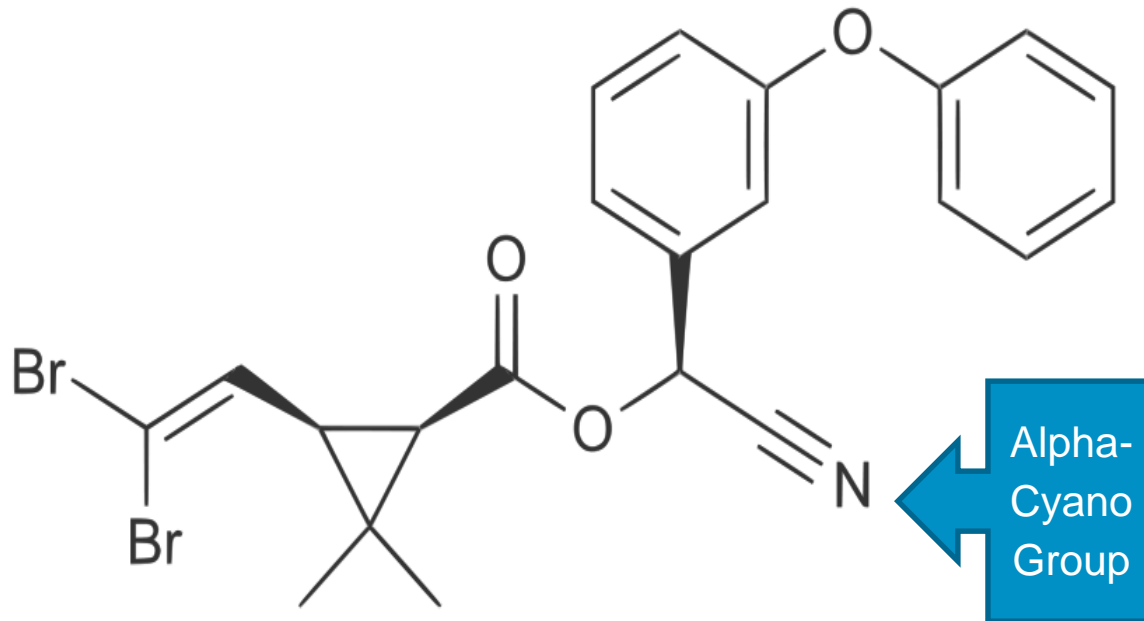




**DeltA Gard<sup>®</sup>**



# DeltA Gard®



Alpha-Cyano Group

- ❑ Active Ingredient = ***Deltamethrin***
- ❑ One signal molecule / no isomers
- ❑ Type II pyrethroid that induces “long-lasting” inhibition of the sodium channel activation gate



**DeltaGard<sup>®</sup>**



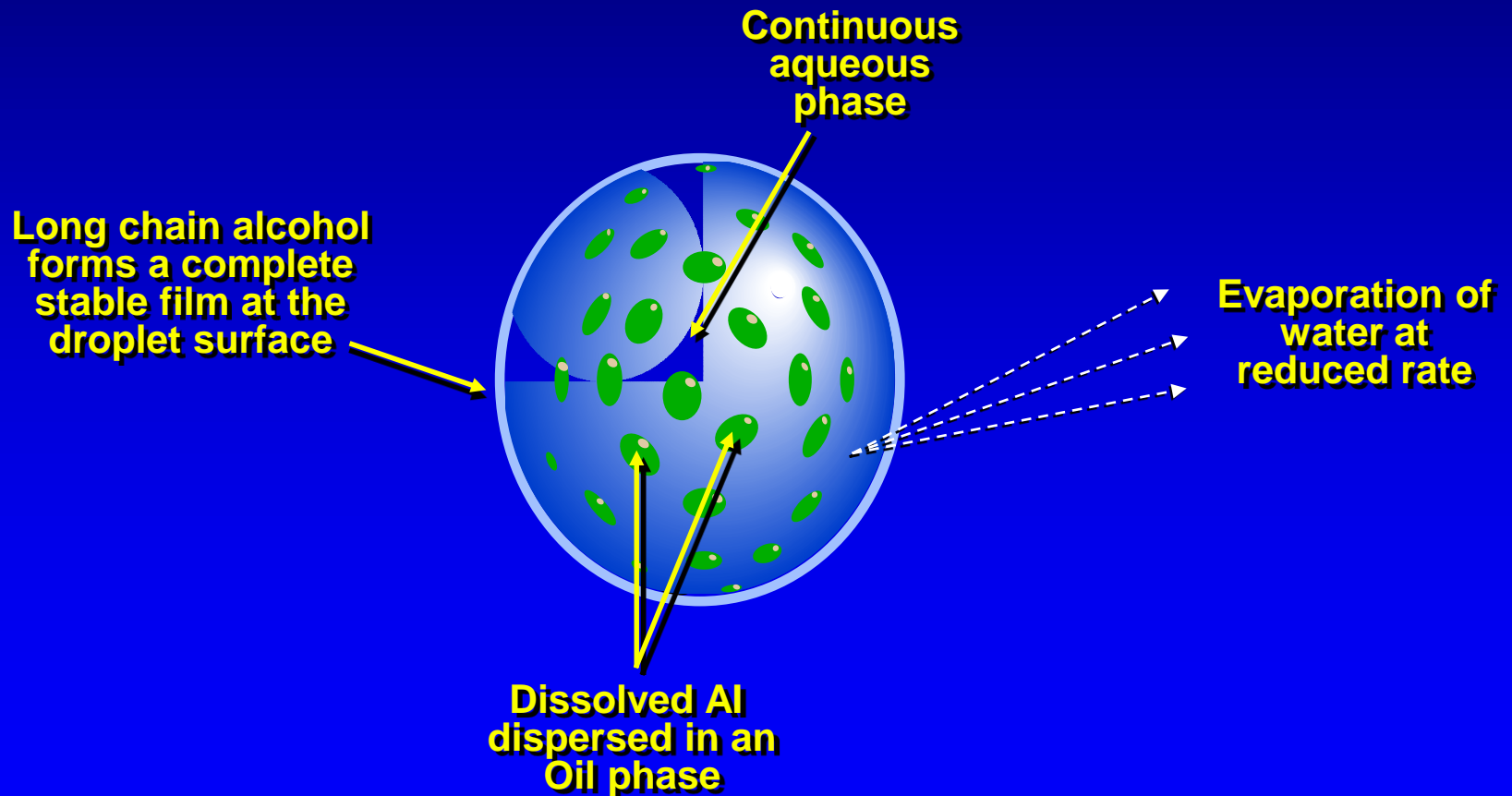
# **EPA Reduced Risk Classification**

## **With All Crop Tolerance**

**Can be used over any and all crops**

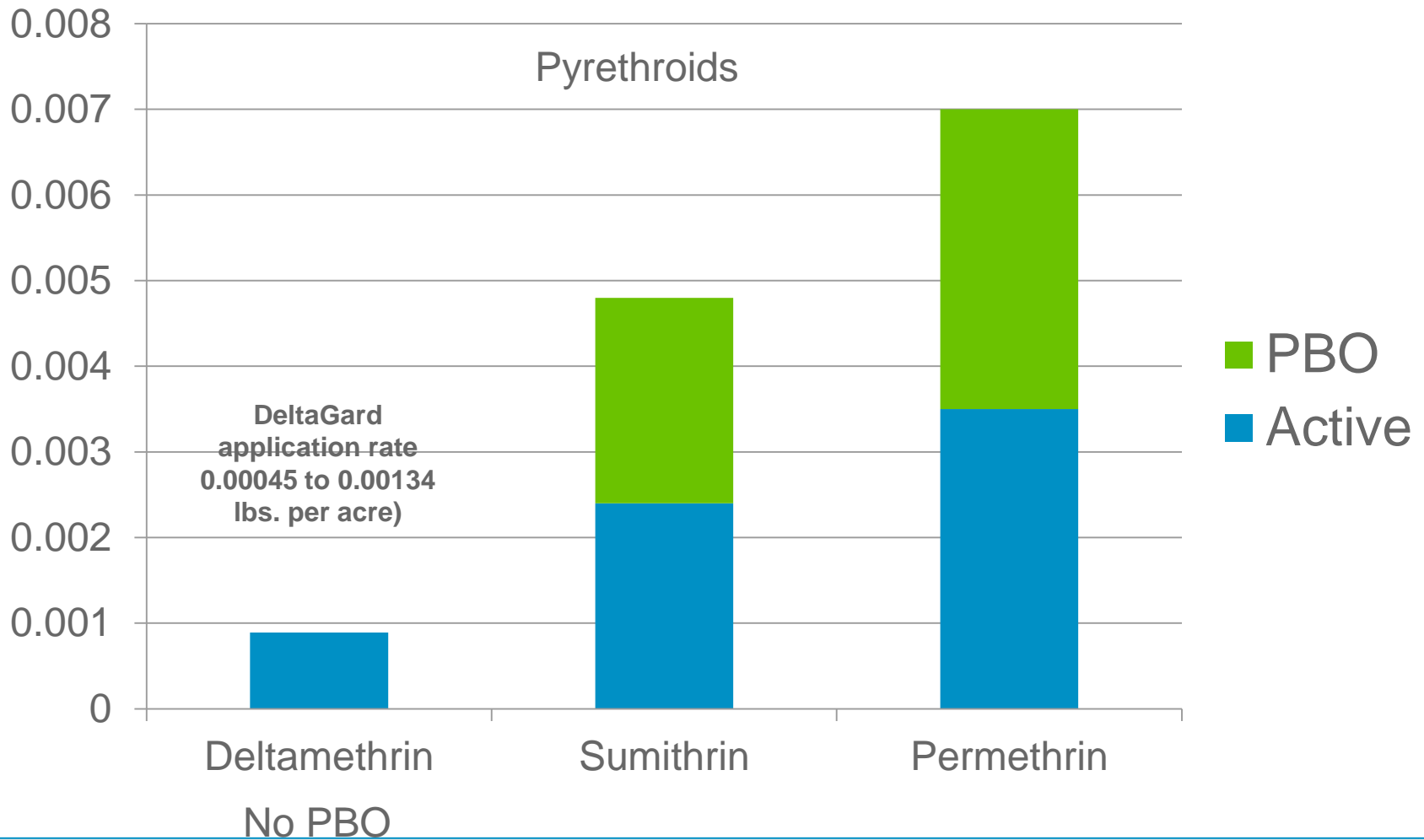
# ***DeltaGard FFAST Technology Slows Evaporation***

