

- I. Optimizing Pheromone Release Rates of Aerosol Emitters to Manage Codling Moth in Walnuts**

- II. Field Efficacy Trials of a 50% Aerosol Rate for Codling Moth Control**

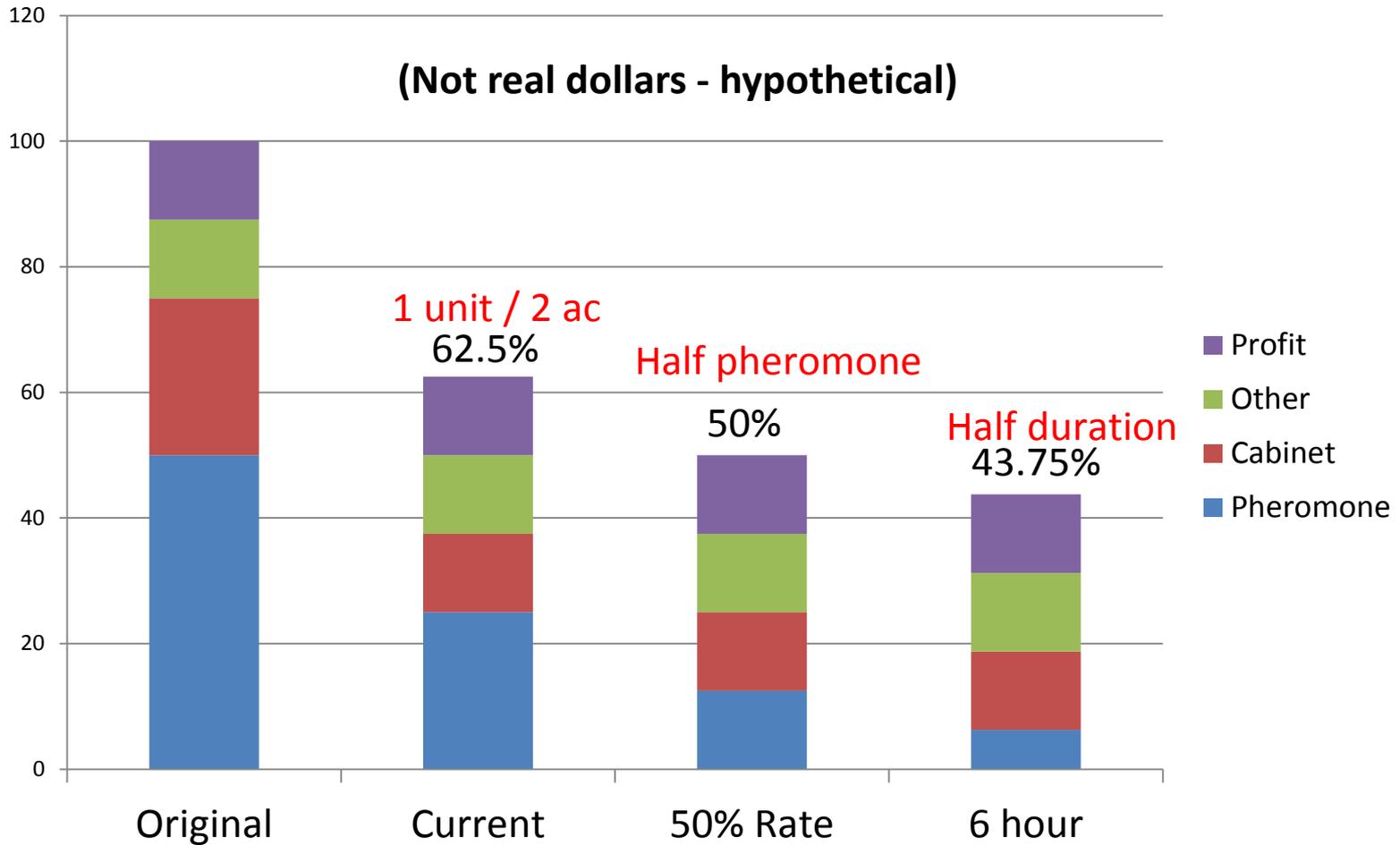
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Sara Goldman-Smith, Jeannine Groh
UCCE

Reducing Costs of MD in Walnuts

- Reduced number of units per acre (1 per 2 acres) – based on plume studies
- Studies to reduce pheromone concentration per puff ('08-11)
 - Reductions up to 50% appear possible based on plume studies and field shut down, but efficacy trials underway
- Fixed cost of emitters becoming increasing proportion of materials cost

