Developing of cost effective pheromone mating disruption for codling moth in pears

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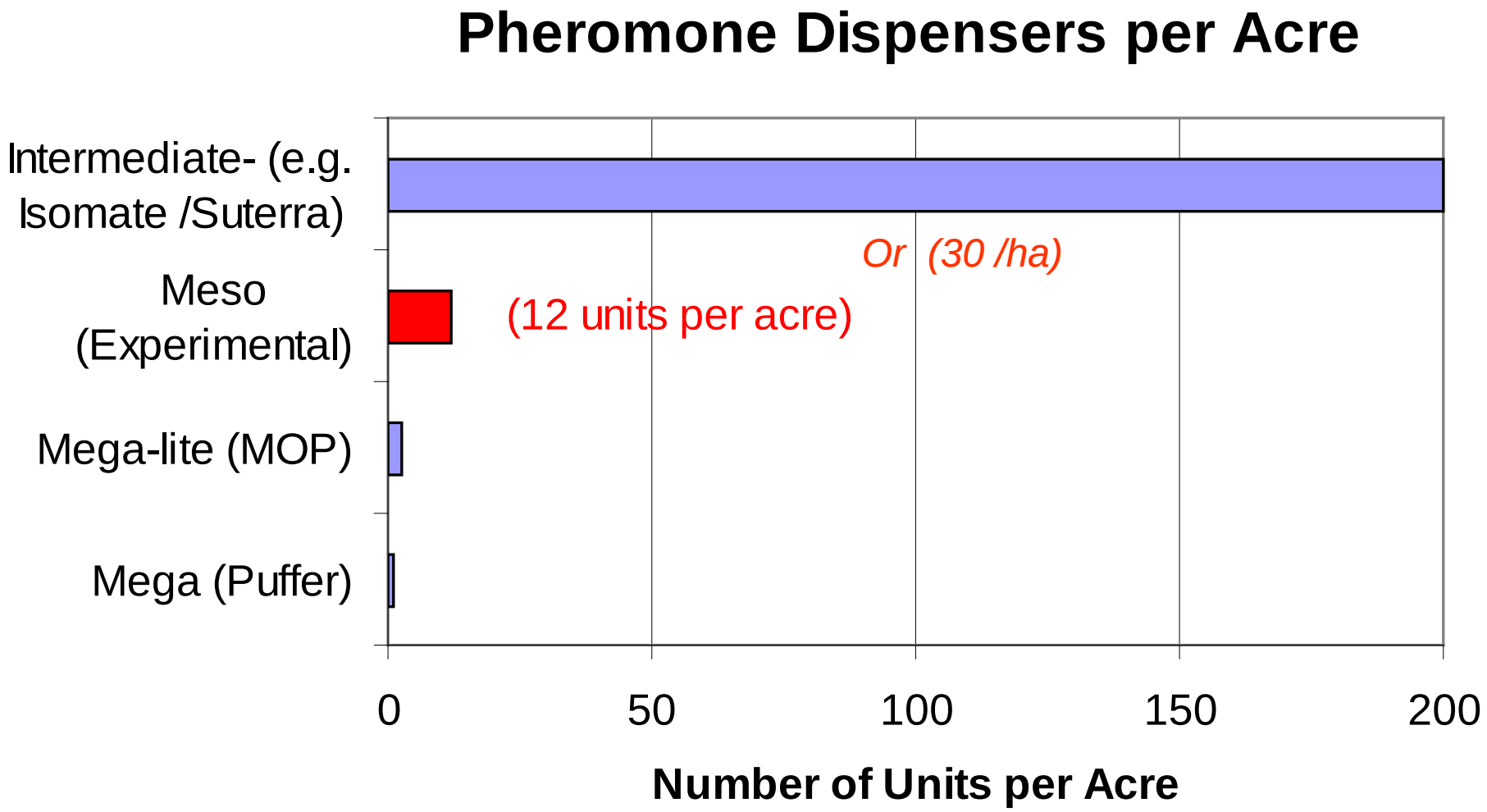
Intermediate Number of Dispensers per Acre



Benefits

- Reduced labor costs
- Speed of application (5 acres were put on in 1 hour by UC crew)
- Examining current standard for level of pheromone per acre to explore reduced program costs

Meso-Emitter Development

2005 – SPLAT wax emulsion experimental prototype

2006 – modified membrane and wax matrix dispensers

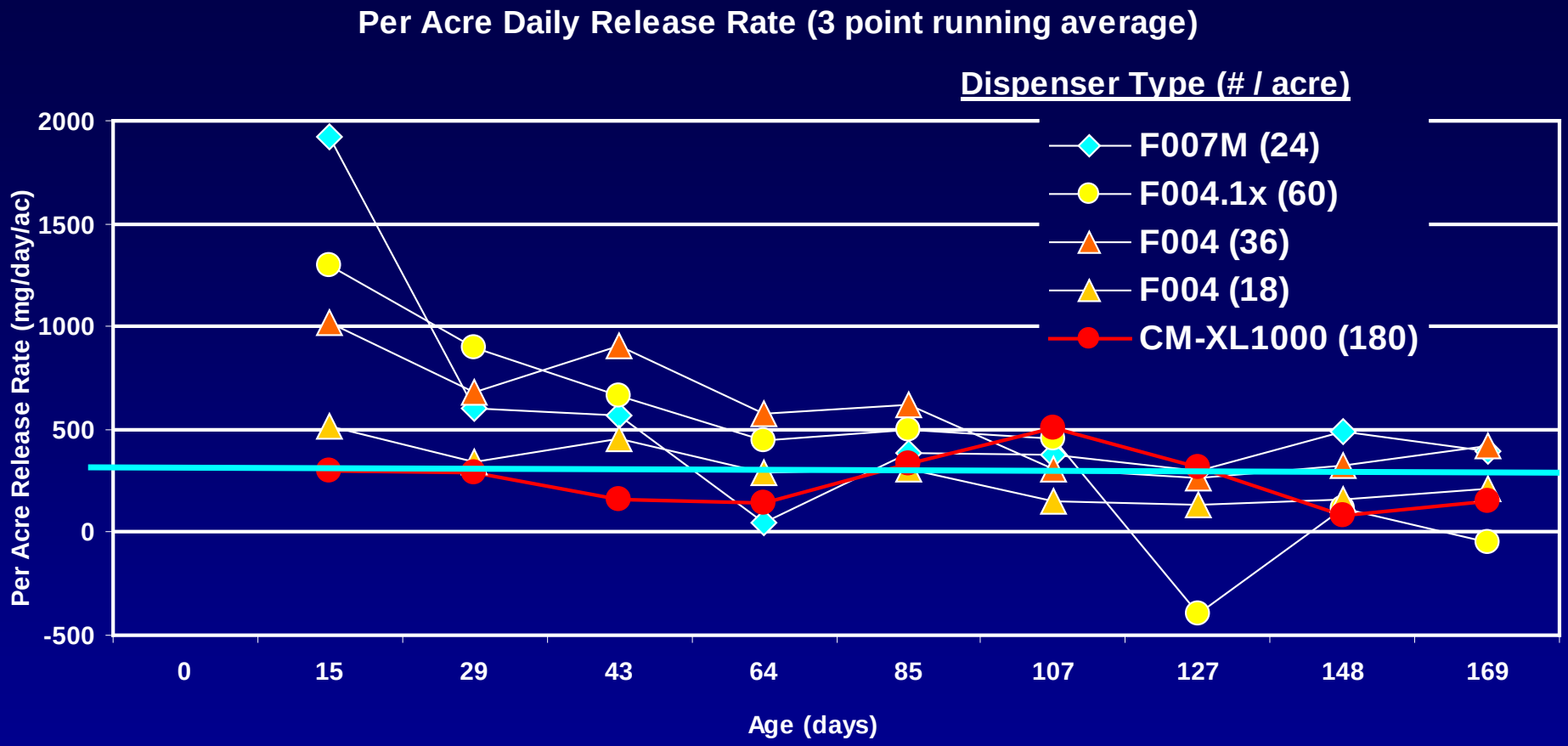
2007 – modified membrane dispensers

Dispensers for Efficacy and Point Source Trials - 2007

- Checkmate CM-XL1000 (standard control)
- F007M and MDD (2-sided emission surface)
- F007.1x (1-sided emission surface)
- F004 (2-sided emission)
- F004.1x (1-sided emission)