Water Based, No VOC's, No Synergist, Non-residual



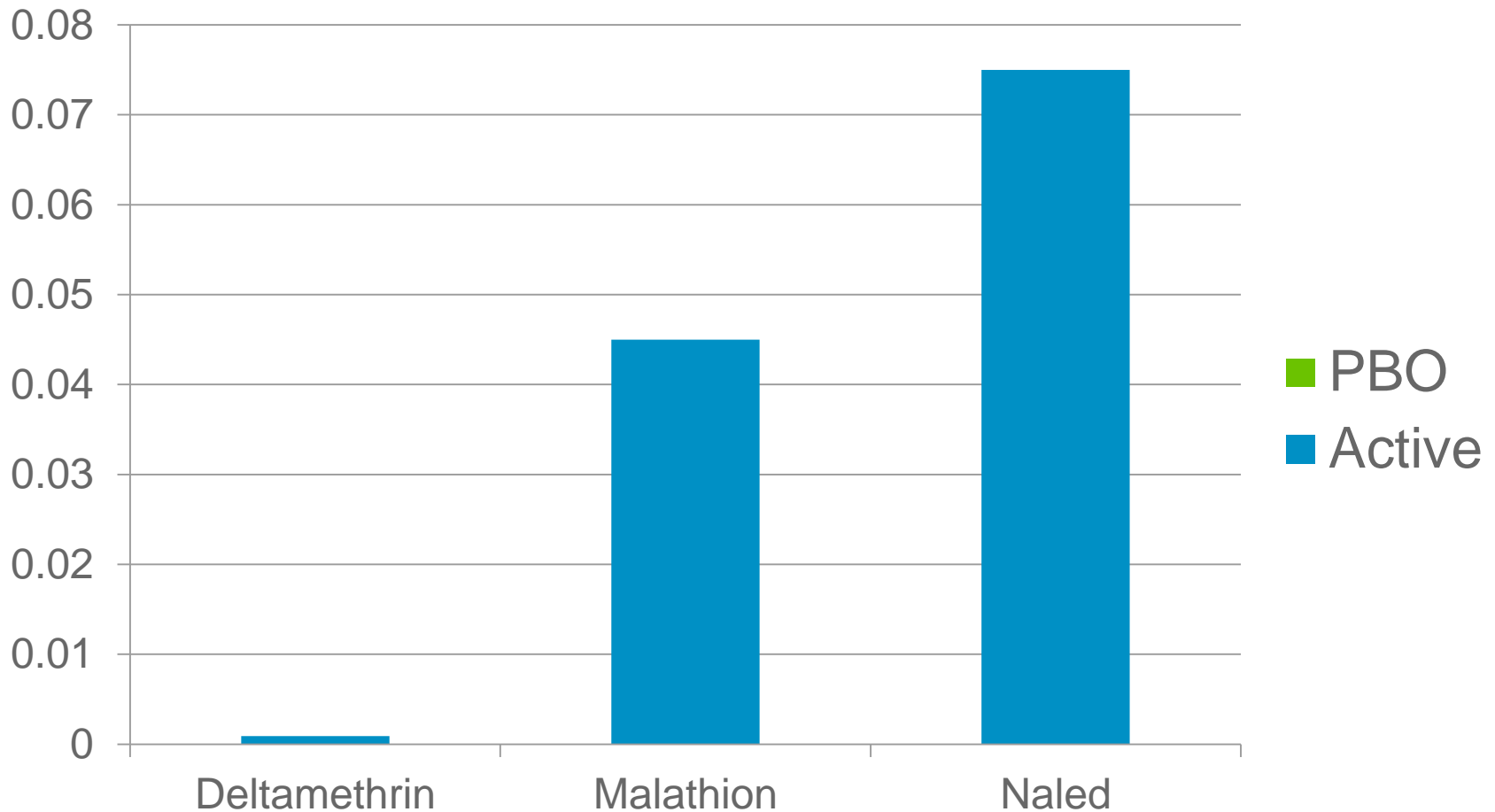
# DeltaGard = Lowest Dose

Pounds of active ingredient / acre / treatment  
mid-label rate, ULV application for adult mosquito control



# Pounds of active ingredient / acre / treatment

mid-label rate, ULV application for adult mosquito control



# Lowest Dose Aspirin-sized pellet dispersed over and entire football field



DeltaGard low-label rate is  
comparable to one aspirin-sized  
pellet of active ingredient dispersed  
over an entire football field.



