

# Analysis of Codling Moth Mating Disruption Dispensers

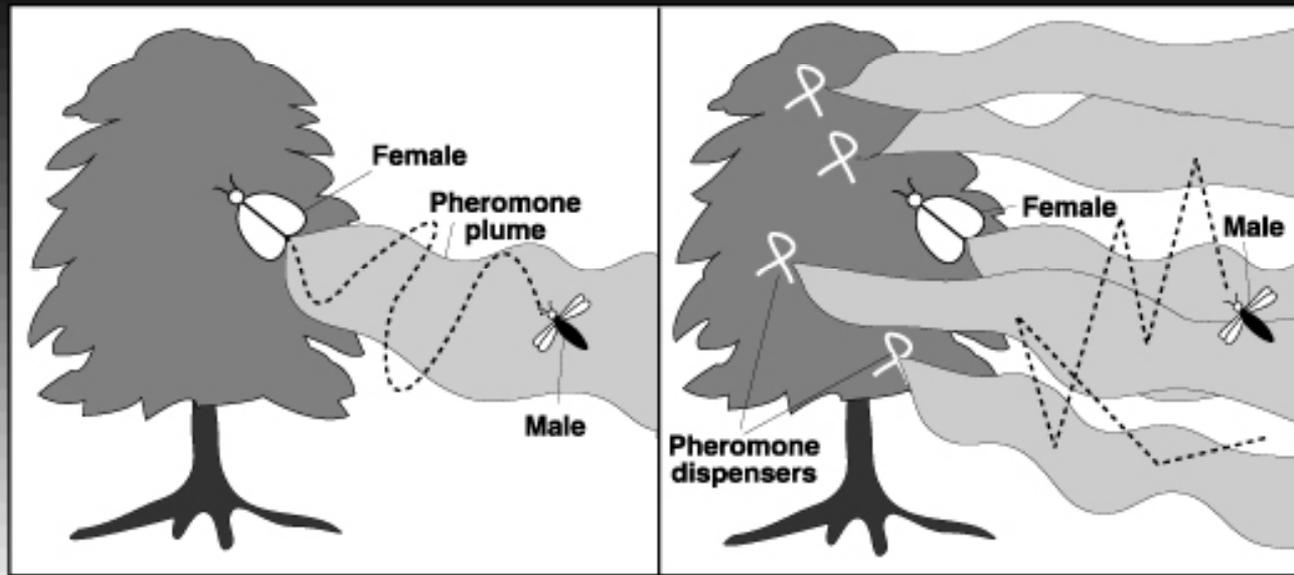
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Marion Murray

USHA Annual Convention 2010

Goal: determine whether the popular mating disruption products on the market are lasting season-long in Utah

## Mating Disruption



**A**

Normal mate location, where the female releases pheromone and the male flies towards the source.