Suterra F007M | Suterra F004 | Checkmate CM-XL 1000

Field-Aged Dispenser Release Rates



- Targeted ca. 320 mg per acre per day
- All treatments except F004.1x overall matched or exceeded pheromone standard through day 169
- After initial release burst, all dispensers demonstrated stable release rates through day 169

Meso-Emitters in Development

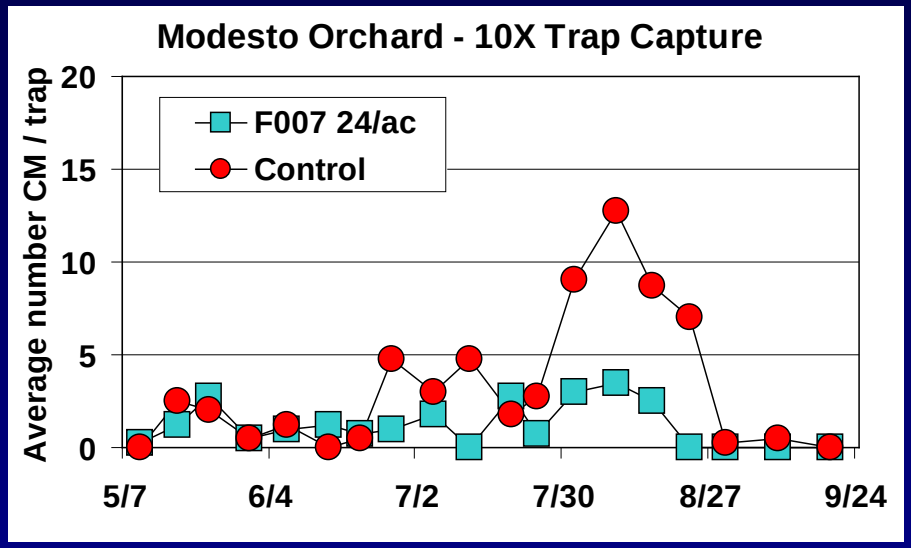
- Suterra – meso-membrane dispenser
- Trece – dispenser (season trap suppression for 2007)
- Isomate – “chained loop of isomate dispensers” – prototype for testing on limited basis

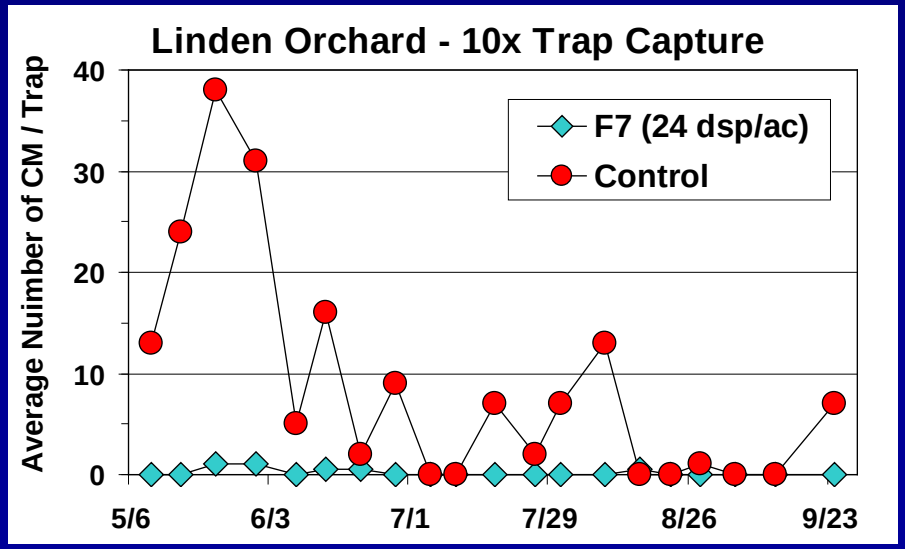
2007 Objectives

- Field efficacy of 2007 experimental dispenser
  - selection based on lab emission data
- Evaluate point-source number effects
  - similar per acre emission rate in all plots but vary the number of dispensers (point sources)
  - moderate number of dispensers per acre
  - Replicated 5-acre field trial
  - Funded by UCIPM

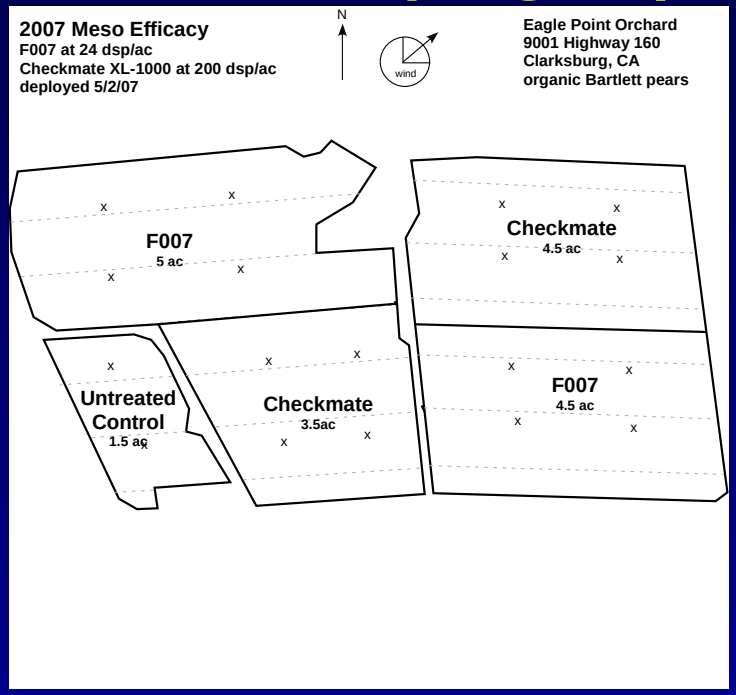
Seasonal Flight using 10X lures in Standardized Meso Plots

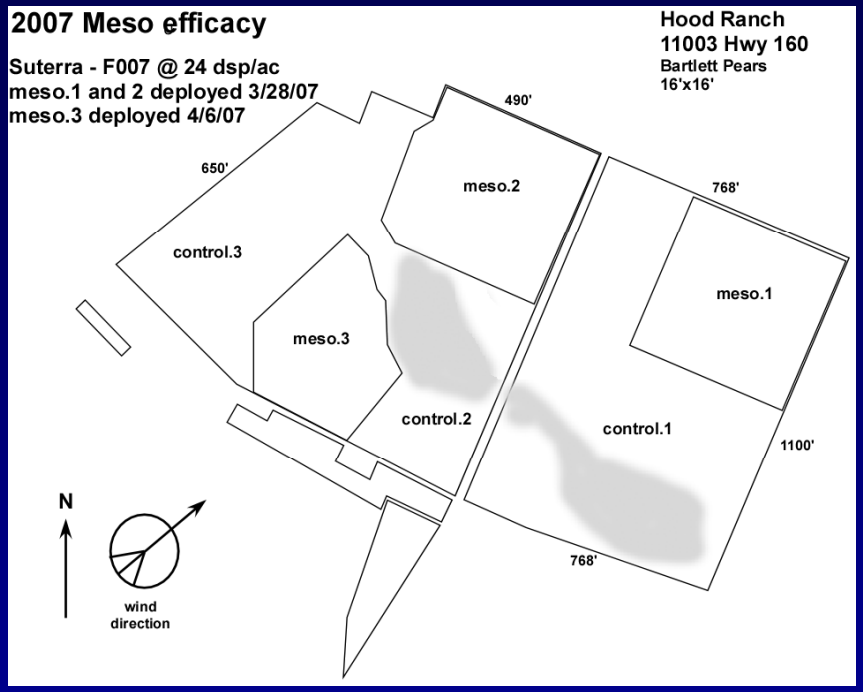
- 10x traps reveal significant flights in all plots
- Linden plot (untreated organic) with peak flights of ca. 40 moths per week