Changes in Walnut MD



2012 Projects:

- **Reducing Costs**

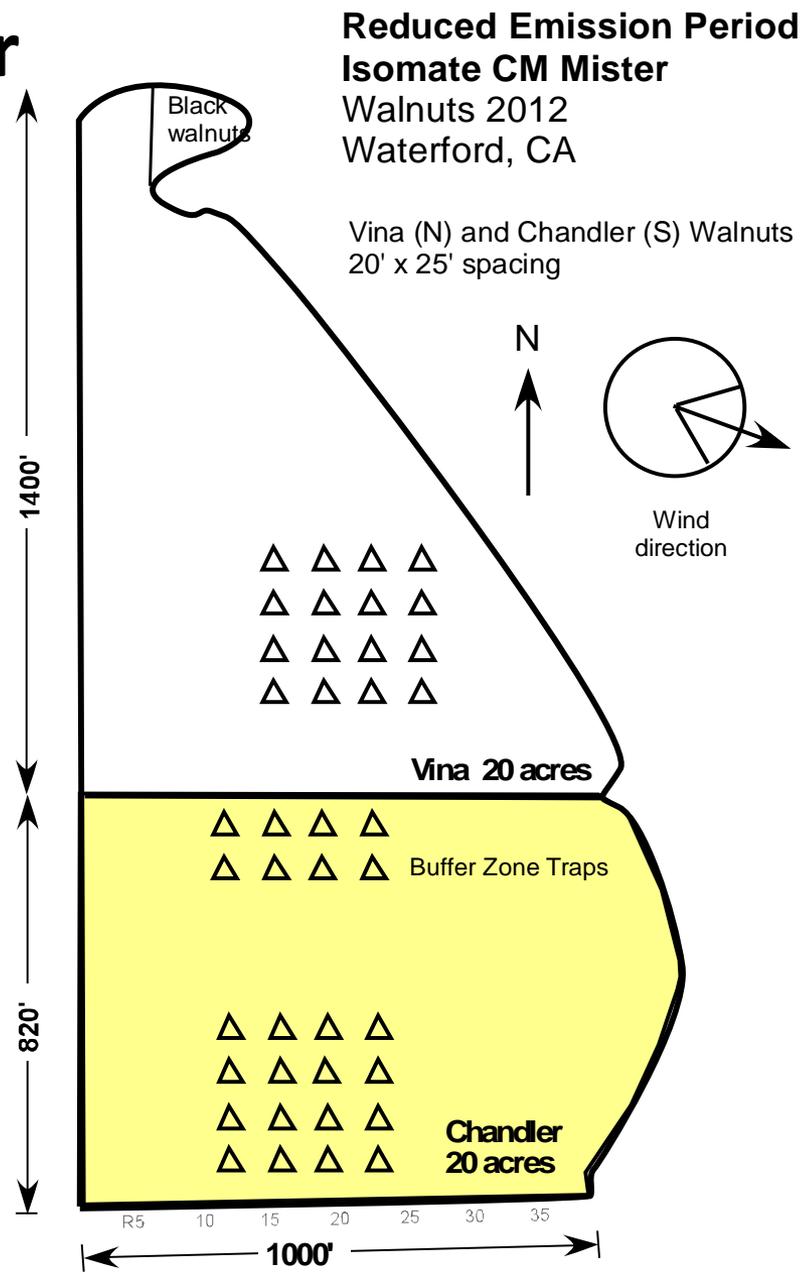
- Examine impact of reduced nightly emission period from aerosol emitters on trap capture
- Evaluate field efficacy of 50% ai can load for suppressing CM damage in walnuts

- **Improving Performance**

- Observe interaction of “puff” concentration and pulse frequency on pheromone plume

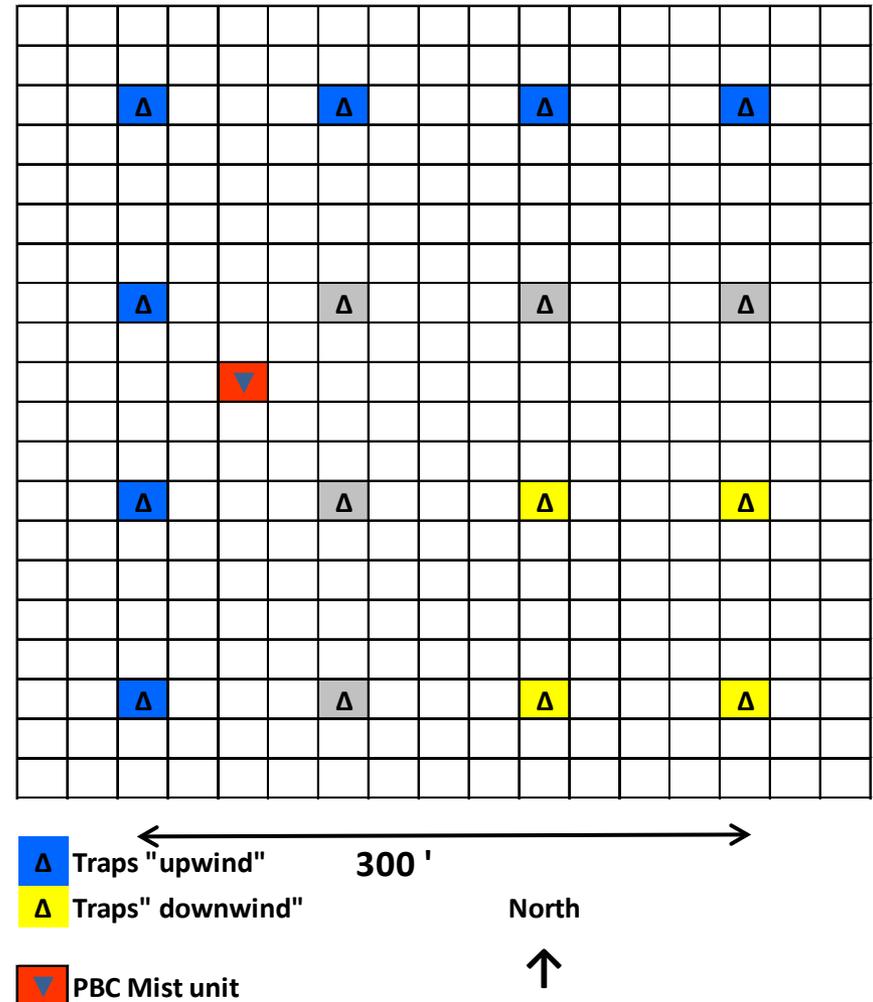
Impact of reduced emission time – Pacific Biocontrol Mister

