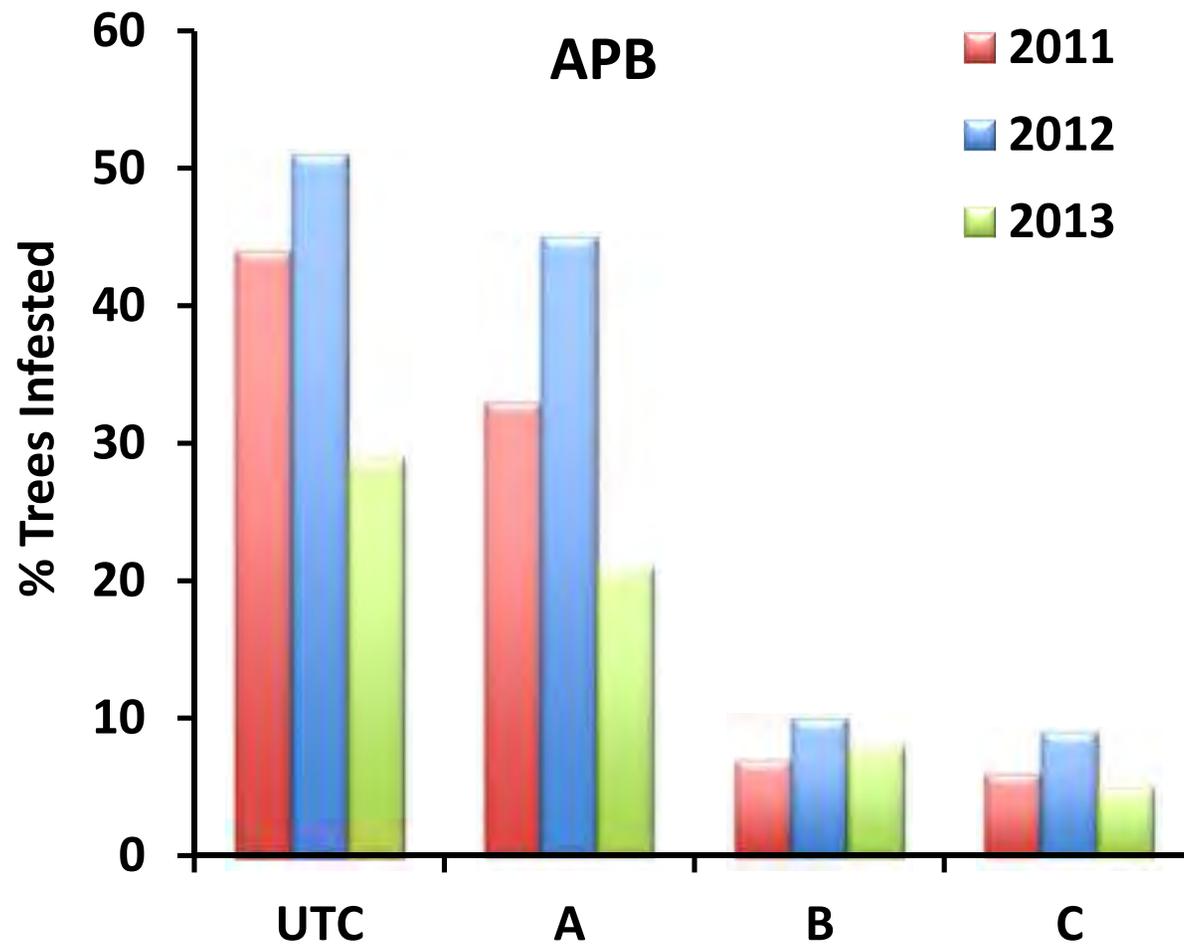
Percent of Trees Infested with PTB



Percentage of Trees Infested with LPTB



Percentage of Trees Infested with APB



Economic Considerations

- Economics of MD:
 - MD ties: ~\$50/acre
 - Labor to hang ties:
 - Trained technicians
~80 hours to cover
185 acres
 - 1 tie/tree
 - $0.44 \text{ hrs/A} \times \$12/\text{hr} = \$5.28/\text{A}$
 - Total: \$55.28/acre
- Lorsban application:
 - 3qt/acre: \$31.68/acre
 - One application may not be sufficient to control all three borers due to differences in life cycle
 - May need multiple annual sprays
 - Worker protection issues with spraying OP to run-off

Other Considerations

- Hedging later in the season can remove ties
 - Ties typically hung on outside of canopy
- Ties ended up on fruit processing line at harvest
 - Shook ties off trees in 2013
 - 3 years of ties built up on trees in project
 - Processing line was able to pick out ties with high powered magnet



Conclusions

- In three years of testing, there were NO differences between orchards with MD compared with the UTC
 - Documented adult trap shut down
 - No reduction in larval infestation for PTB and LPTB
- Based on these results, MD does not appear to be a valid option
 - Additionally, MD does not control APB which seems to be most prevalent larvae in this 200+ acres of cherry

Future Work

- Documented that all borer adults are extremely attracted to their pheromones
 - Future work may include large scale plots with attract and kill that targeting adult moths



Thank you!

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