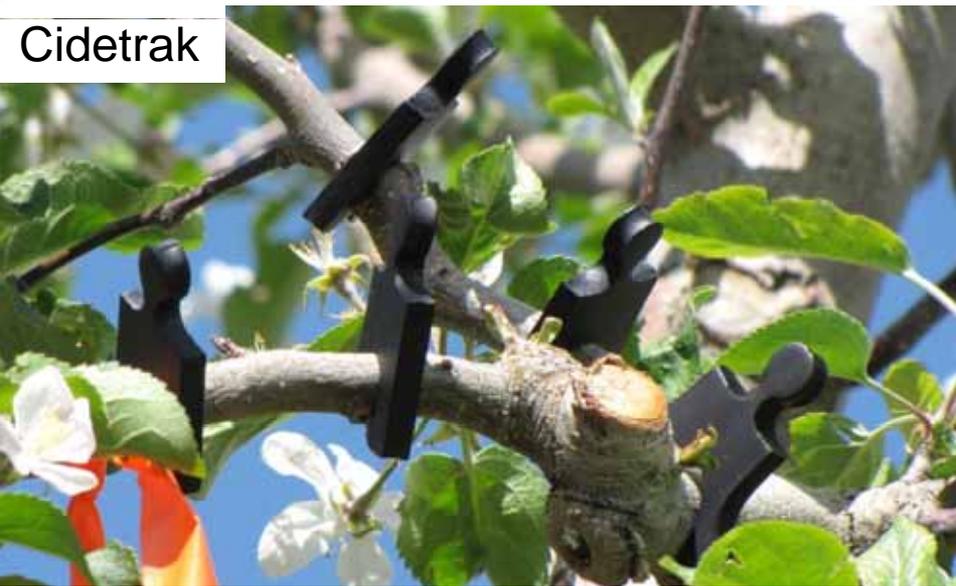
**B**

In mating disruption, pheromone is released from dispensers that act as false sources, or pheromone is released at such a high rate that the male is disoriented or unable to detect the plume of the calling female.

# Potential Problems

- ◆ High temperatures and UV exposure contribute to:
  - conversion of codlemone pheromone to other chemicals (isomerization)
  - weathering (degradation) of membrane material
- ◆ Ideally, dispensers should release enough pheromone consistently over the codling moths' 2-3 generational life span (approximately 140-150 days) without pheromone depletion or dispenser degradation.

Cidetrak



Isomate-C plus



Checkmate



Isomate-CTT

Application rates and cost/acre of codling moth mating disruption dispensers used in this study.

Dispenser	Rate	Cost/ acre
Cidetrak CM	400/acre	\$110 (approx.)
Isomate-C plus	400/acre	\$100
Isomate-CTT	200/acre	\$100
Checkmate CM-XL	200/acre	\$110

# Methods

- ◆ Hung dispensers May 5 in a commercial 'Fuji' block in Payson, which sits at approximately 4800 feet
- ◆ Dispensers left for 140 days, and 6 dispensers of each brand were collected and sent to Michigan State University to determine pheromone content (residual analysis) and pheromone release rate (volatile trapping system) of each dispenser:

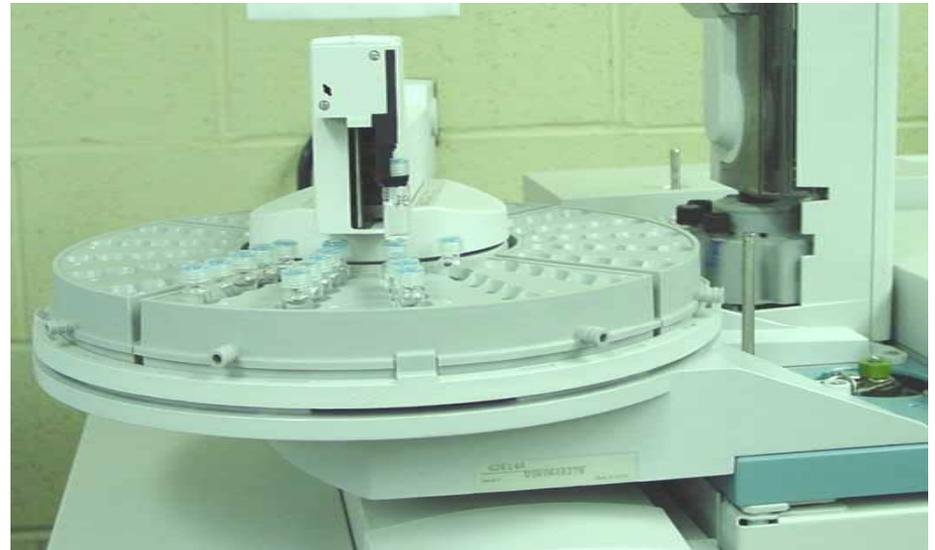
Date	Days after deployment	Number of dispensers tested	
		residual analysis	VTS
May 5	0	6	6
May 19	14	0	6
August 4	90	6	6
September 1	120	6	6
September 22	140	6	6

# Residual Analysis

- ◆ Conducted by Dr. Jim Miller's lab at Michigan State University
- ◆ Measures amount of pheromone remaining within the dispenser.
  - dispensers cut into pieces, soaked in acetone, filtered into a vial for gas chromatography