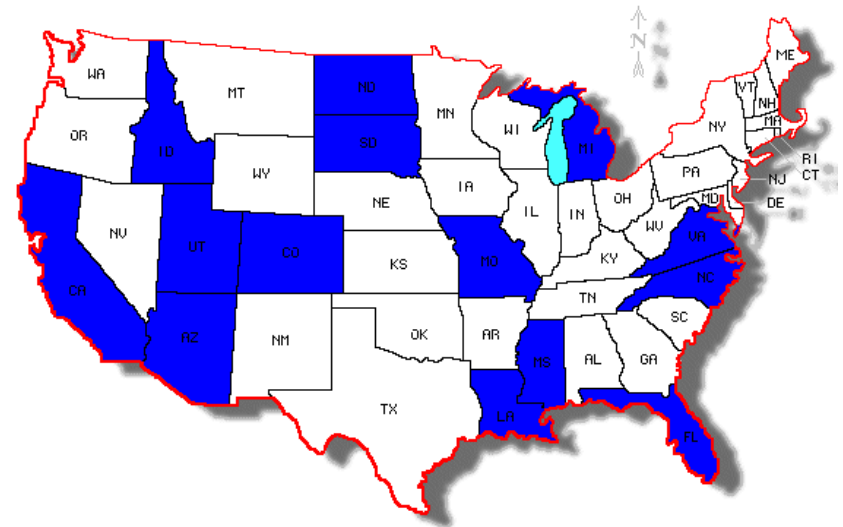






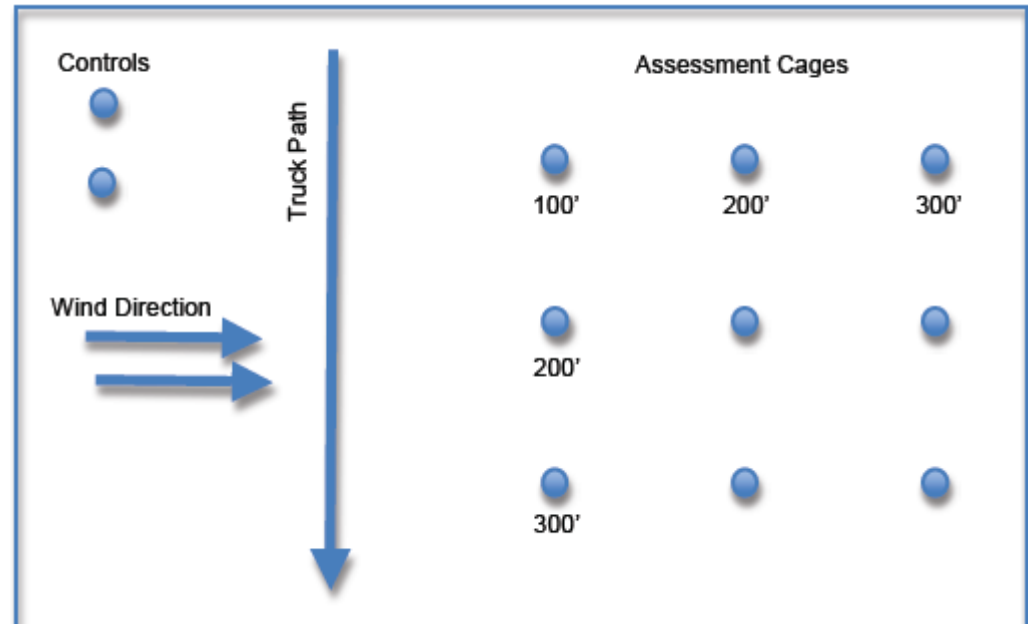
# 2014-5 DeltaGard Field Trials

- Robust, nationwide strategy:
  - 18 states
  - 25 Cooperating Mosquito Control Districts
  - Over 26 different mosquito species
    - Documented Resistance
  - Benchmarking against 8 major active ingredients:
    - Deltamethrin (DeltaGard)
    - Etofenprox (Zenivex)
    - Malathion (Fyfanon)
    - Naled (Dibrom)
    - Permethrin (Permanone, Aqua-Reslin, Kontrol)
    - Pyrethrin (Evergreen)
    - Resmethrin (Scourge)
    - Sumithrin (Anvil)
    - Sumithrin/Prallethrin (Duet)



# Methodology

- ❑ Standard 300x300' plot
- ❑ Sampling sites in triplicate
- ❑ 20-30 mosquitoes/cage
- ❑ When available droplet sampling - MgO slides for water-based formulations
- ❑ Truck Mounted ULV application at dusk. Meteorological conditions recorded.
- ❑ 1 hour KD, 12 and/or 24 hour mortality.
- ❑ Control mortality corrected using Abbott's formula





# Saginaw Trial

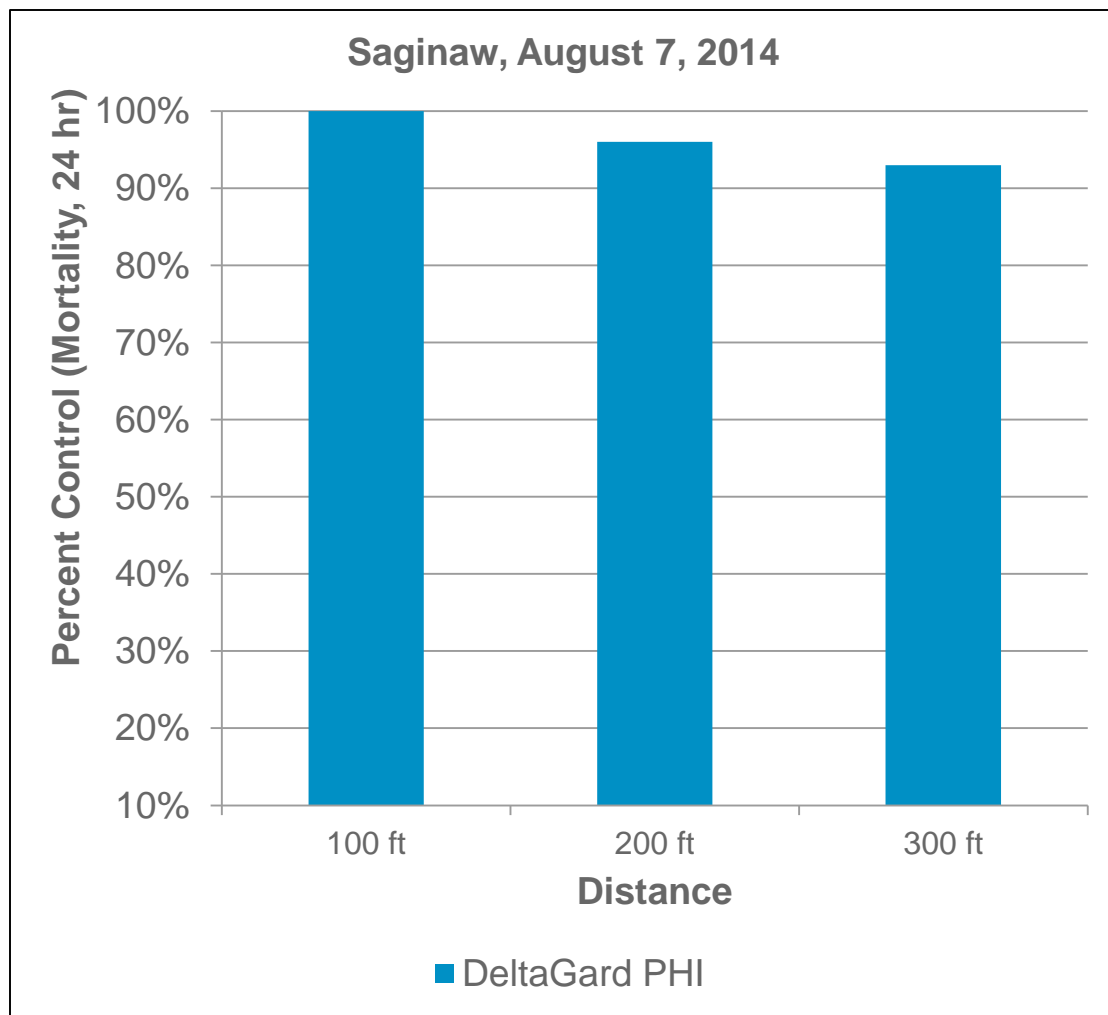
Bill Stanuszek, Isaac Blackmon, Rich Hanrahan Bayer, Jason Trumbetta ADAPCO, Beth Klein Biologist



# Saginaw Mosquito Abatement District Michigan



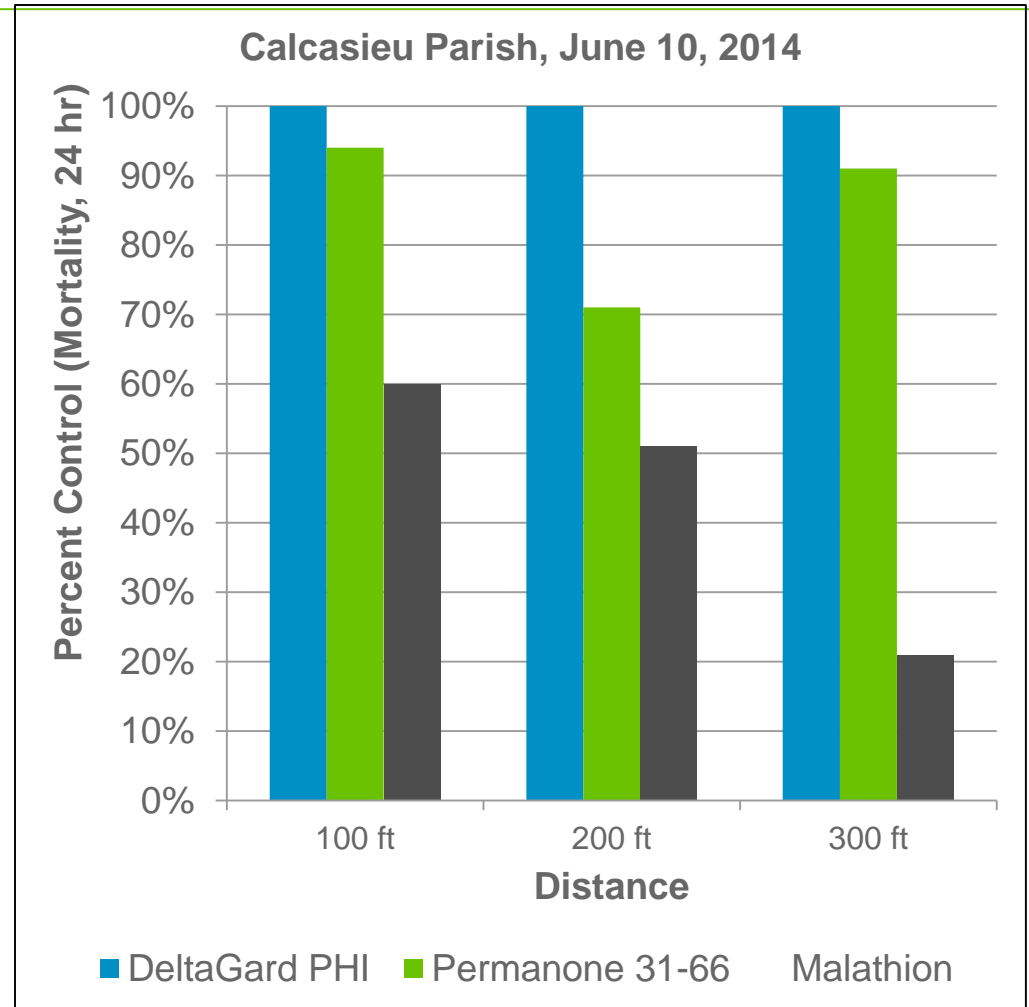
- ❑ Mixed Mosquito Species including *Anopheles quadrimaculatus*, collected from the field for this trial.
- ❑ DeltaGard: applied at 0.00045 lbs.ai/acre (Low Rate)