- Treatments:
 - **12 hours** “ON”, 5 pm - 5 am
 - **7 hours** “ON”, 5 pm - 12 am
 - **0 hours**, Mister removed
- Site:
 - 40 acre hilltop walnut orchard
 - Varieties: Vina, Chandler
 - High CM pressure

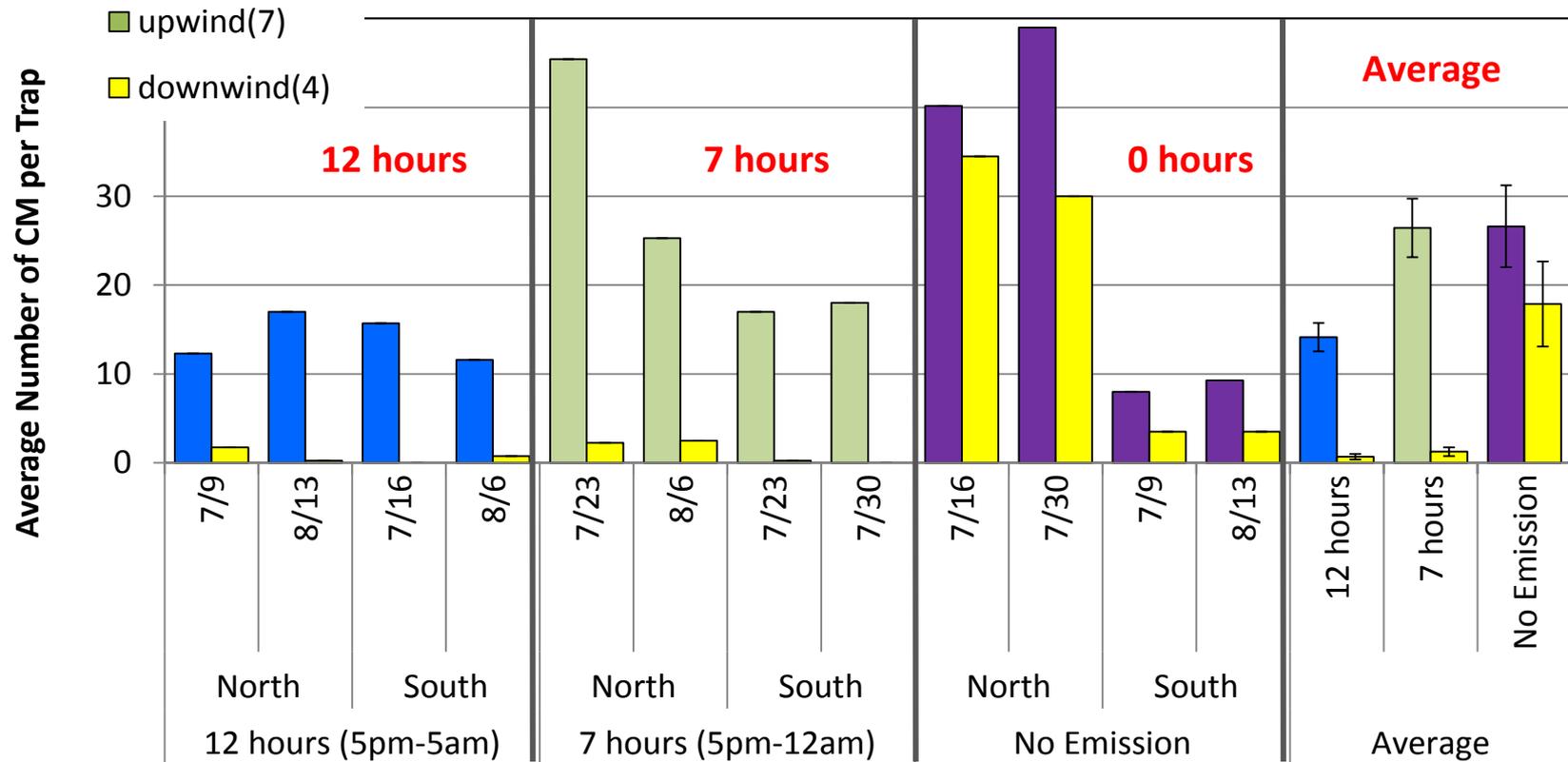


Impact of reduced emission time – Pacific Biocontrol Mister

- Design:
 - Two 16-trap grids
 - 100 feet between traps
 - 1x Biolure bait
 - traps high (15 feet)
 - Treatment periods 1 week
 - Wild population
 - Single Isomate Mister each plot, standard load
 - Compare trap capture of downwind vs upwind traps
 - RBD, 2 replicates / block, 4 replicates total

