



The best of both worlds
for wide area mosquito control

**EPA REDUCED
RISK
CLASSIFICATION**

**SUPERIOR
EFFICACY AGAINST
MOSQUITOES**



DeltA[®]Gard

TECHNICAL MANUAL



SCIENCE FOR A BETTER LIFE

DeltaGard® Insecticide outperforms the competition at lower application rates while providing the superior efficacy you need to help protect your community from mosquitoes.

EPA - Designated Reduced Risk for wide area mosquito control.

- More favorable toxicity – Reduces risk for applicators and the public
- No Piperonyl Butoxide (PBO) or other synergist – reduces risk for applicators, the public, and the environment

Fast knockdown and control.

DeltaGard kills mosquitoes quickly – in as few as 10-15 minutes – with no knockdown recovery.

Effective against resistant mosquito species.

Deltamethrin, a Type II pyrethroid, has been proven to effectively control mosquitoes resistant to other pyrethroids in the United States.

Labeled for application over any and all crops including range and pasture lands.

DeltaGard provides you with the application flexibility to control mosquitoes in a wide variety of environments.

Easy to apply, easy to clean up and non-corrosive.

DeltaGard is a proprietary FFAST® water-based formulation that can be applied neat or mixed with water. It's also non-corrosive, so it's easy on your equipment.

NO visible residue.

Applied at a lower rate when compared to other adulticides, DeltaGard will not spot surfaces or leave behind a visible residue.

Low odor.

DeltaGard has low odor which benefits not only the residents in your community but also you and your coworkers.

Cost effective.

Since DeltaGard Insecticide is diluted with water, no oil purchase or storage is required, saving you money.

Effective against flies.

DeltaGard provides excellent indoor and outdoor fly control in livestock and poultry facilities.





DELTAMETHRIN

Isomer : 1

Composition: ((S)-1R-cis) +98%

Among the most popular and widely-used insecticides in the world, Deltamethrin has been used for Vector Control for over 15 years. It has the full recommendation by WHOPES (World Health Organization Pesticide Evaluation Scheme).

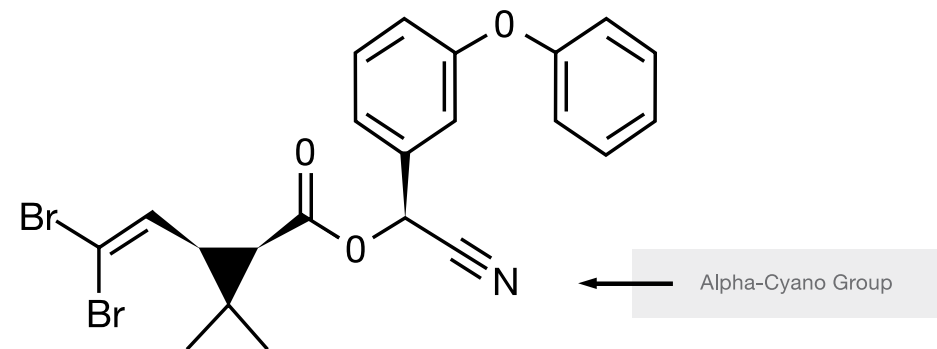
Deltamethrin, the active ingredient in DeltaGard, is a pyrethroid insecticide – a man-made molecule modeled after pyrethrins which are natural insecticides extracted from the chrysanthemum flower (*Chrysanthemum cinerariae folium*). As a class, pyrethroids are the most widely-used insecticides for controlling adult mosquitoes by professionals in the United States.

THE DELTAGARD DIFFERENCE

DeltaGard is the first and only Type II pyrethroid registered in the United States for wide area mosquito control. This is significant because Type II pyrethroids exhibit **longer-lasting** inhibition of the sodium channel activation gate when compared to Type I pyrethroids, making them extremely effective against mosquitoes and other target pests.