Standardized Meso Applications in Pears (high pressure orchards)

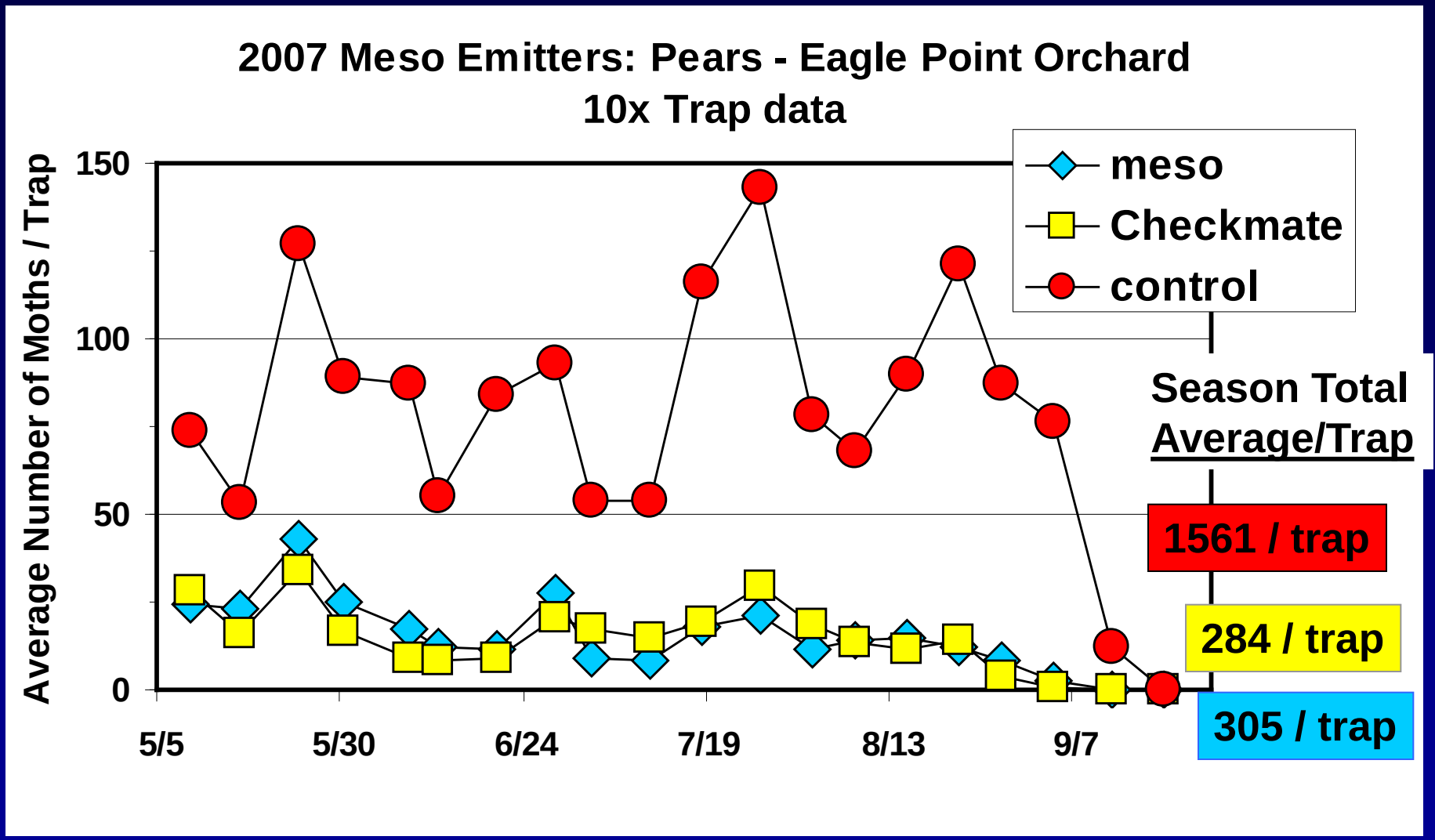




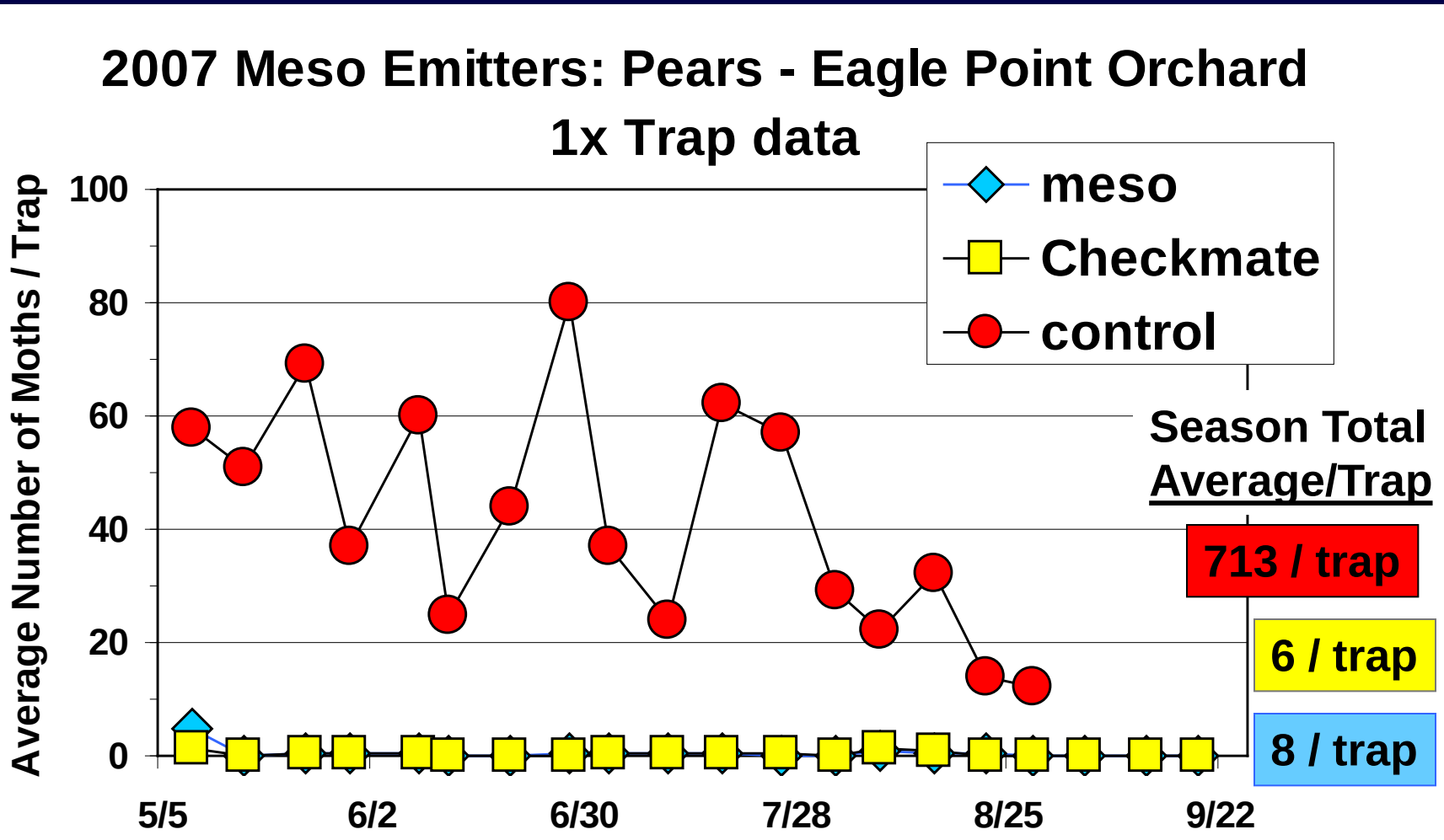
- **Site 1: Eagle Point**
  - **1 replicate for untreated control**
  - **2 replicates of Checkmate standard**
  - **2 replicates of standardized meso treatment (Suterra F007, 24 dpa)**
- **Site 2: Hood**
  - **3 replicates untreated control**
  - **3 replicates standardized meso treatment (Suterra F007, 24 dpa)**