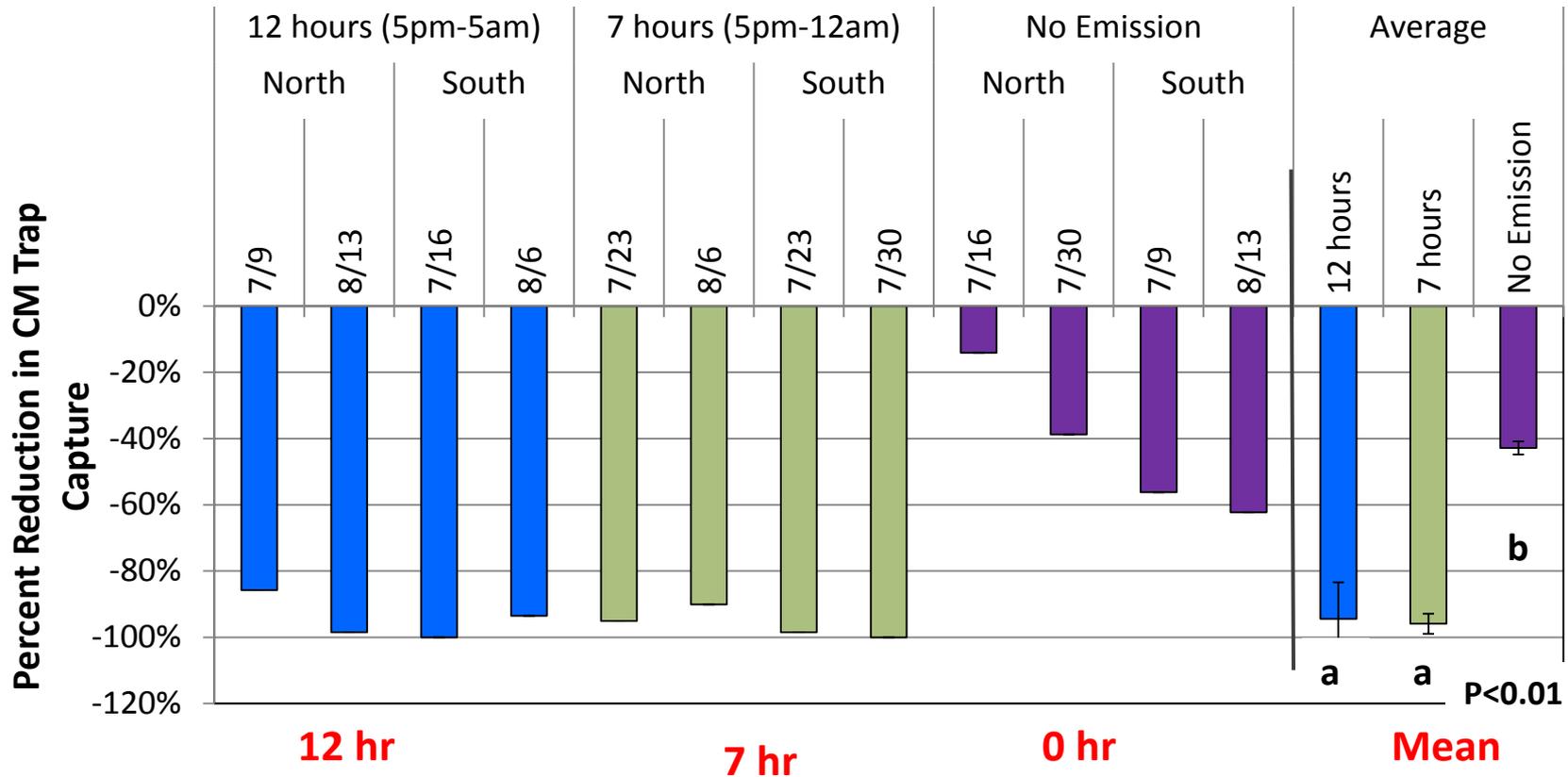


2012: 12, 7, or 0 hr Emission Periods for Aerosol Emitters Trap Capture in Downwind Traps vs Upwind Border Traps



- Trap capture variation
 - Cultivar differences
 - CM flight peak during trial period
- Upwind traps
 - Average 8 to 49 CM/trap
- Downwind trap captures (ave)
 - 12 hr treatment → 0 to 2 CM
 - 7 hr treatment → 0 to 2.5 CM
 - 0 hr treatment → 3.5 to 34 CM

2012: Percent Reduction of Average Trap Capture in Downwind Traps Compared to Border Traps when Exposed to 12, 7, or 0 hr Pheromone Emission Periods

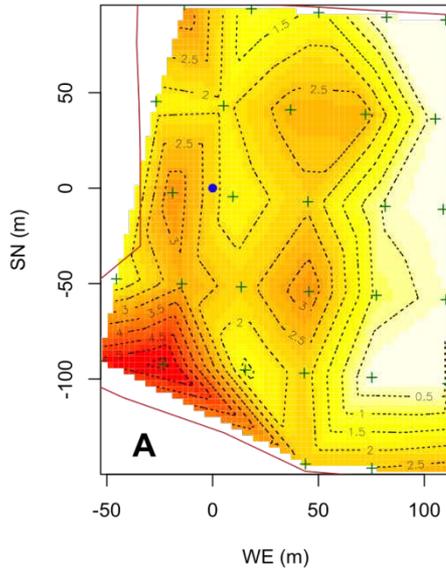


- **NO difference** 7 hr vs 12 hr emission
 - 12 hr treatment → 85 – 100%
 - 7 hr treatment → 90 – 100%
 - 0 hr treatment → 14 – 62%

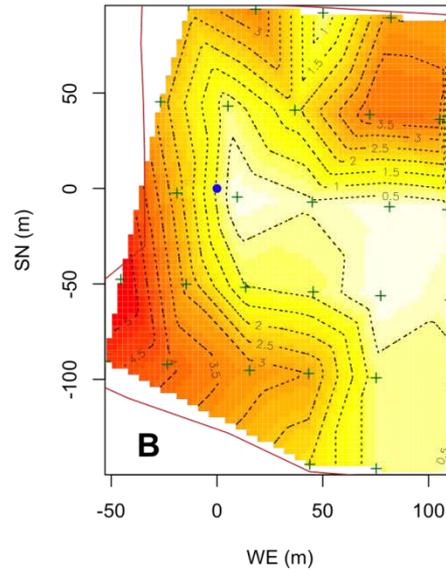
- Suppression less than expected in pheromone treatments
 - Hilltop location with wind variation
- 0-hour treatments with downwind suppression
 - no clearance period between treatments