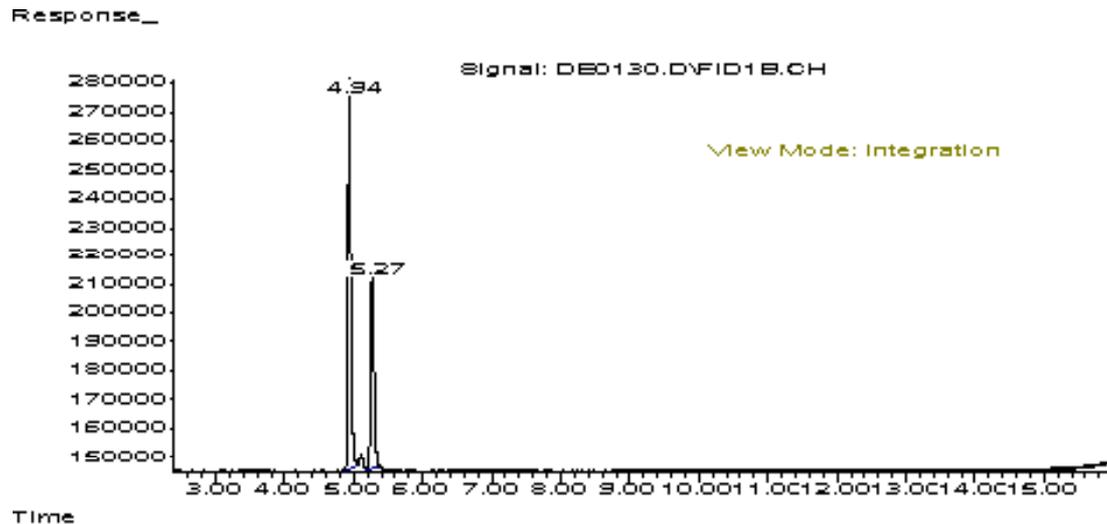
# Residual Analysis-GC

Gas chromatography separates and identifies compounds in a solution based on their size and chemical properties.