Methods - Pears

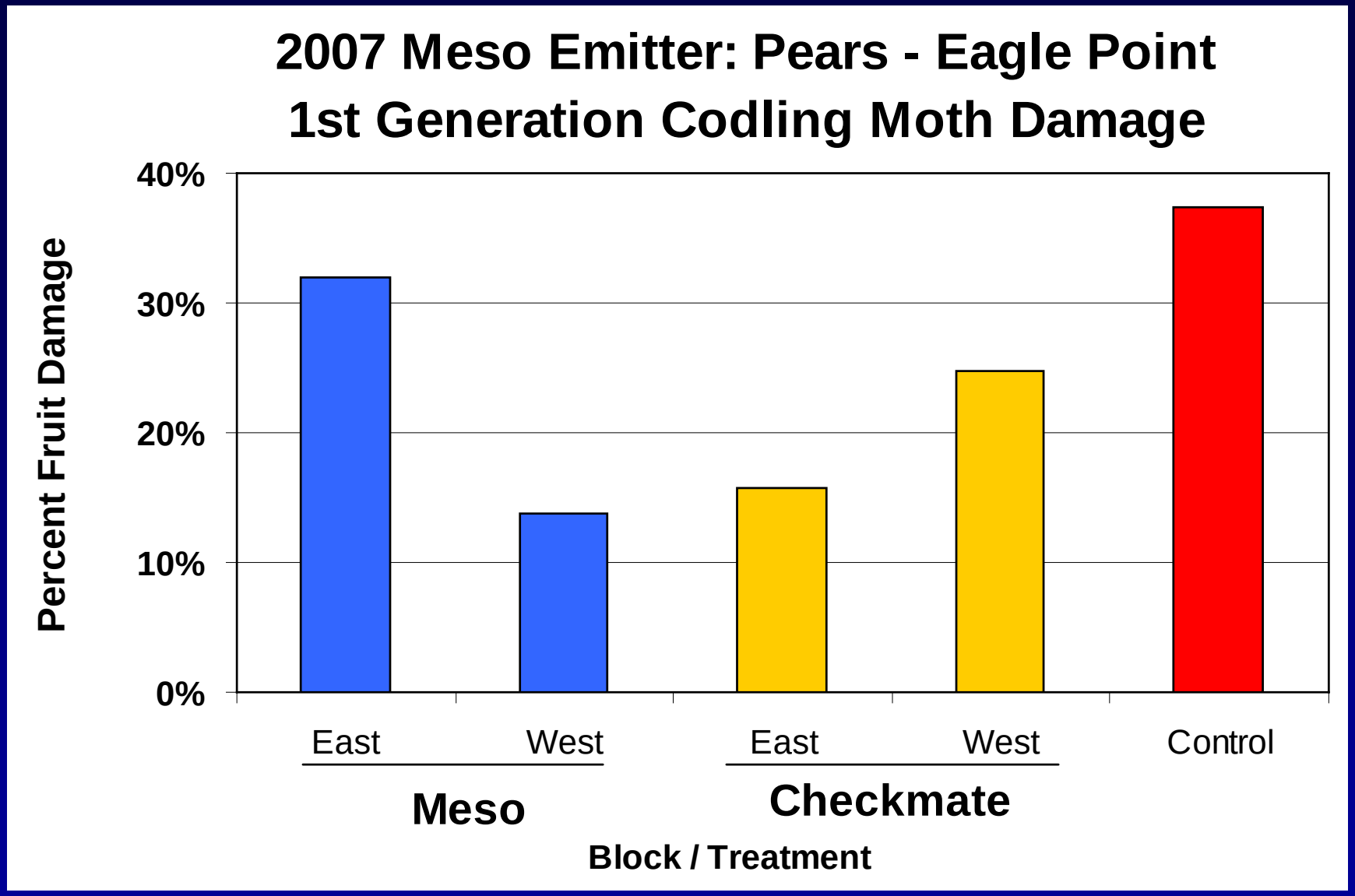
- 5-acre (one 3.5-acre) treatment plots
- Orchards with history of high flight counts and/or damage
- No insecticide treatments anytime
- Ambiguities in orchard management precluded orchard setup before codling moth flights