Rate Effects on Plume Size and Shape on Wild CM Males

1%



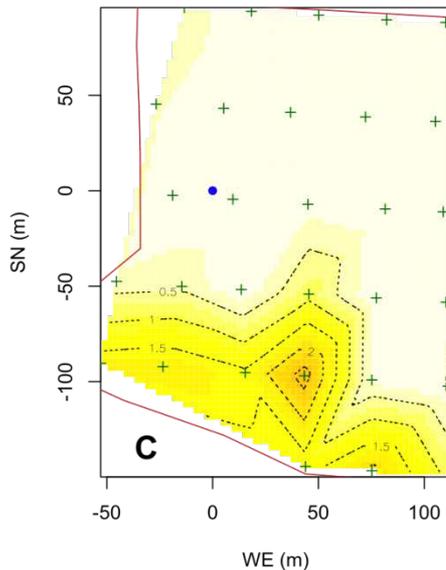
10%



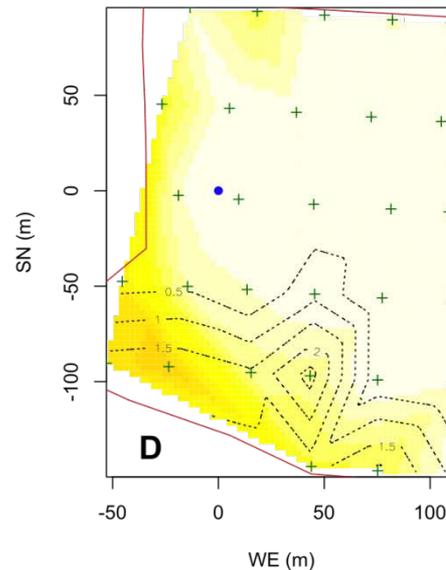
No clear plume
observed with 1%
ai per puff

Smaller, more
narrow plume
with 10% ai per
puff

50%



100%



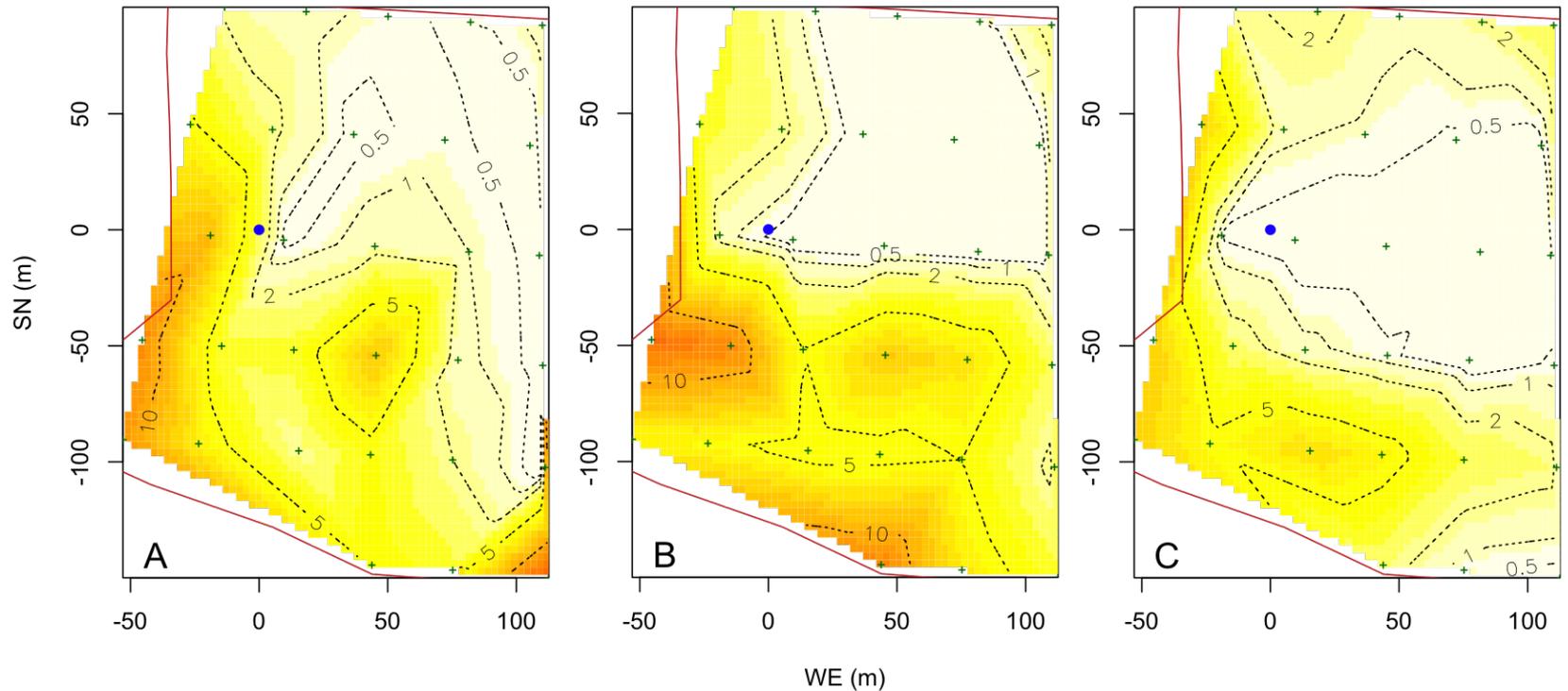
50% and 100%
rates with roughly
similar plume size
and shapes