# Calcasieu Parish Mosquito Control District, Louisiana



- Documented resistant strain of *Culex quinquefasciatus*
- All applications made on the same day.
- Application rates:
  - DeltaGard: applied at 0.00134lb ai/acre (high rate)
  - Permanone: applied at 0.003lb ai/acre (low rate)
  - Malathion: applied at 0.058lb ai/acre (high rate)
- DeltaGard 100% mortality 1 hr after treatment

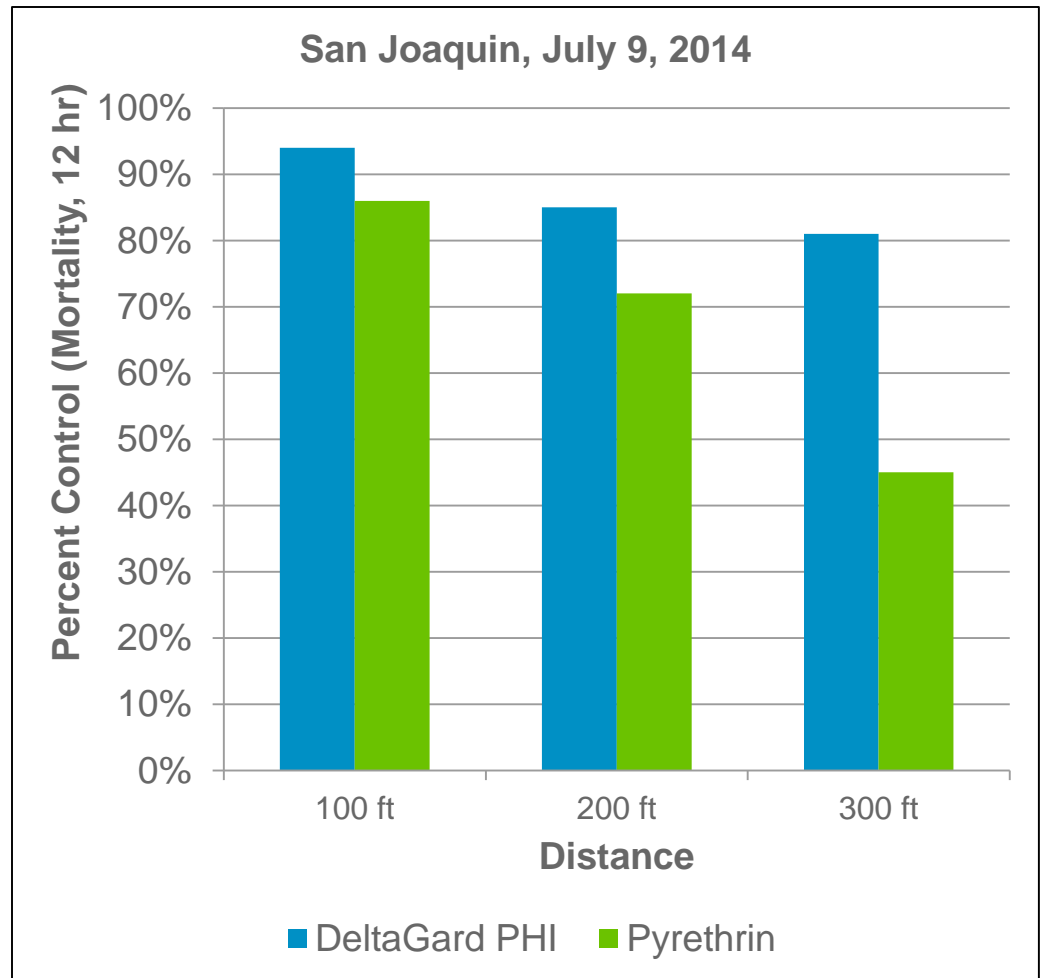




# San Joaquin Mosquito & Vector Control District, California



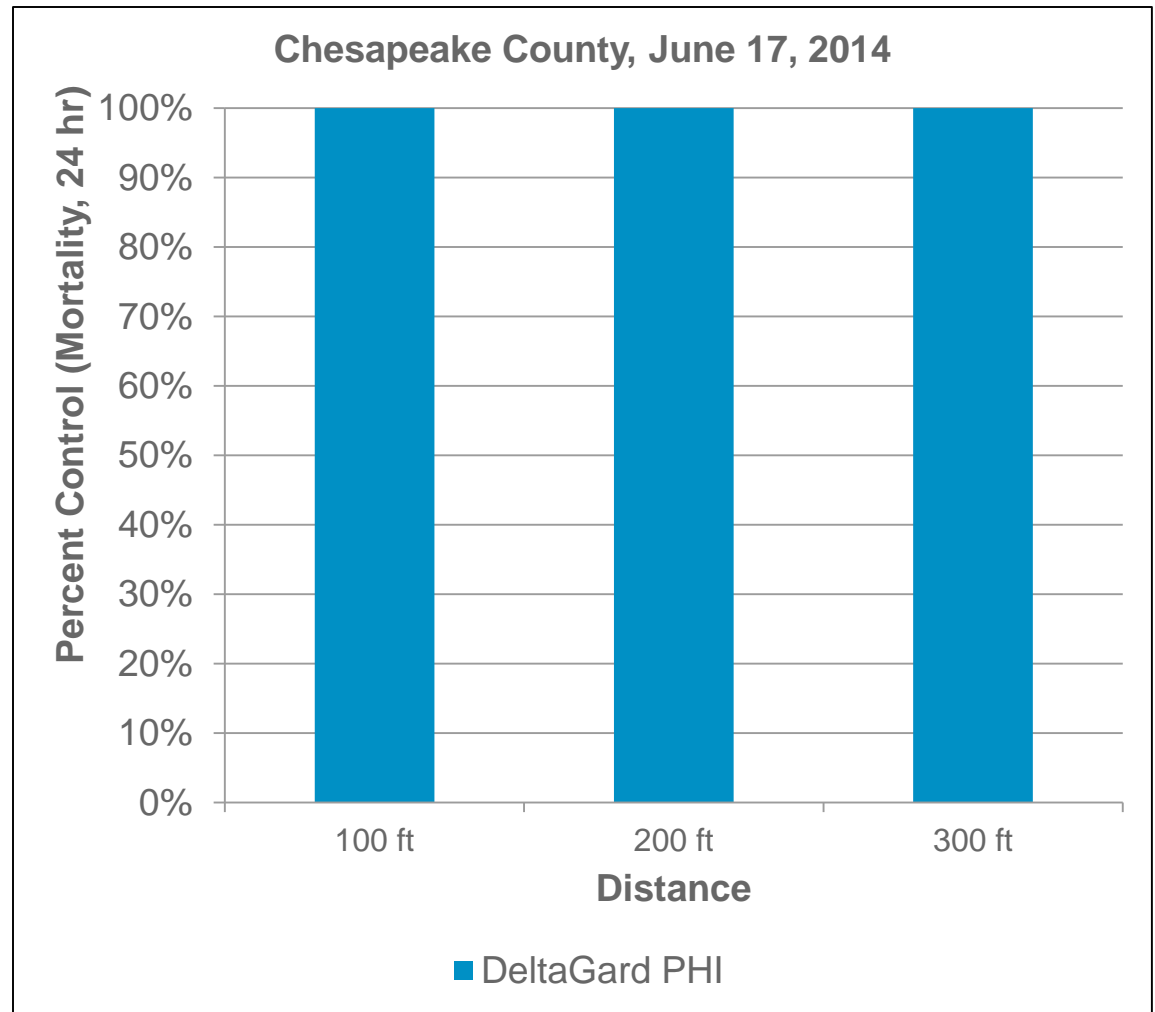
- Resistant strain of *Culex pipiens*
  - Resistance ratio - 35 for permethrin; knockdown resistance (kdr) gene present.
- All applications made on the same day.
- Application rates:
  - DeltaGard: applied at 0.00089lb ai/acre (Mid Rate)
  - Evergreen Mosquito Adulticide EC 60-6: applied at 0.0025lb ai/acre





# City of Chesapeake Virginia

- ❑ Mixed population of *Coquillettidia perturbans*, *Aedes albopictus* and *Aedes canadensis*
- ❑ DeltaGard: applied neat, 4 oz/min  
0.00089lb ai/acre (mid-rate)
- ❑ Very fast knockdown  
~20 min all cages