Extreme flights observed in 10x traps throughout the season for all plots

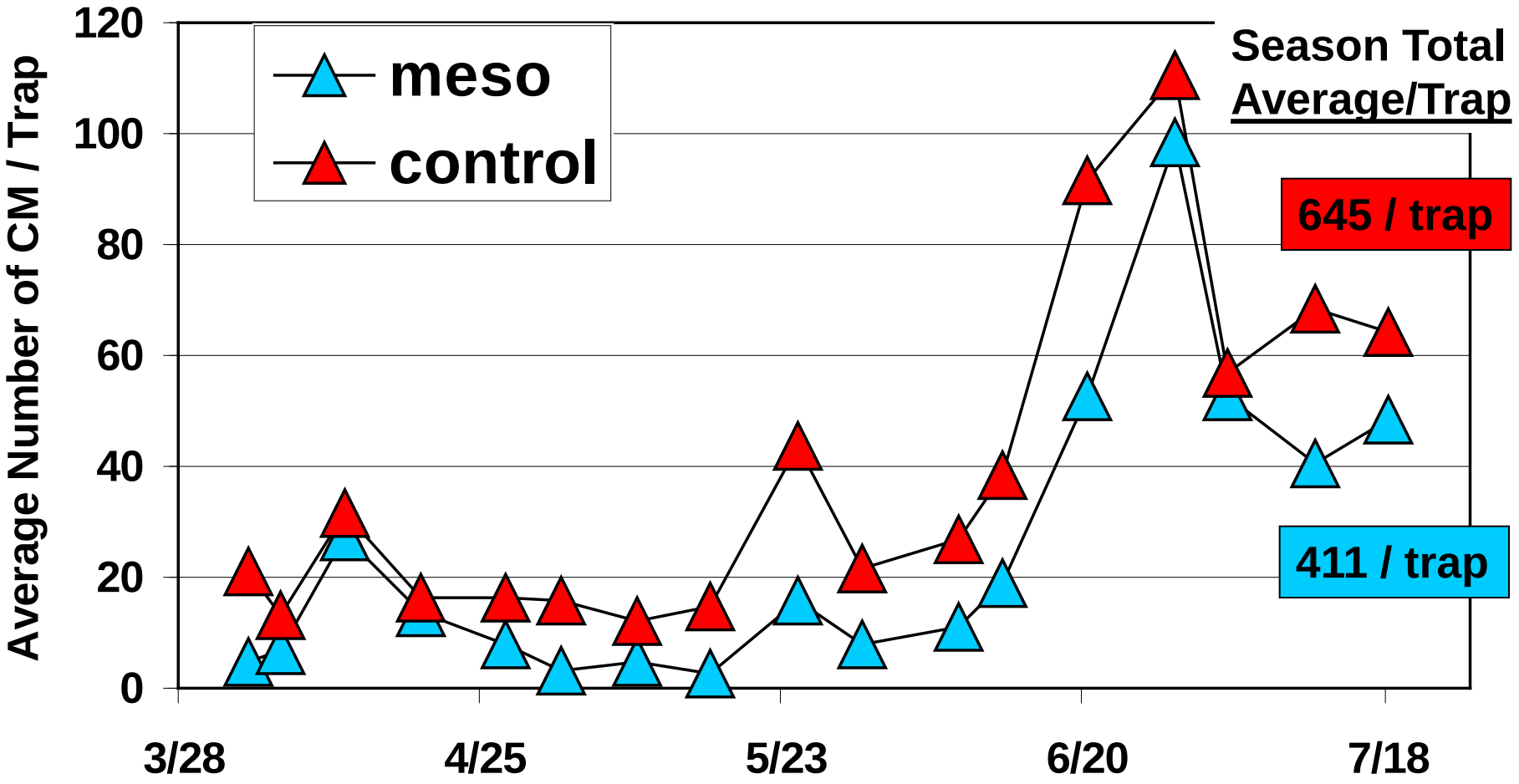


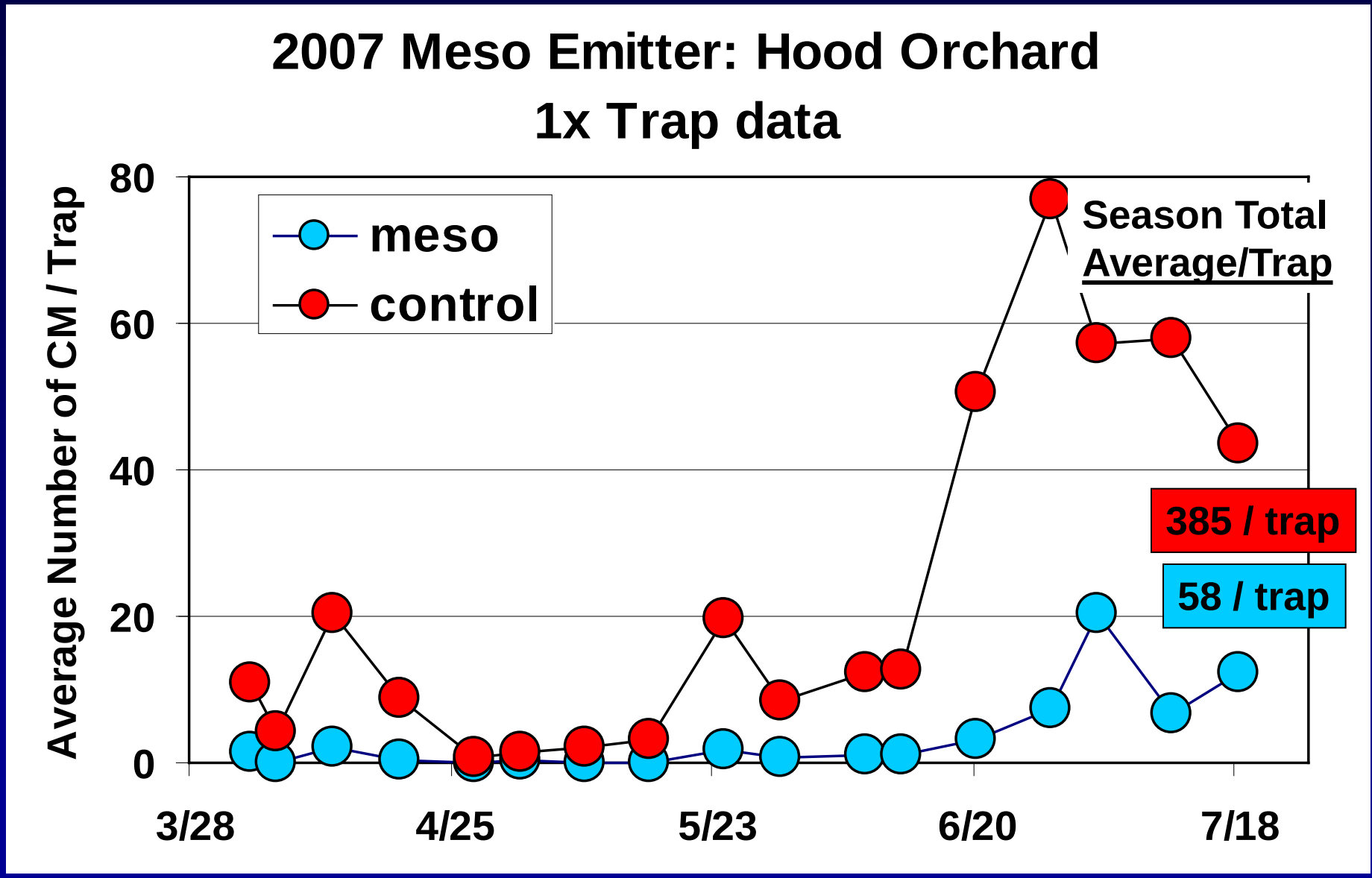
- Limited trap suppression likely in control plots based on higher observed 10X trap counts
- 1X lures suppressed ca. 100% in meso treated plots



All plots experienced high damage levels given high pressure and late applications (Checkmate, Meso plots, and control)