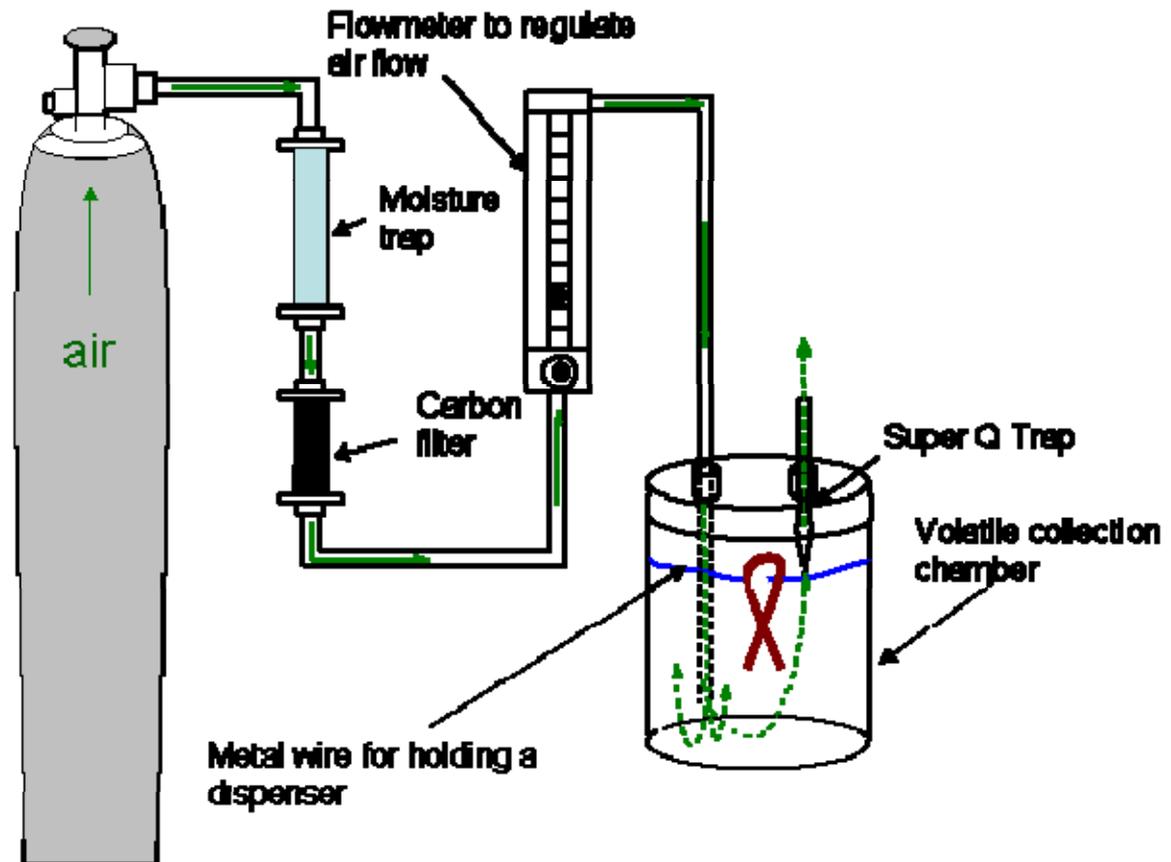
# Residual Analysis-GC

A chromatogram is generated, showing amount and time at which material was detected. By running standards, compounds can be identified and quantified.