Effects of Rates on Sterile CM Males in Walnuts

1%

10%

50%



Relatively small plume with 1% ai per puff with little clear distinction between 10 and 50% plume

Summary :

Interaction of concentration and pulse frequency on pheromone plume

- No clear impact of different load-frequency emission strategies
- No clear impact of changing pulse frequency for low concentration emission
- Detailed analysis difficult due to many uncontrolled variables
 - Wind speed/direction, temperature, canopy structure, planting pattern
 - Possible trouble with one of the puffer units

Reduced rate aerosol applications – Large plot efficacy trials using 50% of standard ai concentration



- Product:
 - Checkmate Puffer (*Suterra*)
 - Isomate Mister (*Pacific Biocontrol*)
- Sites: 8 total
 - 4 replicates (orchards) per product
- Collaborative research:
 - Welter lab
 - Joe Grant
 - Carolyn Pickel/
Sara Goldman-Smith

Methods: Reduced rate aerosol applications

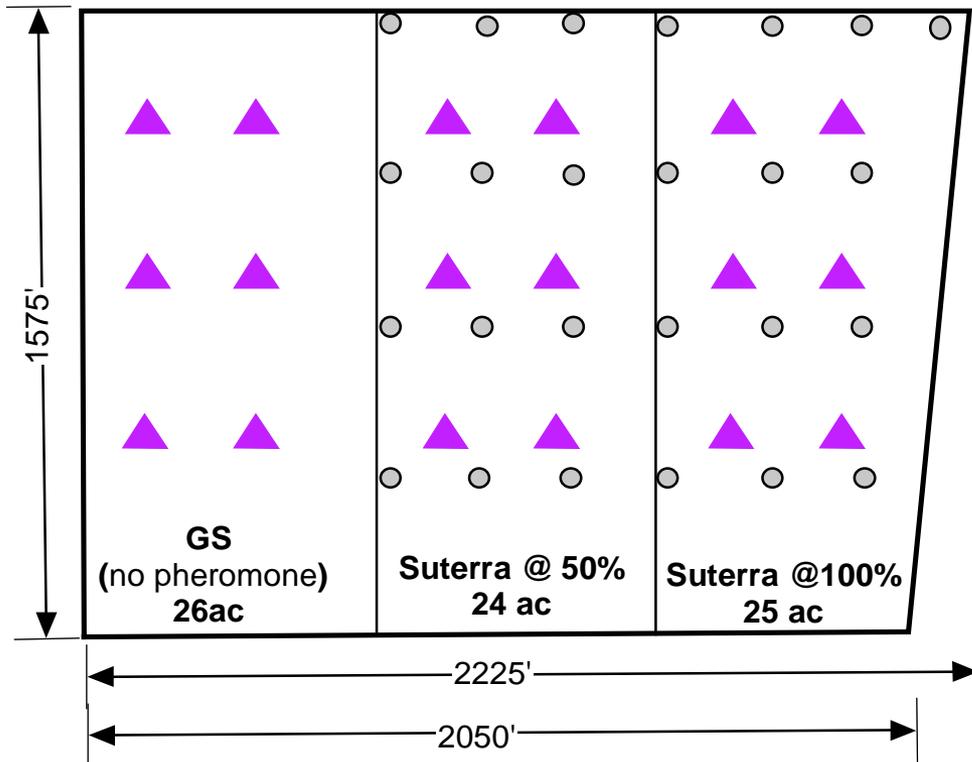
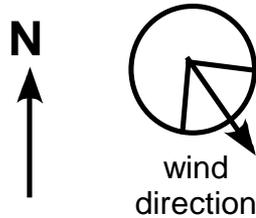
Plot Example

50%/100% Suterra Puffer Efficacy Trial
Riverbank, CA

Site information:

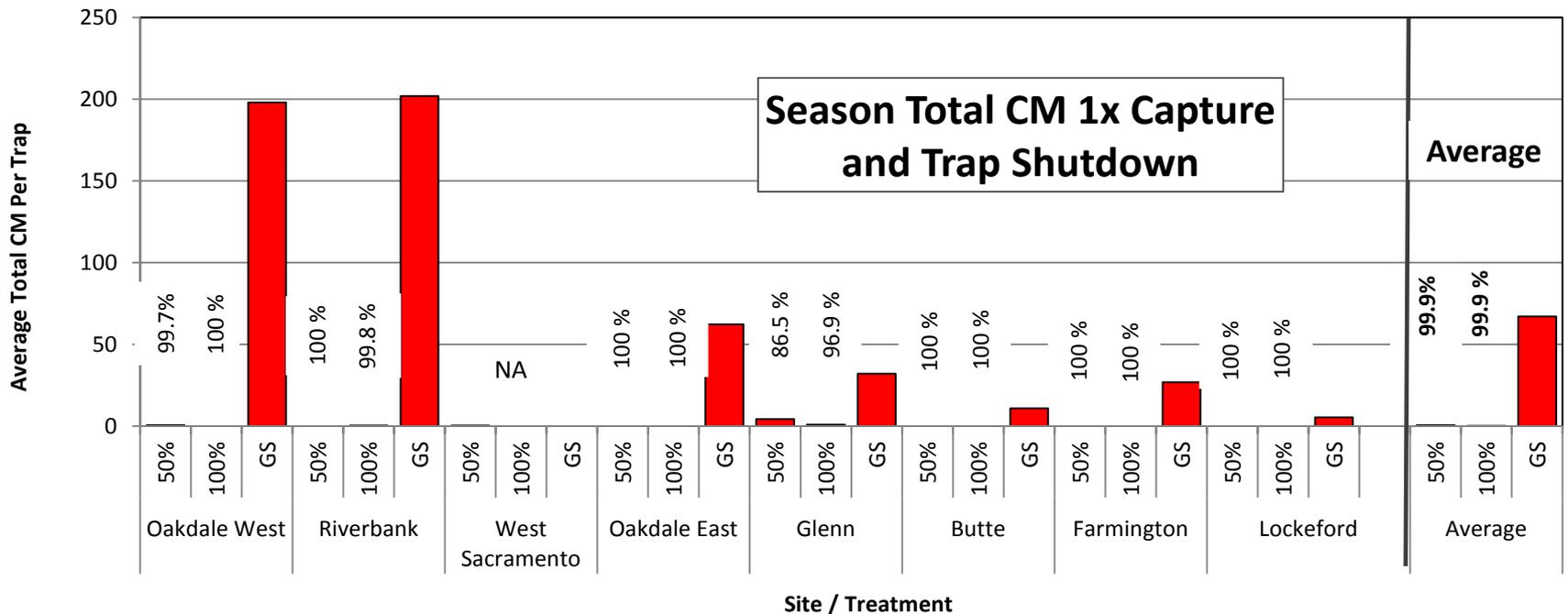
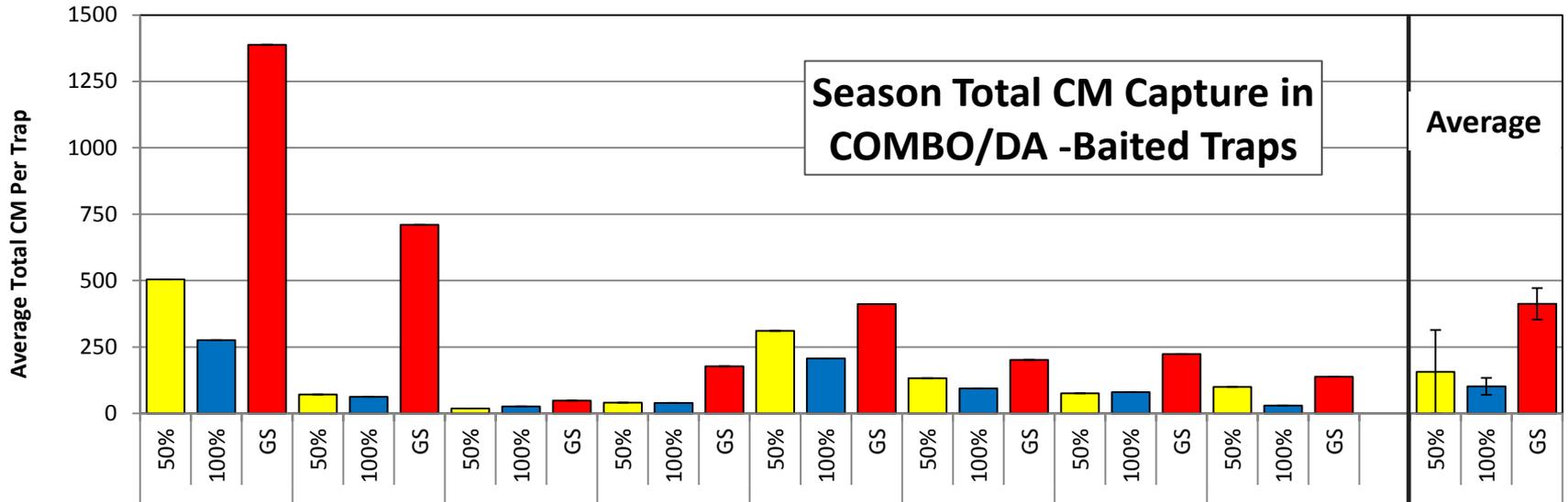
Variety: Ashley
Planted 1962
25' x 25'

○ Puffer
▲ Trap



- Treatments:
 - 50% rate
 - 100% rate (current % ai)
 - Grower Standard (no-pheromone)
 - All deployments at 1 unit / 2 acres
- Monitor
 - CM flight (combo lures)
 - 1x trap suppression
 - Canopy damage (July)
 - Harvest damage

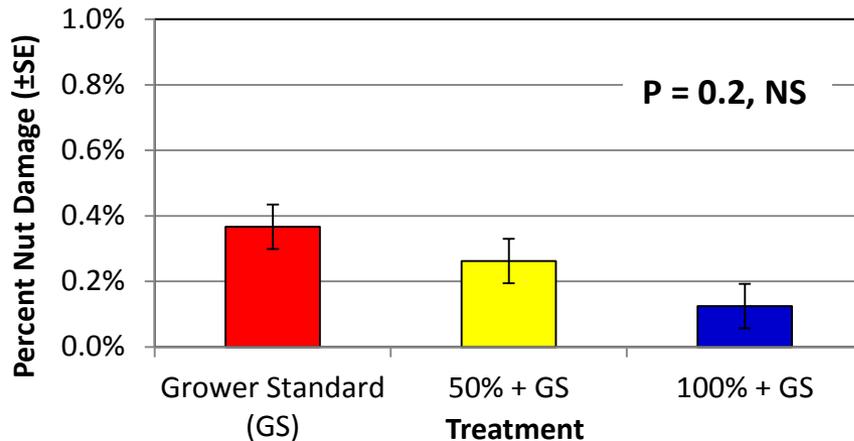
Efficacy Trials : Reduced Rate Aerosol Emitters