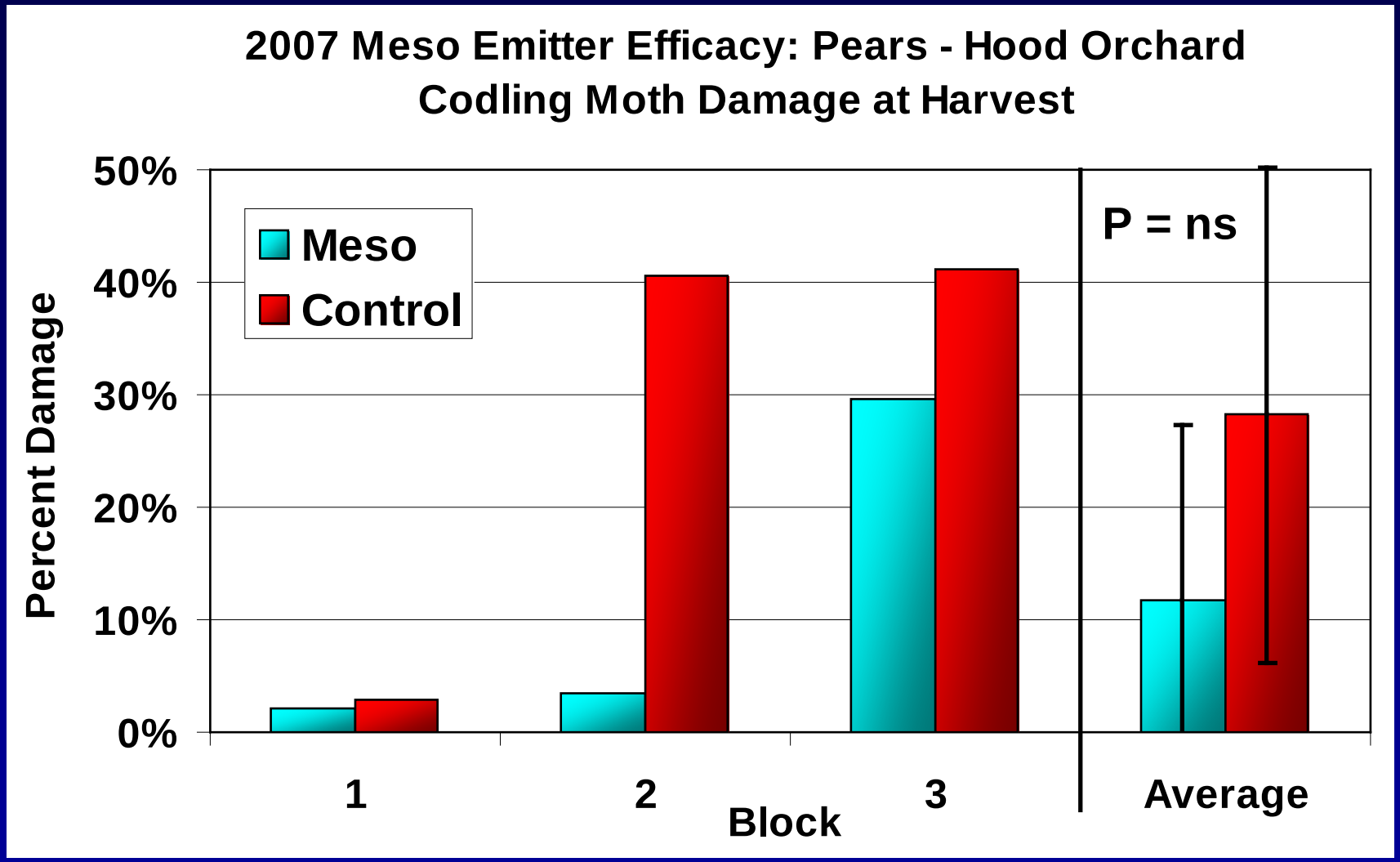
2007 Meso Emitter: Pears - Hood Orchard
10x Trap data





Trap counts in 1X lures were not well suppressed in meso treated plots – damage was expected

Harvest Damage in Hood Orchard

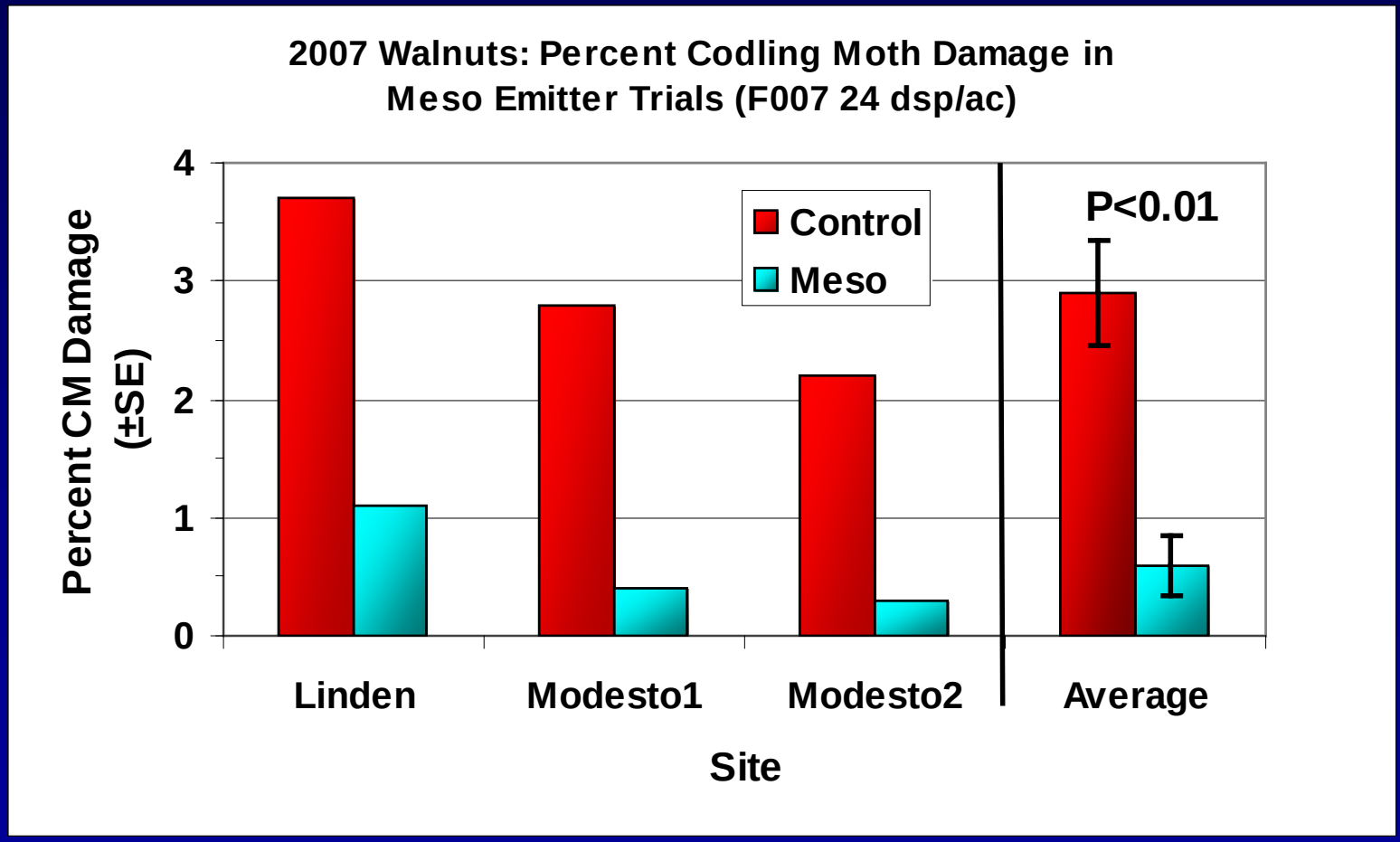


High inter-plot variation observed; Aging trial may have influenced block 1

Standardized Meso Efficacy **Trial**

- Standardized Meso Treatments
  - fixed number: 24 dispensers / acre
  - fixed rate: Suterra F007 emitter
  - 3 treatment replicates across 2 orchards
  - 2 controls across orchards
  - 5 acre plots