# Sac-Yolo Mosquito & Vector Control District, California

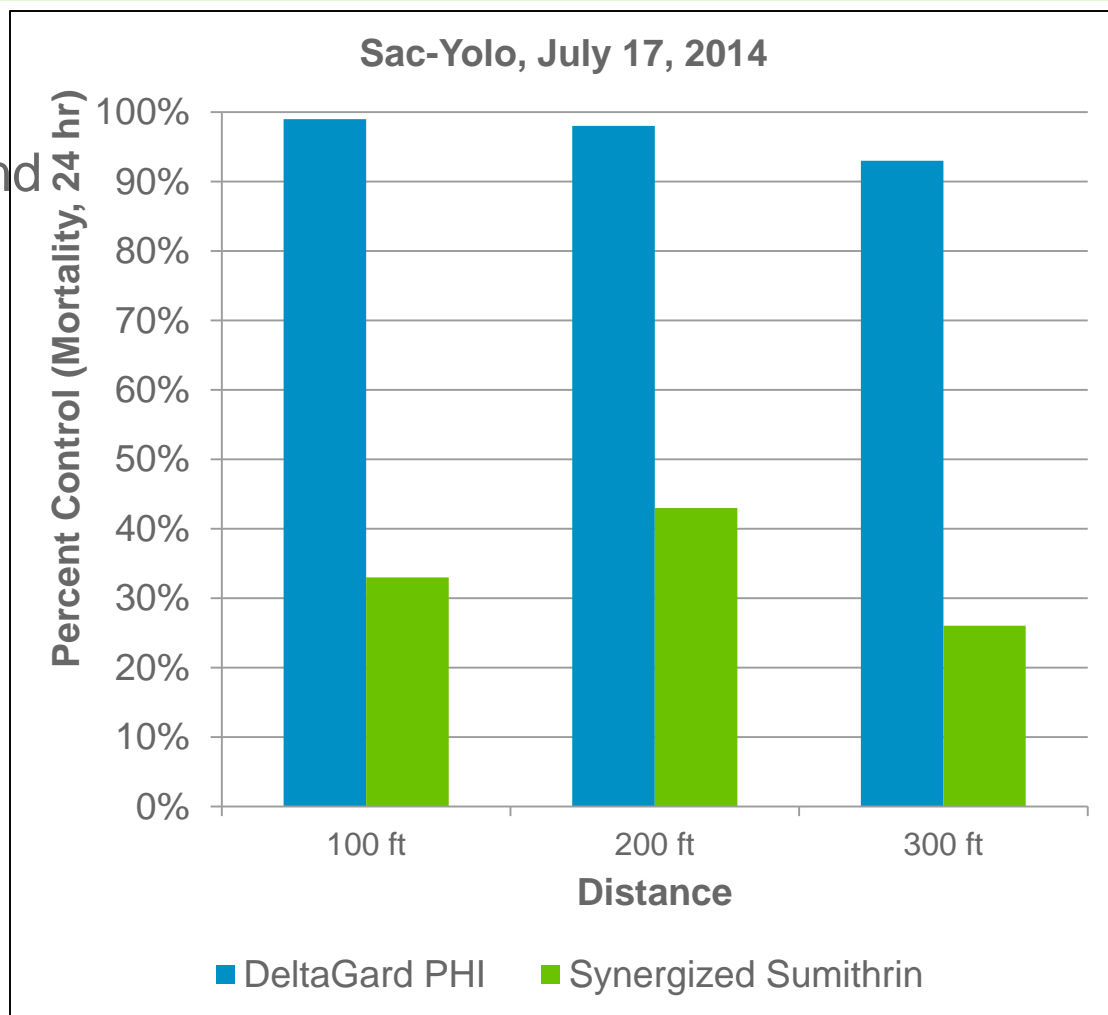


Dennis Candito, ADAPCO; Paula Macedo, DVM, Ph.D., lab director; Mario Boisvert, Ph.D., assistant director; Marcia Reed, program coordinator; and Demetri Dokos, field supervisor.

# Sac-Yolo Mosquito & Vector Control District, California



- Culex quinquefasciatus* (susceptible colony), *Culex pipiens* (resistant colony), and field collected *Culex tarsalis* were used for this study.
- All applications made on the same day.
- Application rates:
  - DeltaGard: applied at 0.00089lb ai/acre (mid rate)
  - Anvil 10+10 : applied at 0.0036lb ai/acre



# Grand River Mosquito Control District, Colorado



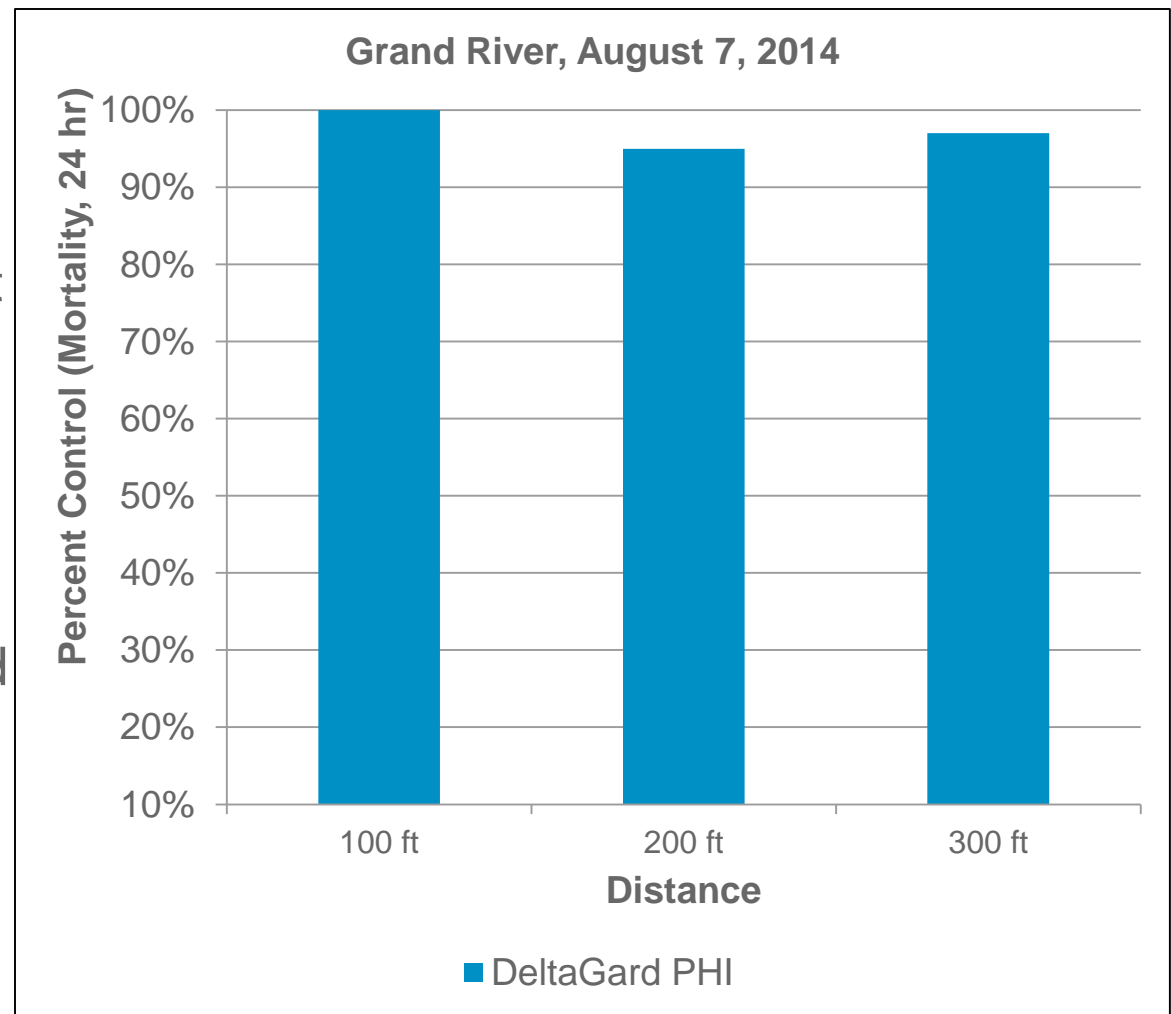
Doug Fledgerjohn, lab tech; Zane McCallister, district manager; Steve DeFeyter, assistant director; Gale Jirik, ADAPCO.