Pyrethroids are divided into two groups:

- Type I do not contain an alpha-cyano group in their molecule (e.g. permethrin, sumithrin and D-phenothrin)
- Type II do contain an alpha-cyano group



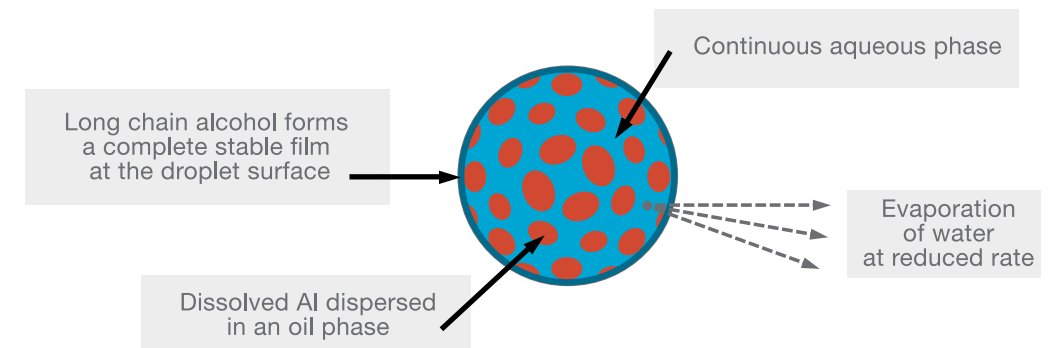
Unlike other pyrethroids, DeltaGard deltamethrin is the only single-active isomer pyrethroid adulticide. This ensures consistent activity at lower rates than pyrethroids with two, four, or even eight isomers, which often have varying degrees of biological activity.

DELTAGARD FILM FORMING AQUEOUS SPRAY TECHNOLOGY (FFAST®)

All the performance of a traditional oil-based spray, but with no volatile organic compounds (VOCs).

The active ingredient in DeltaGard is dissolved in a non-VOC oil. In a final spray, the active oil droplet is encased in the FFAST technology. There is no particle present. The AI is in a dissolved state and will behave more like an emulsifiable concentrate (EC) than a typical suspension concentrate (SC). The DeltaGard formulation is an oil-in-water emulsion where active oil phase is dispersed into water.

PROPERTIES OF A DELTAGARD INSECTICIDE DROPLET



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

DELTAGARD ENVIRONMENTAL IMPACTS

- Lowest application rate (0.00045 to 0.00134 lbs. per acre) vs. competitive products
- Significantly reduces the amount of pesticide applied to the environment compared to competitive products
- No Volatile Organic Compounds (VOCs) - therefore no VOC exposure to people and the environment
- Low solubility in water – little potential to leach into groundwater

PACKAGING

- 2.5 gallon plastic container packed two per case
- 30 gallon returnable container designed for use with the FFAST Injector, a convenient semi-closed pesticide loading system

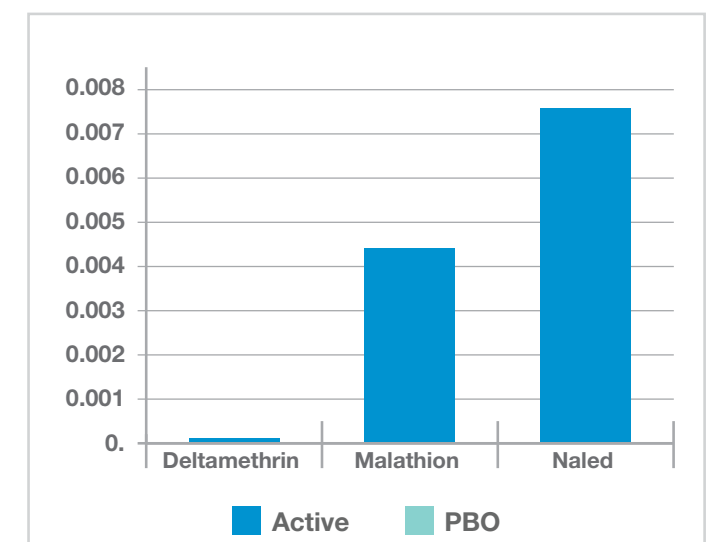
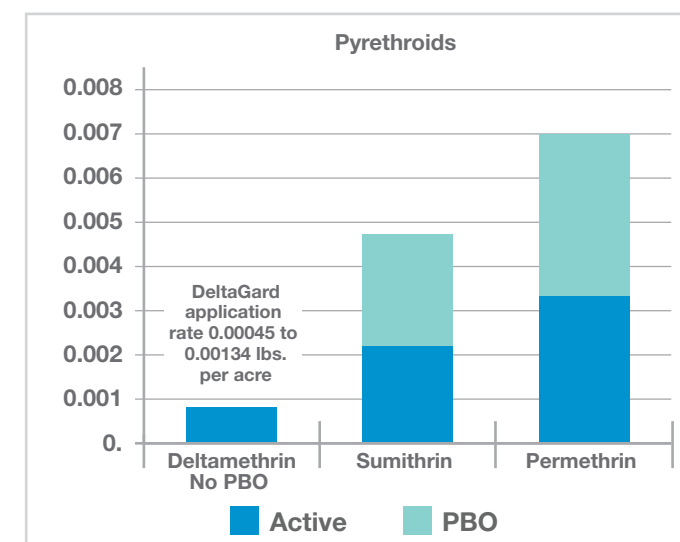
EPA HUMAN HEALTH RISK ASSESSMENT (2009)