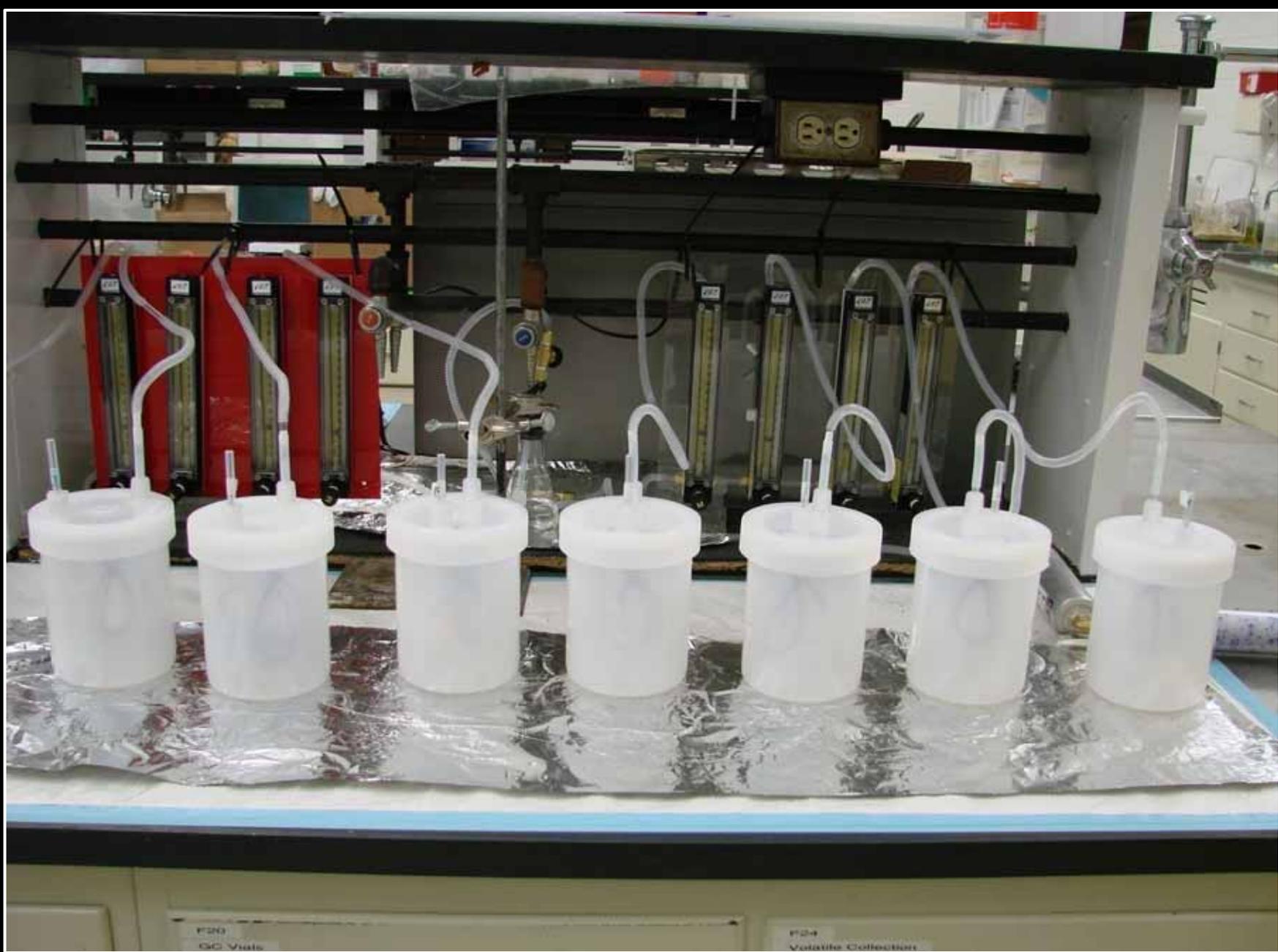


# Volatile Trapping System

- ◆ Conducted by Dr. Larry Gut's lab at MSU
- ◆ Measures release rate (per hour) of pheromone from dispensers