# Grand River Mosquito Control District, Colorado



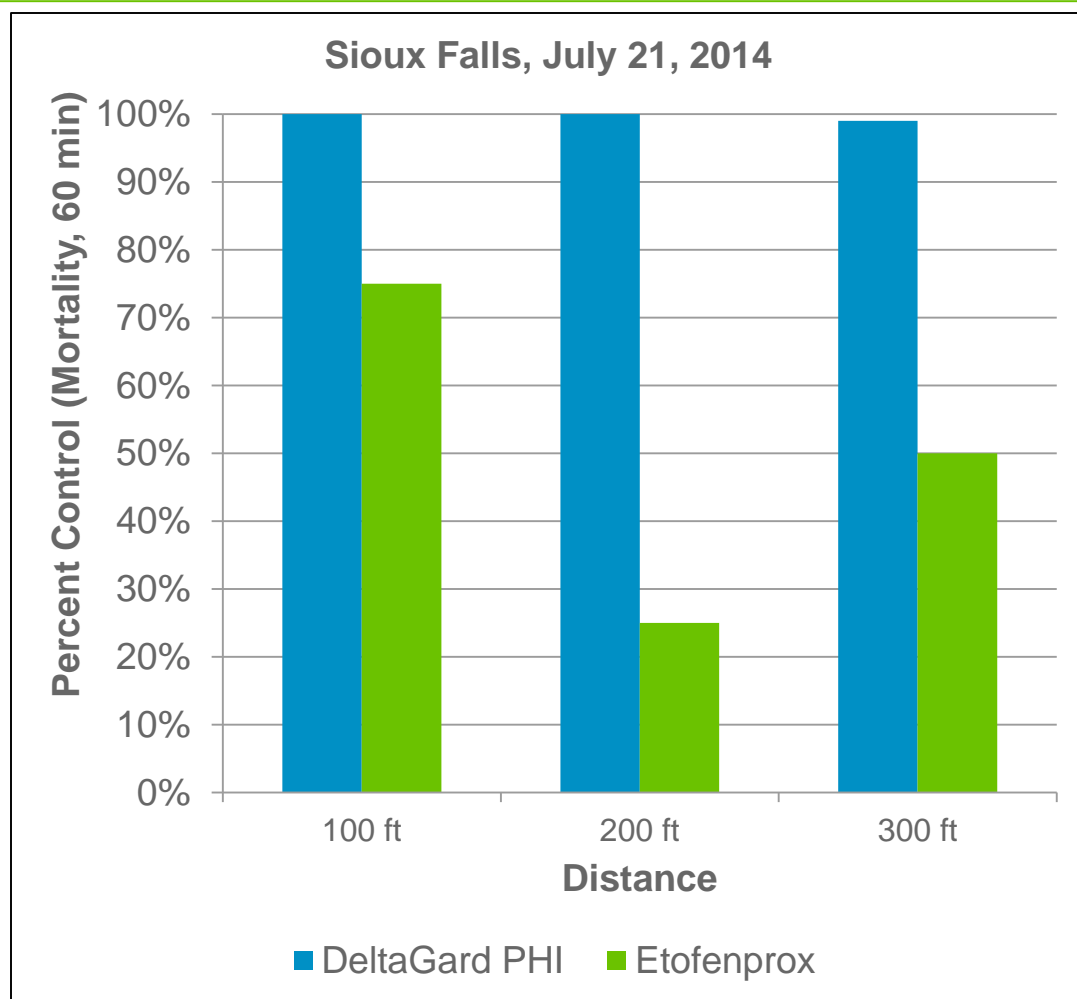
- Field collect *Aedes vexans*
- Application rate:
  - DeltaGard: applied at 0.00045lb ai/acre (low rate)
- Low wind speed  $\approx$ 1mph during application
- DeltaGard applied at the lowest label rate provided excellent control, even in adverse application conditions.



# Sioux Falls Mosquito Abatement District, South Dakota



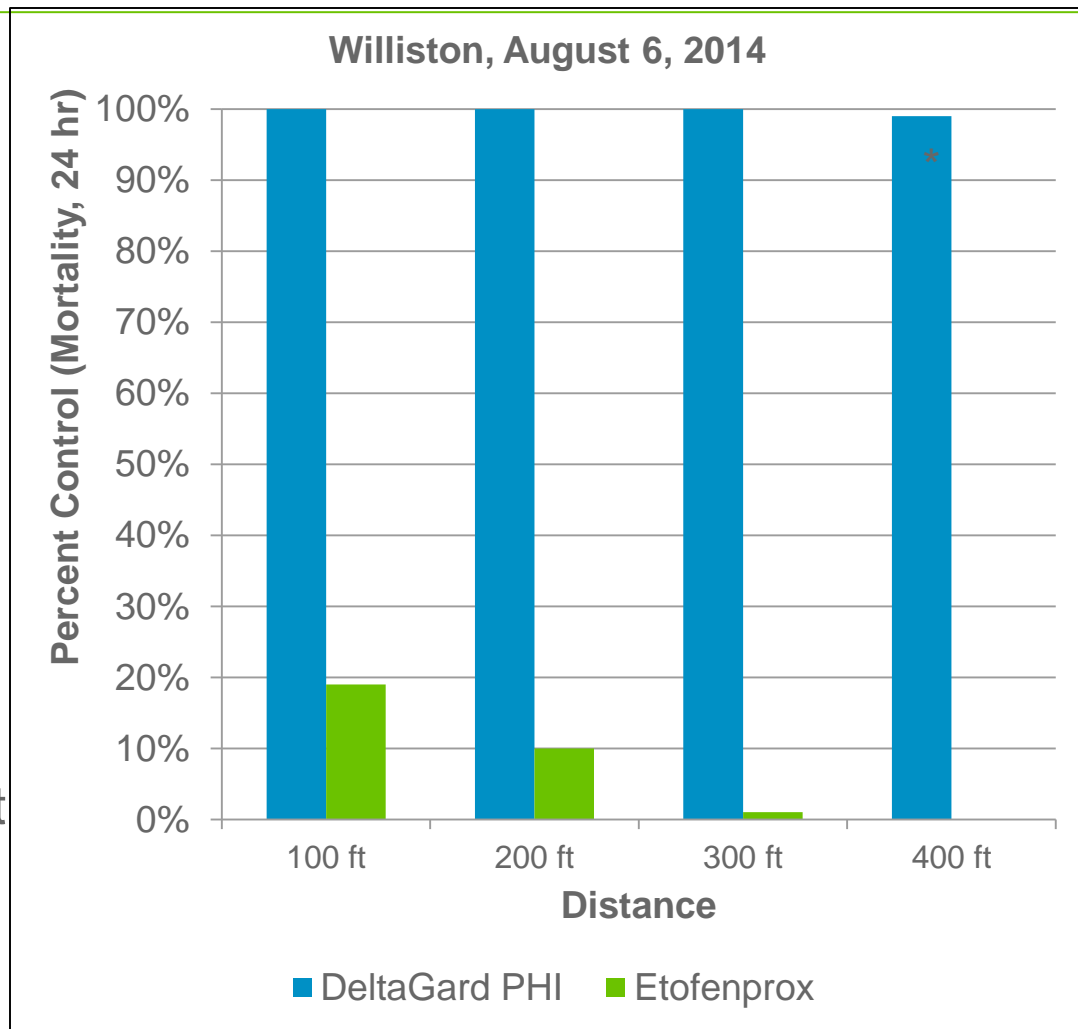
- A mixed population of field collected mosquitoes
- All applications made on the same day.
- Application rates:
  - DeltaGard: applied at 0.00089lb ai/acre (mid-rate)
  - Zenivex E20: applied at 0.007lb ai/acre (High Rate)
- DeltaGard applied at a lower rate than the competitive standard provided better control.



# Williston Mosquito Abatement District, North Dakota



- A mixed population of field collected mosquitoes
- All applications made on the same day.
- Application rates:
  - DeltaGard: applied at 0.00089lb ai/acre (mid-rate)
  - Zenivex E20: applied at 0.007lb ai/acre (High Rate)
- DeltaGard provided excellent control even at a distance of 400ft!