Codling Moth Harvest Damage
Standardized Meso Plots

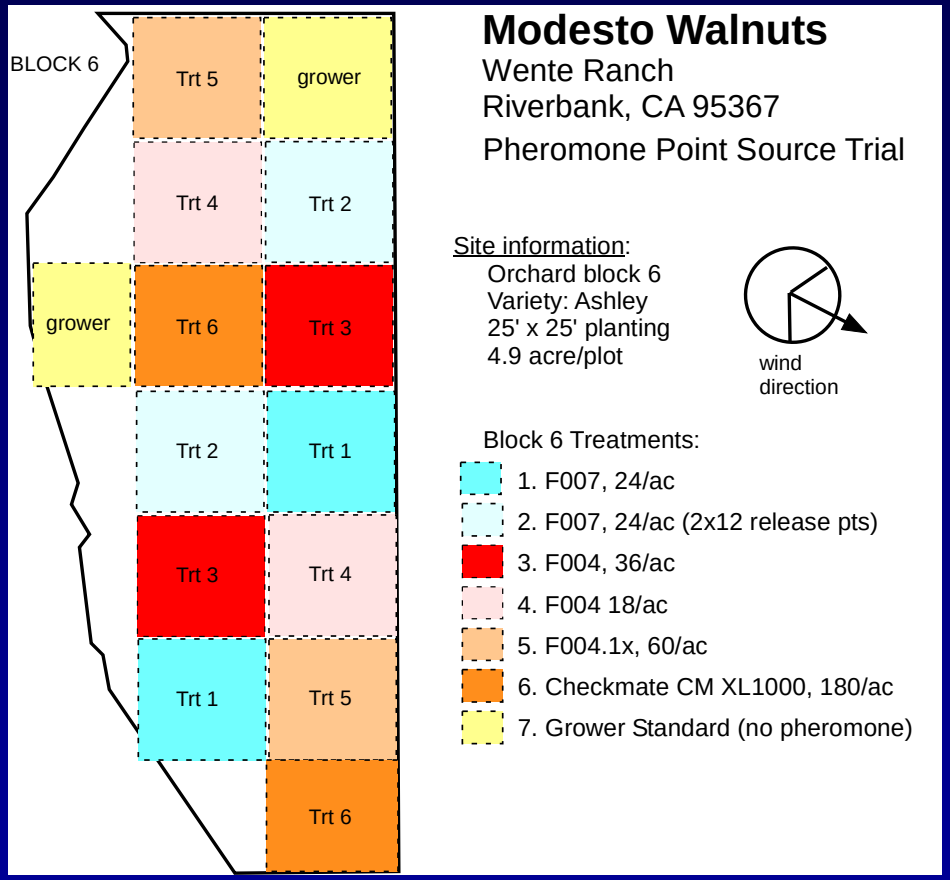


Summary: Standardized Meso Efficacy

- In walnuts with low to moderate pressure
  - Good suppression of 1x traps
  - Suppressed damage
- In pears with extreme codling moth pressure and late application
  - Mixed results for 1x trap suppression
  - Mixed results for damage suppression

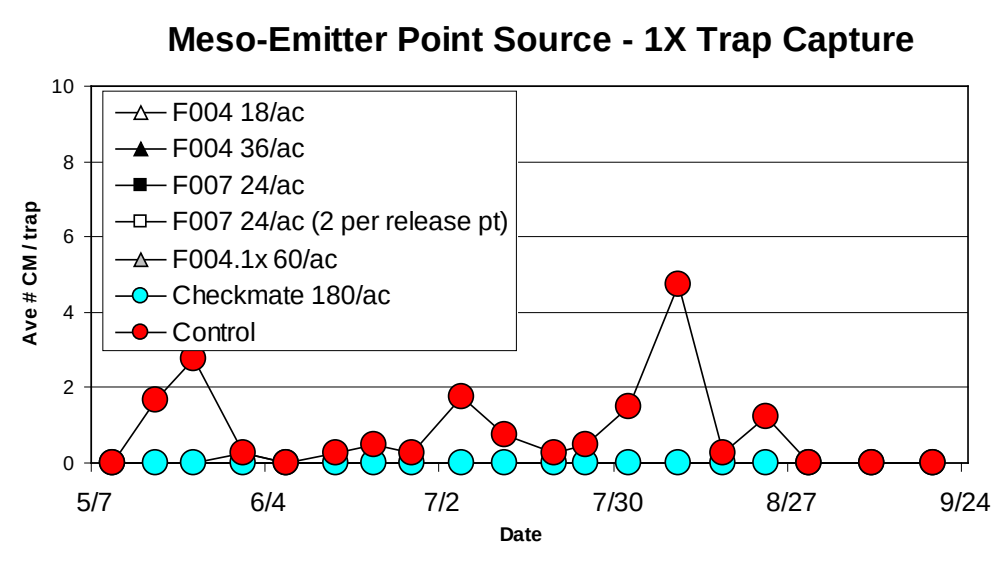
Point Source Effects - Walnuts

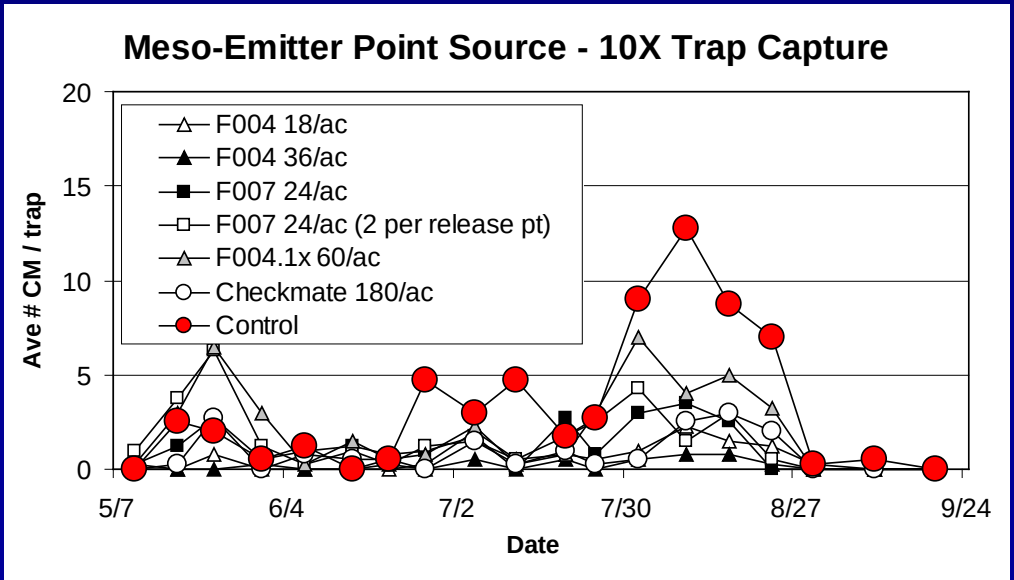
- 6 Treatments
  - target a single total emission rate per acre
  - vary number of dispensers per acre x vary release rate per dispenser
- 2 replicates all treatments including grower standard
- 5 acre plots
- **ALL** plots received grower insecticide treatments (3-spray program)