**Volatile Collection System**



F20  
GC Vials

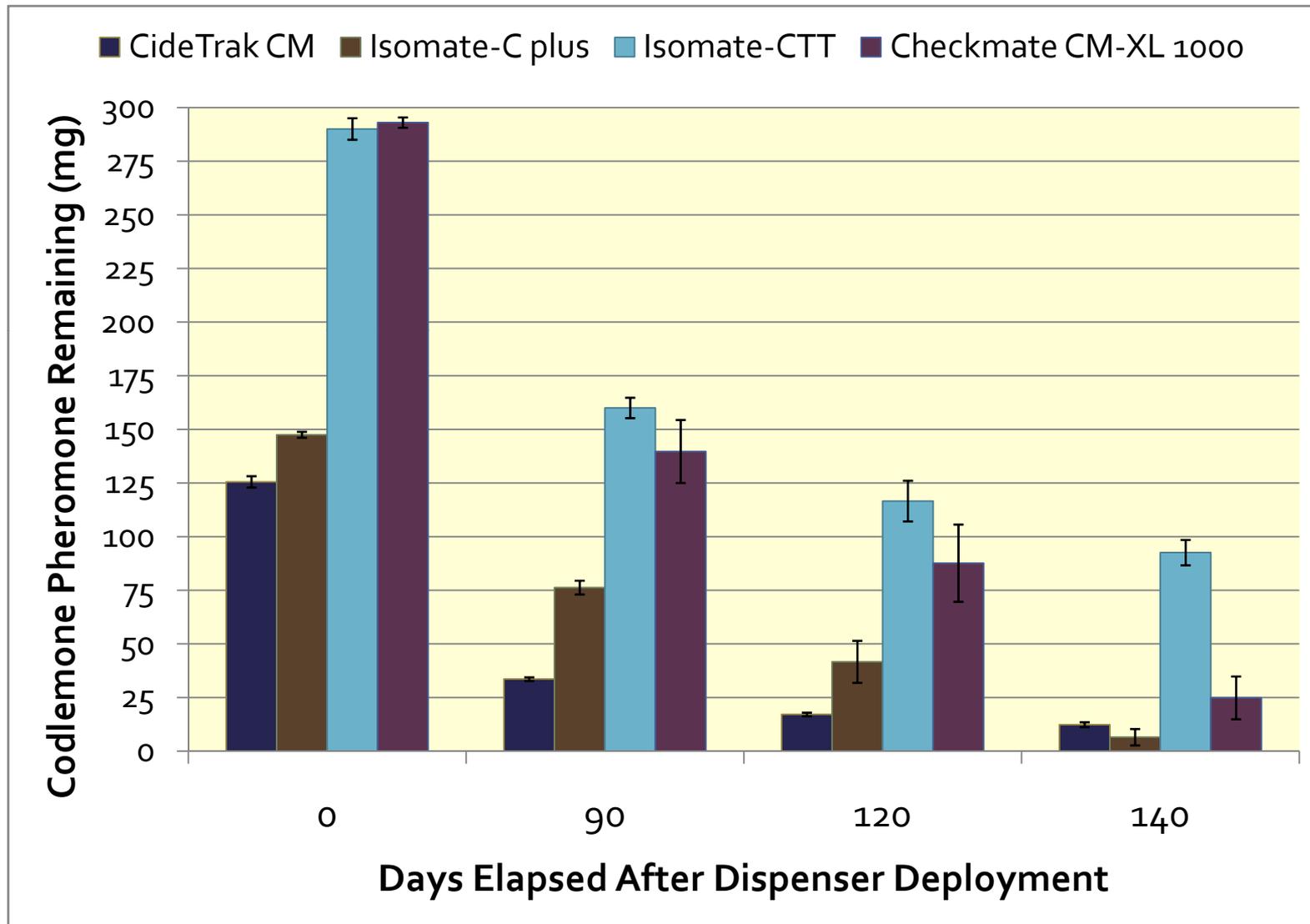
F24  
Volatile Collection

# Results – Residual Analysis

Amount of pheromone within each dispenser product at start and end of study.

Dispenser	Pheromone Day 0 (mg)	Pheromone Day 140 (mg)	Percent Remaining
Cidetrak CM	125	12	10
Isomate-C plus	147	6	4
Isomate-CTT	290	93	32
Checkmate CM-XL	293	25	9