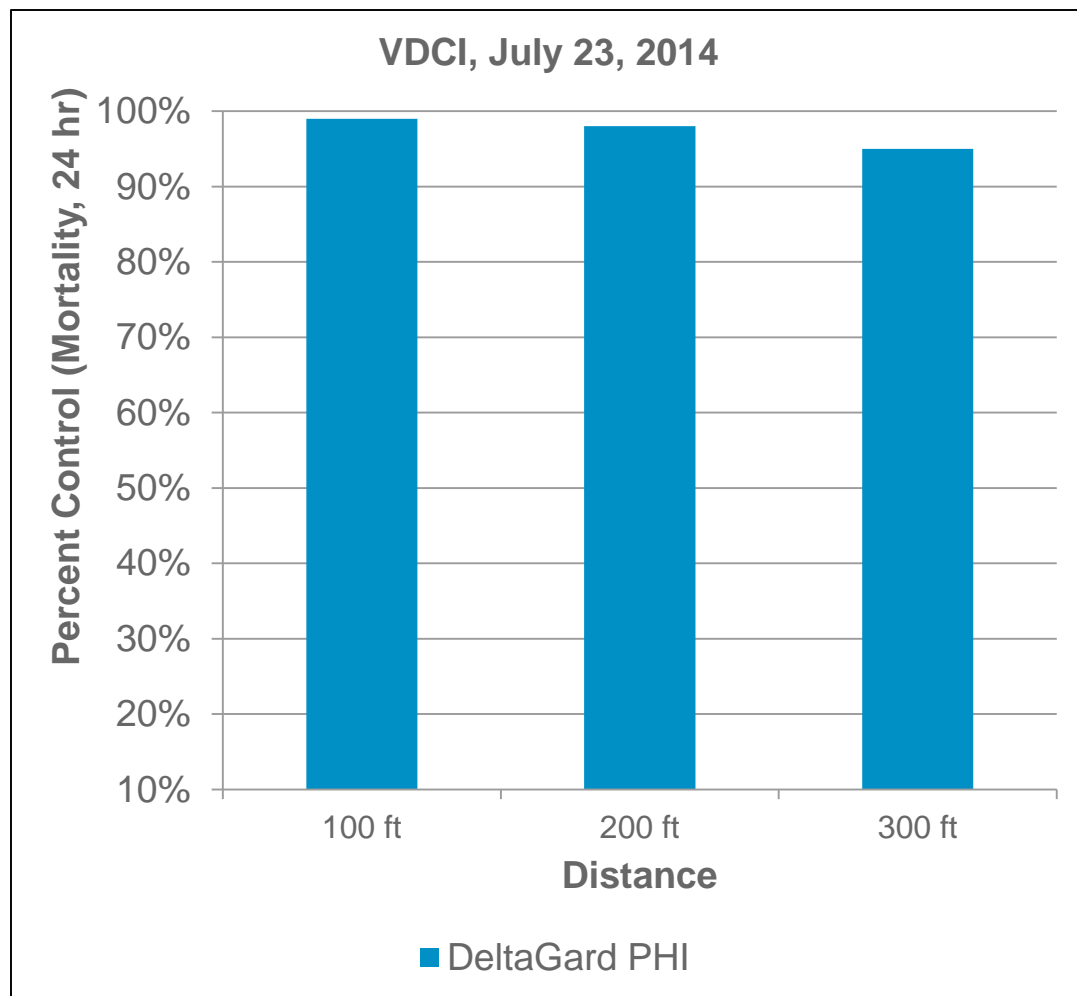


\* Only DeltaGard was tested at a range of 400 ft

# Vector Disease Control International, Mississippi



- A mixed population of field collected mosquitoes
- Species included: *Ae. japonicus*, *Cx. pipiens*, *An. quadrimaculatus*, *An. punctipennis*, *Cx. territans*, *Cx. restuans*, and *Ae. vexans*
- Application rate:
  - DeltaGard: applied at 0.00045lb ai/acre (low-rate)



# Jefferson County Vector Control; Festus, MO Airport

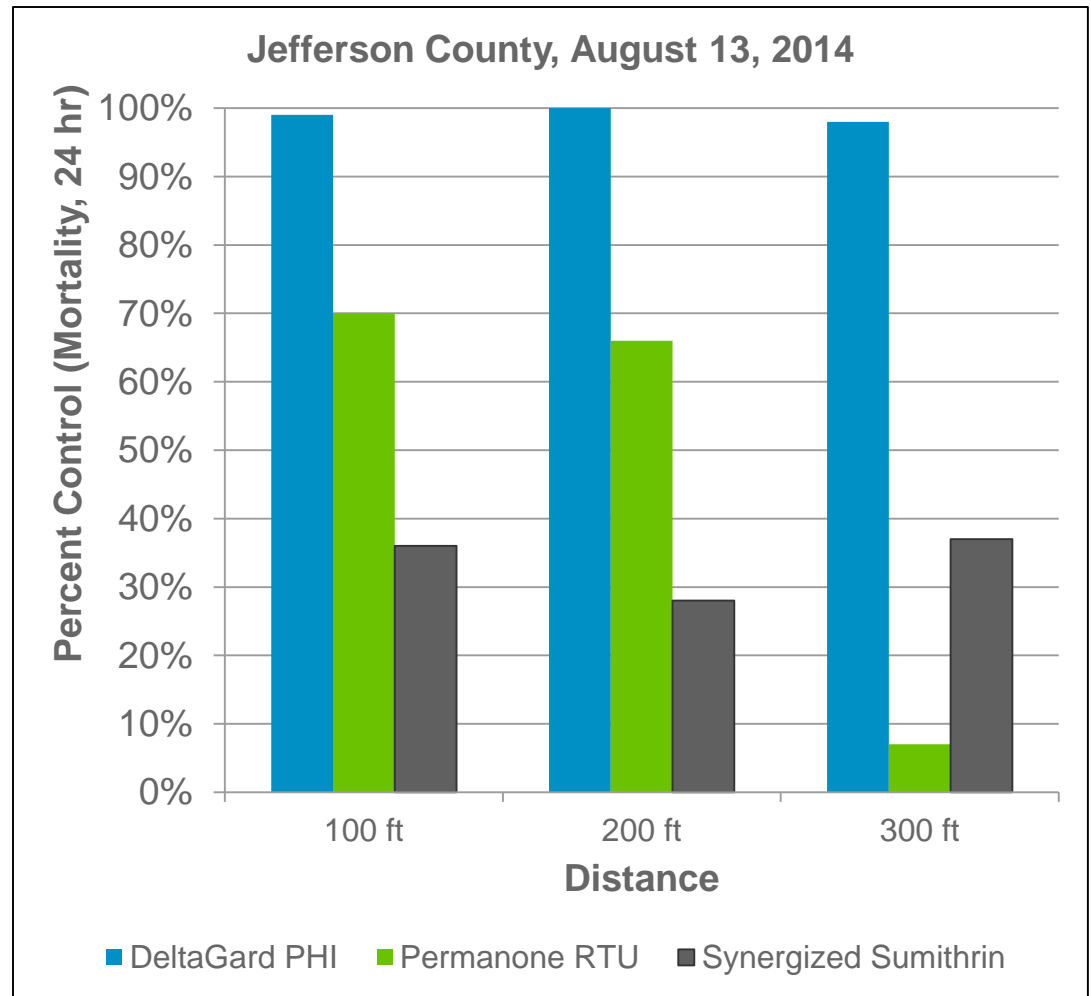




# Jefferson County Mosquito Abatement District, Missouri



- Documented resistant strain of *Culex quinquefasciatus*
- All applications made on the same day.
- Application rates:
  - DeltaGard: applied at 0.0089lb ai/acre (mid rate)
  - Permanone: applied at 0.015lb ai/acre (low rate)
  - Anvil 2+2: applied at 0.036lb ai/acre