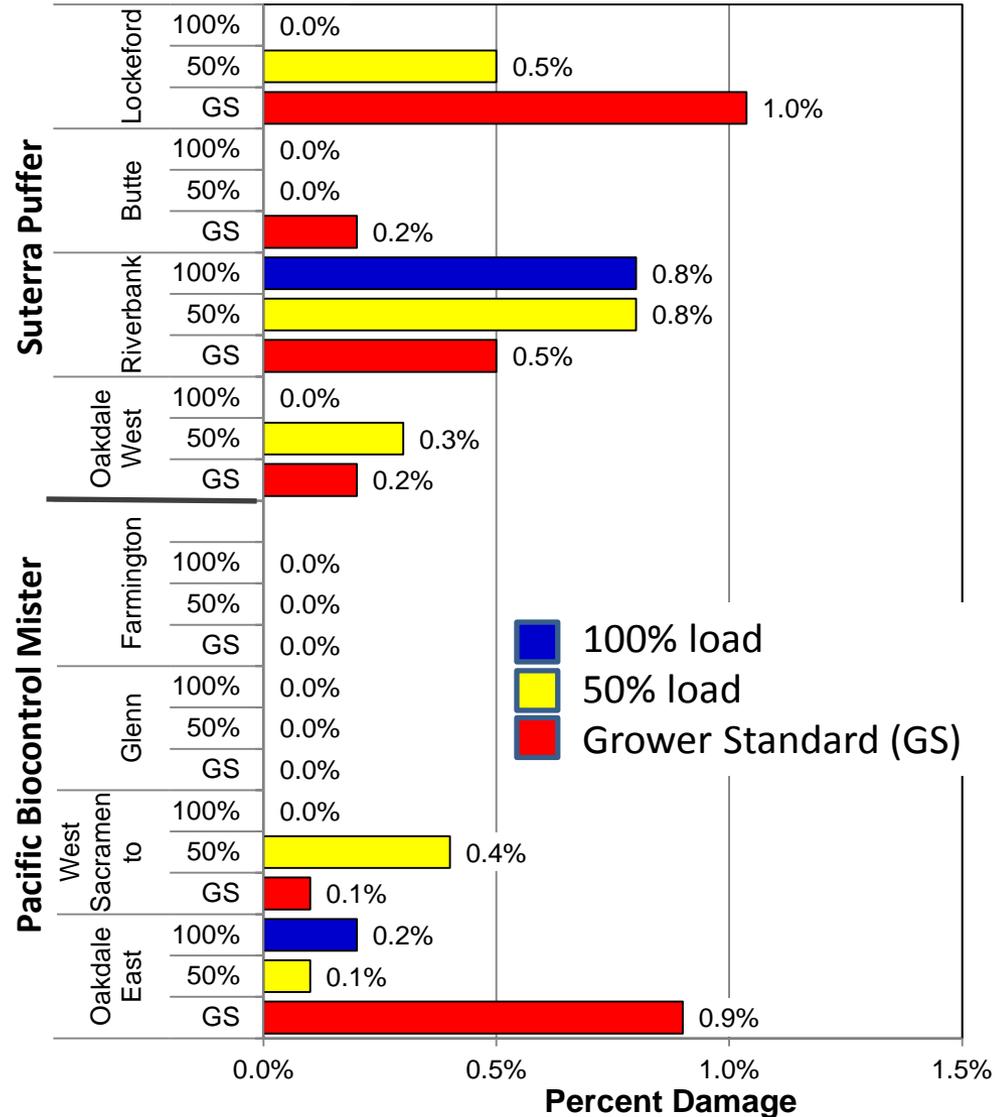
Reduced Rate Aerosol Emitters – Codling Moth Damage at Harvest

- Damage highly variable between sites
- Damage low all sites and all treatments
 - Only one GS > 1.0%
 - Two sites recorded no CM damage

Average Codling Moth Damage at Harvest (2012)



Codling Moth Damage All Sites (2012)



Summary

- Rate reductions with aerosol treatments may be achieved by more than one strategy
 - 50% rate trial (reduced ai concentration)
 - High 1x trap shutdown success
 - CM damage at harvest similar between both pheromone treatments though few sites with moderate GS pressure
 - 7-hour emission period trial (preliminary trial)
 - 1x trap shut down similar between standard (12 hour) and short night (7 hour) emission time
- Aerosol based MD products from multiple producers now available
 - Products appear to have similar impact / success

Concluding Statements

- Walnuts continue to have success with MD, but variation between plots suggest other confounding factors still exist (canopy volume, tree height, untreated varieties, less efficacious insecticide coverage)
- Opportunities exist for reducing the required total pheromone per acre
- Increased numbers of emitters per acre possible with decreased pheromone costs; perhaps to reduce program (plume) variation (e.g. 1 unit: 1-1.5 acres)

Thank you (‘86-2012)

- Pear Board / Pear Pest
 - Bob McClain / Jean Mari Peltier
- Extension
 - Chuck Ingel
 - Rachel Elkins
 - Bob Van Steenwyk
- Suterra – Tom Larsen
- Pacific Biocontrol – Don Thomson, Jack Jenkins,