# Results – Residual Analysis

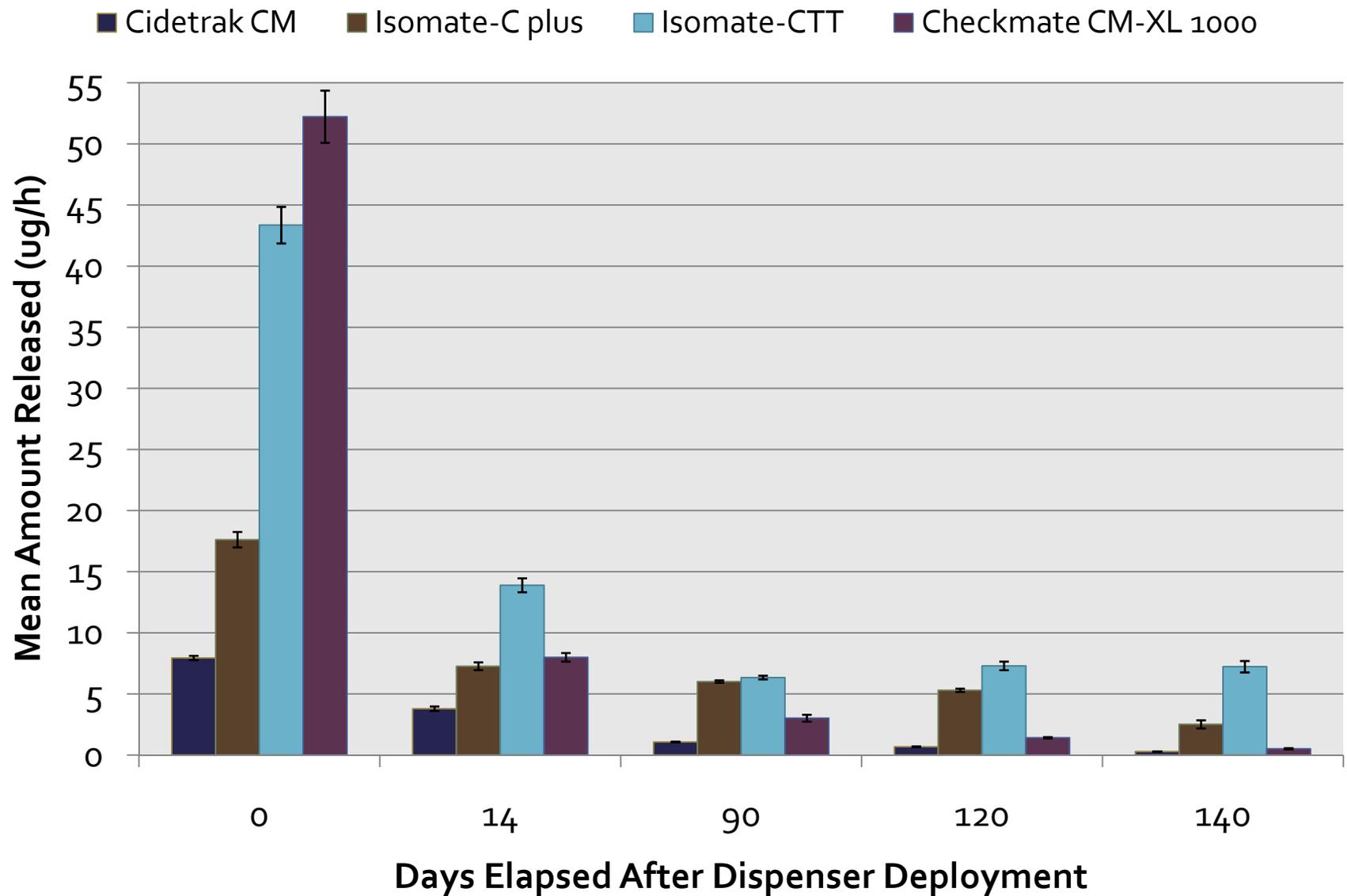


# Results – VTS

Average release rate of pheromone within each dispenser product at start and end of study.

Dispenser	Pheromone Day 0 (ug/hr)	Pheromone Day 14 (ug/hr)	Pheromone Day 140 (ug/hr)
Cidetrak CM	8.0	4.0	0.3
Isomate-C plus	17.5	7.0	2.5
Isomate-CTT	43.0	14.0	7.0
Checkmate CM-XL	52.0	8.00	0.5

# Results – VTS



# Results by product



## Cidetrak

- release rate was lowest among the 4
- average amount of codlemone with dispensers also lowest
- previous studies have shown good results with this product



## Isomate-C plus

- constant release rate through 1<sup>st</sup> and 2<sup>nd</sup> generations
- second highest in release rate after 140 days



## Isomate-CTT

- release rate 2x that of C plus, but became the same as C plus after 90 days
- by 140 days, release rate highest
- greatest amount of codlemone remaining



## Check-mate

- starts as the highest release rate, and ends near the lowest
- least efficient product—lost greatest amount of pheromone from dispensers, but lowest release rate

# Final Conclusions

- ◆ All products still releasing pheromone after 140 days in the field, and lowest release rates still 41 times greater than release of individual females.
- ◆ Isomate products released the most.
  - Because we have high pest pressure and weather can be hot, products that release the greatest amount of pheromone consistently will provide the best results.
- ◆ No matter which product is used, all orchardists should carefully monitor all treated blocks using pheromone traps and injury inspection, particularly toward the end of the season when release rates are at their lowest

# CM flex

- ◆ new product from Pacific Biocontrol
- ◆ 2011
- ◆ applied at 400/acre rate, but allows growers to set their own rate
- ◆ 50% faster to apply than Isomate-C plus, may save \$10/acre
- ◆ price of cm flex will be same as c-plus

# THANK YOU

- Utah State Horticultural Association
- Utah Dept. of Agriculture and Food