# Key Players

**Dennis Candito, ADAPCO**

**Stephen Abshier, Sutter-Yuba MVCD**

**Michael Kimball, Sutter-Yuba MVCD**



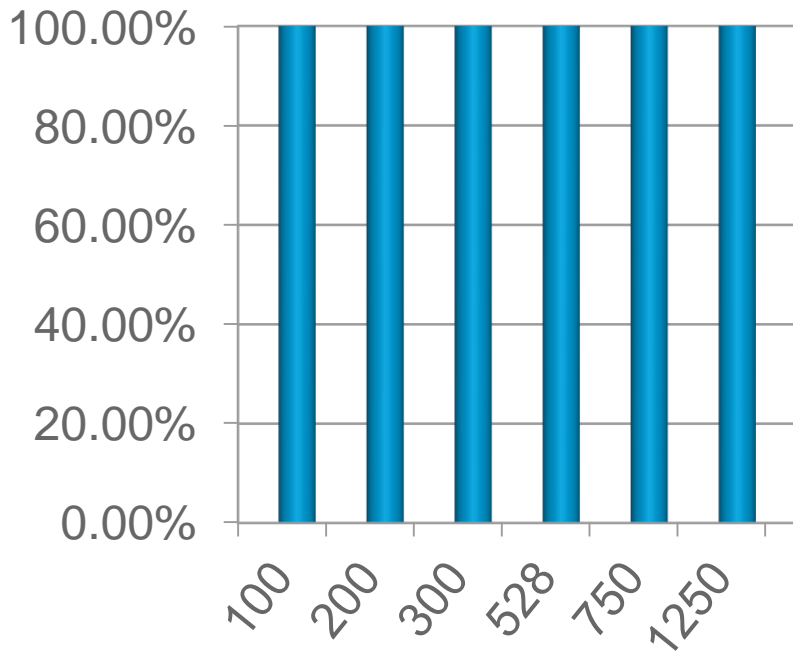
# Average % Mortality at 12 hours

## *Anopheles freeborni*



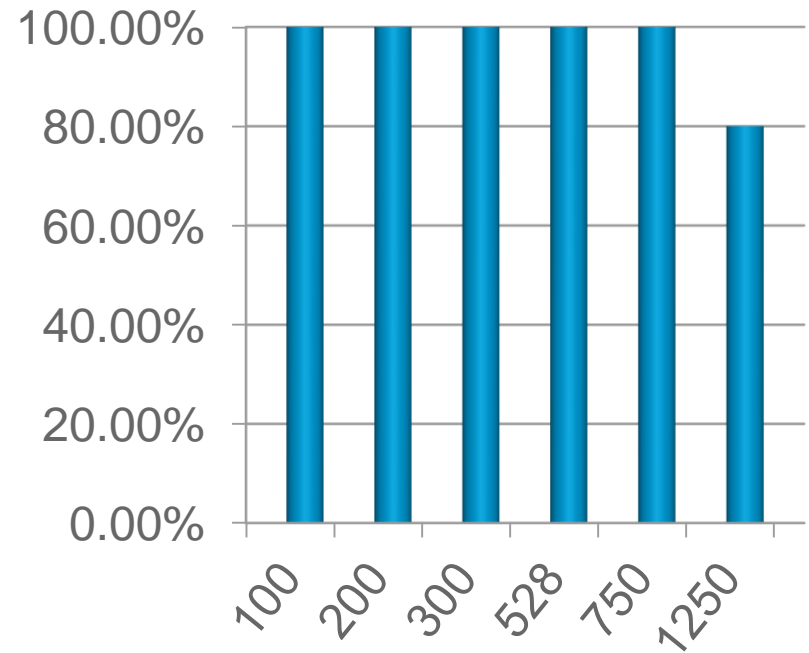
### Colusa

#### % Mortality



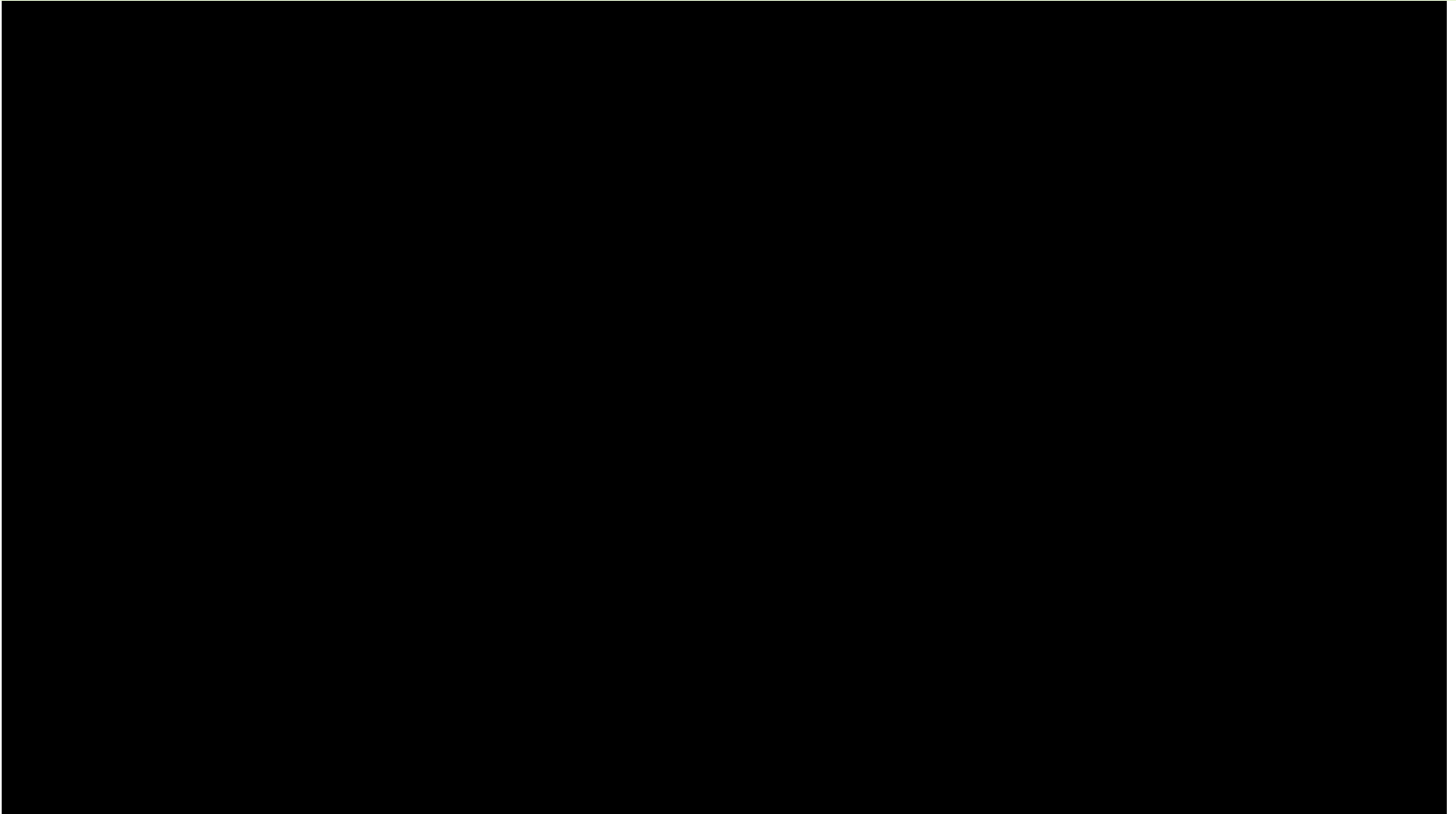
### Sutter-Yuba

#### % Mortality



Distance in feet

# Aerial Proof of Concept Manatee County, Florida





# Aerial Proof of Concept / Results

## Complete control at both rates in two highly resistant, field-collected populations

- *Aedes aegypti*, *Anopheles quadrimaculatus*

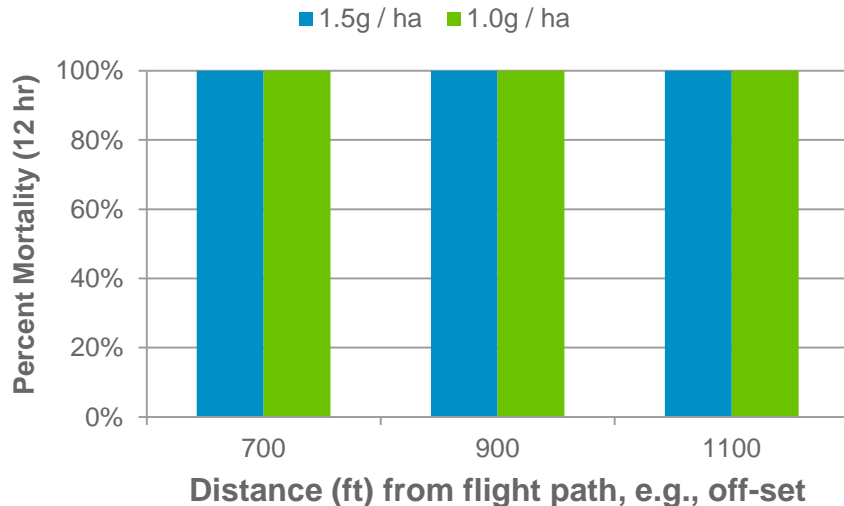
Manatee County (FL) Mosquito Control District

- Helicopter application on August 10, 2015

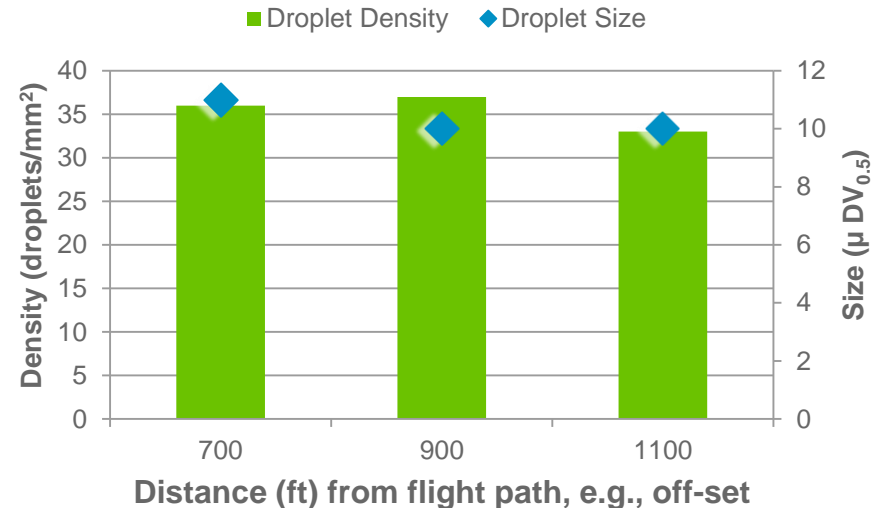
## Excellent droplet spectrum

- As seen in ground applications, the formulation preserves droplets over great distances.
  - (Further evidence to support patent filed in 3Q14)
- Can lead to better coverage with a wider, more consistent swath than competition.

### Field Bioassay



### Droplet Spectrum







# DeltA Gard<sup>®</sup> Effective against Flies



Stable fly



# ADAPCO

INNOVATIVE MOSQUITO SOLUTIONS



Science For A Better Life

# Science for a Better Life<sup>®</sup>