- Not a developmental or reproductive toxicant
- Not genotoxic or mutagenic
- Cancer Classification: not likely to be carcinogenic to humans by all routes of exposure
- Low dermal absorption (~1%) and low toxicity by dermal route of exposure
- Chronic Feeding studies demonstrate no effect levels indicating low potential to bioaccumulate and rapid detoxifications in mammals

DELTAGARD VS. THE COMPETITION – THE LOWEST APPLICATION RATE

When compared head-to-head with competitive adulticides, DeltaGard uses the lowest dose of active ingredient on the market. See the charts below for details.

POUNDS OF ACTIVE INGREDIENT / ACRE / TREATMENT MID-LABEL RATE, ULV APPLICATION FOR ADULT MOSQUITO CONTROL



PRODUCT SPECIFICATIONS

Active Ingredient: Deltamethrin 2.0% or 0.17 pounds per gallon

Solubility: Mixes readily with water

Appearance: White emulsion

Specific Gravity: 8.37 – 8.53 lbs./gallon

Freezing Point: Below 14 degrees Fahrenheit

(-10 degrees Celsius) pH Range: 5-8

Droplet Measurement: For maximum efficiency, the droplet sizes need to be within parameters – too big and they fall to the ground, too small and they may not impact the mosquito. The volume median diameter (VMD) is 8-30 microns for ground applications.

- Magnesium oxide-coated glass slides spread factor = 0.86
- Teflon slides should be covered and read within a few hours: Spread factor = 0.61 Read at least 200 drops

MIXING & STORAGE

- DeltaGard may be applied neat (undiluted) or mixed with water, not oil; when mixing, pour DeltaGard into water, do not pour water into DeltaGard
- The pH of water does not affect the mixing or effectiveness
- DeltaGard does not require filtering before mixing
- The product should be stored between 40° - 95°F
- In colder temperatures, the product may thicken or freeze; simply warm product to above 70°F and agitate to regain usability
- The shelf life, if stored in its original container, is a minimum of two years
- Diluted product may be held in a tank for at least one week; normal transport provides sufficient agitation to re-suspend diluted product

ENVIRONMENTAL FATE

Because of their strong tendency to adsorb to soils and organic matter, pyrethroids are unlikely to undergo significant migration from areas of direct application, except on particulates that are carried by wind or water.

DEPOSITION DATA

Mosquitoes exposed to residues from DeltaGard Insecticide application exhibit no mortality or observed sub-lethal effects.

Deltamethrin degrades via hydrolysis and microbial action, is relatively immobile in soils, and has little potential to leach into groundwater. In field trials, the average terrestrial deposition of DeltaGard is extremely low (0.0007 ug AI/cm²). Laboratory assessments of mosquito mortality utilized residual deposits that were higher than those noted in field studies (0.001 ug ai/cm²). These laboratory studies utilized *Aedes aegypti* and *Culex quinquefasciatus* as target organisms. Mosquitoes were exposed to treated surfaces for 30 minutes; following this, 24-hour mortality was assessed. Residual exposure was assessed over three days.