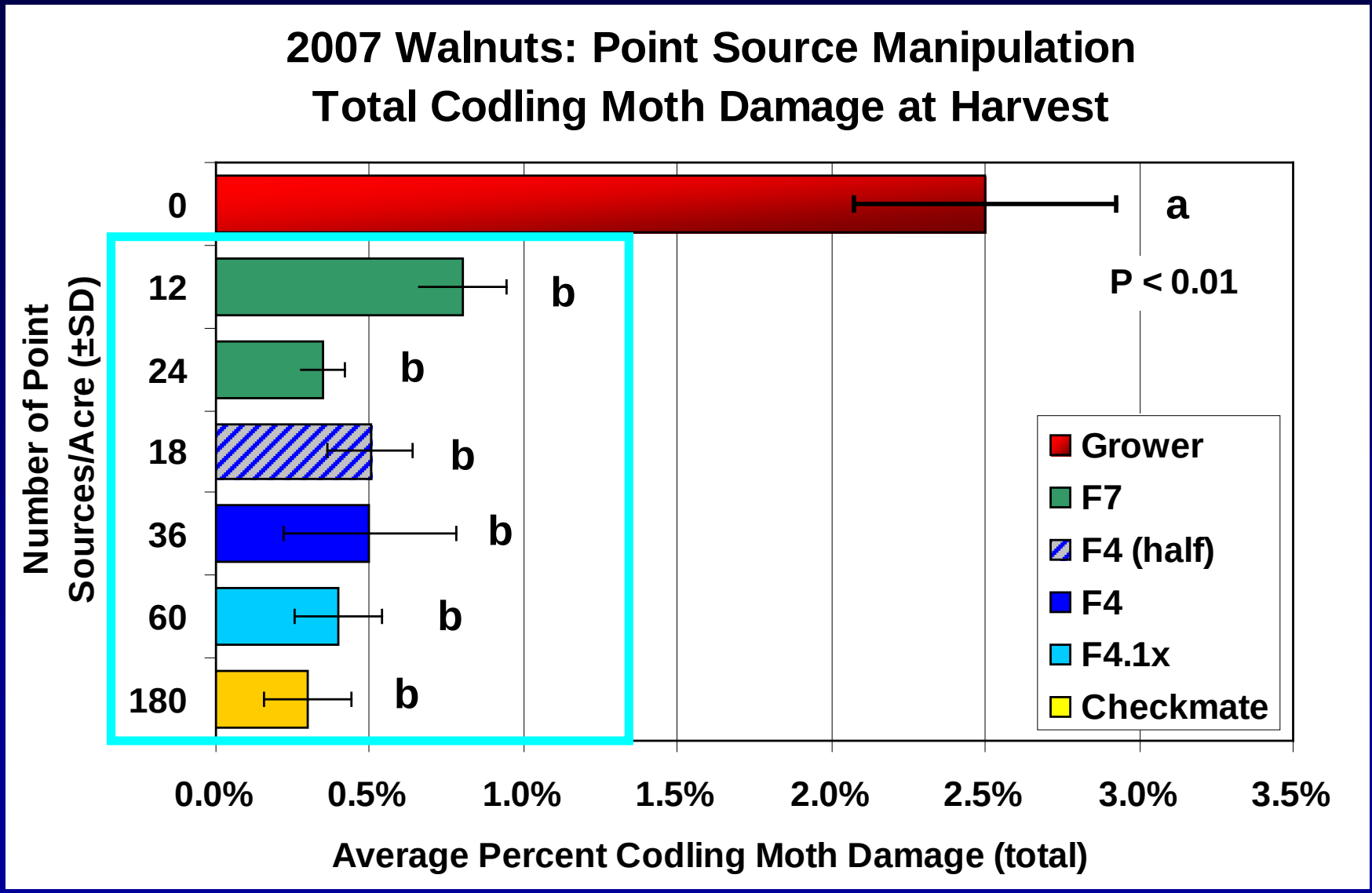
Seasonal Flight Curves (1X and 10 Lures)

- All treatments suppressed 1X lures functionally 100%
- 10X lures indicated relative low counts;
  - peak at ca. 13 moths per week





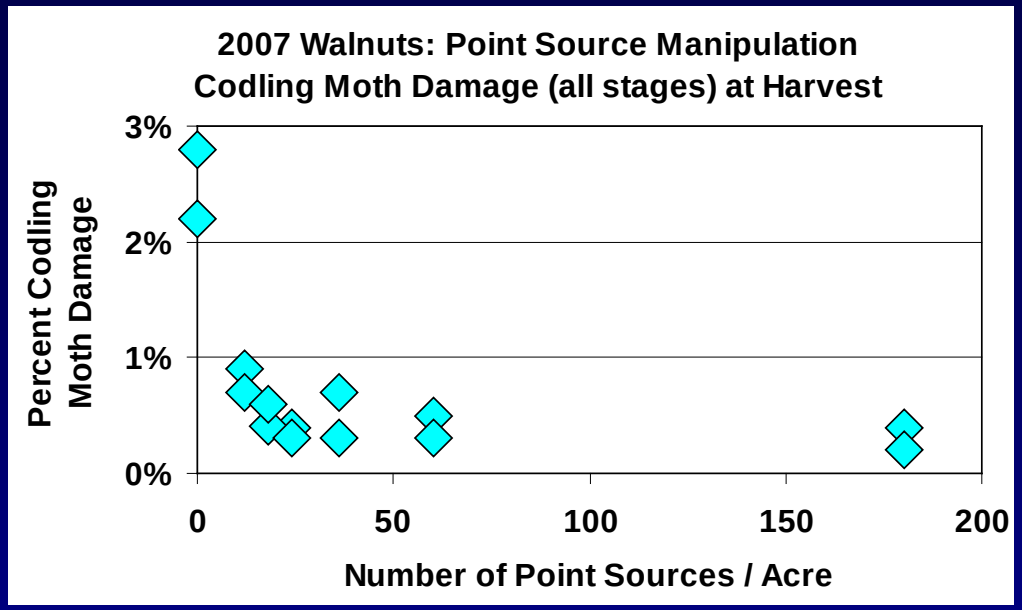
Codling Moth Damage at Harvest

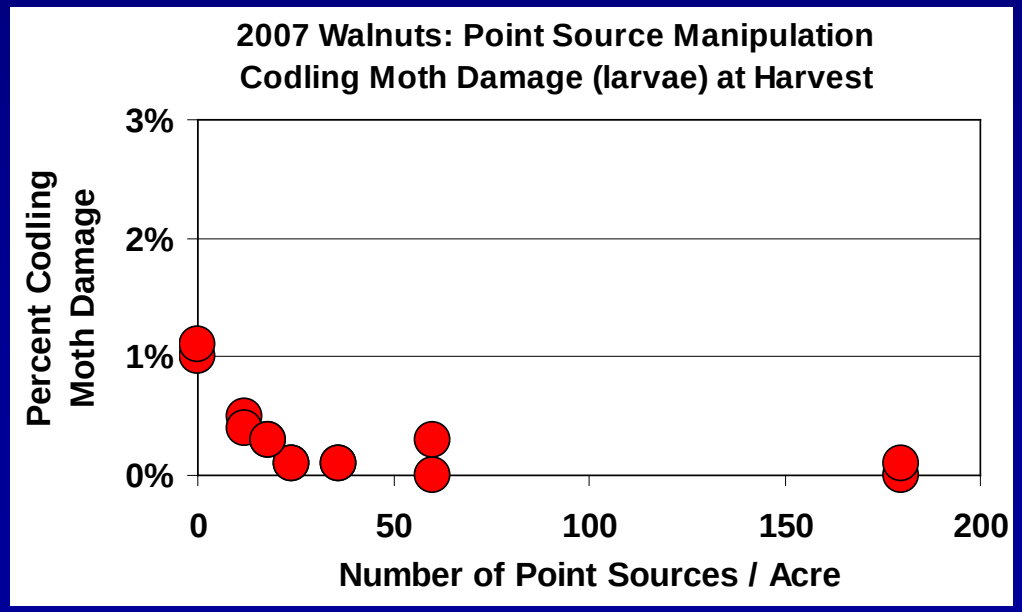


All treatments statistically different from grower standard, yet not from each other

Codling Moth Damage at Harvest

- Effect of number of point sources on codling moth damage
- At 12 dispensers per acre, slightly higher damage levels, but not statistically significant
- All treatments provided suppression levels statistically comparable to Checkmate dispensers (pheromone standard)





Summary: Effect of Point Source Number

- No loss of efficacy was associated with reducing the number of point sources per acre up to 90% reduction
- All meso-emitter treatments with 18 or more point sources / acre improved control of codling moth equal to pheromone standard (Checkmate CM XL1000)

2008 Objectives

- Field test “meso dispenser” developed in 2007 for control of codling moth damage
  - Contrast meso-emitter program with standard hand-applied pheromone program
  - Target 6-8 sites
  - Treat 5-acre plots at 18 dispensers/acre
  - Monitor codling moth activity and treatment impact
    - Trap suppression and codling moth flight
    - Damage at 1st generation and harvest