AVERAGE TERRESTRIAL (HORIZONTAL) DEPOSITION FROM DELTAGARD FIELD TRIALS

DeltaGard Application Rate (lbs AI/acre)	Average Deposition (ug/cm ²)
0.00045	0.0002
0.00089	0.0005
0.00134	0.0014

MOSQUITO MORTALITY WHEN EXPOSED TO RESIDUAL DEPOSITS OF DELTAGARD INSECTICIDE

Treatment	<i>Culex quinquefasciatus</i>			<i>Aedes aegypti</i>		
	% Control on Wood 24 hrs after treatment			% Control on Wood 24 hrs after treatment		
DeltaGard 0.001 ug AI/cm ²	1d	3d	7d	1d	3d	7d
		0	0	-	0	0





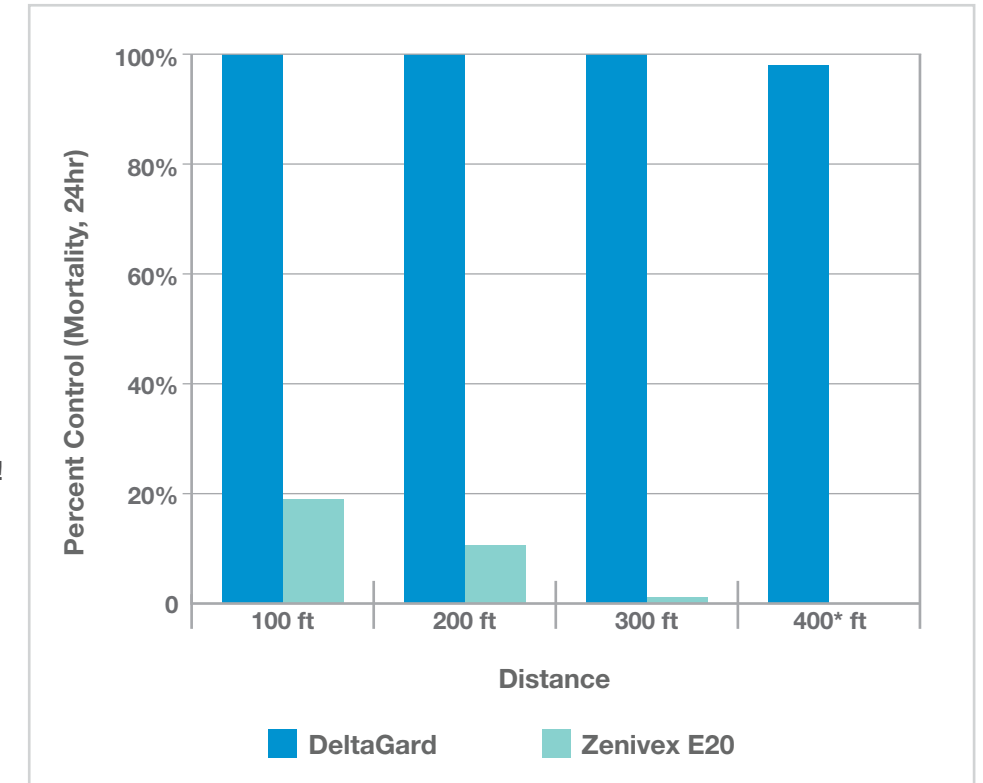
DELTA GARD INSECTICIDE FIELD TRIALS

DeltaGard has been field tested by over 20 Mosquito Abatement Districts and independent Vector Control Specialists throughout the United States. DeltaGard applied by ground-based ULV consistently provided excellent results, outperforming competitive products that were applied at significantly higher rates.

This unprecedented trial program covered 14 states, a variety of climates, and assessed efficacy against more than 30 species of mosquitoes. Comparative efficacy was developed comparing DeltaGard to 10 leading mosquito adulticides. Methods utilized followed well-established protocols for truck-mounted ULV applications with caged mosquitoes. Vehicles, equipment, and observations varied according to the cooperators' established methodology yet the results were remarkably consistent and efficacious. Bayer would like to thank the Mosquito Abatement Districts and Cooperators for their excellent scientific contributions.

NORTH DAKOTA

- Mixed population of field collected mosquitoes
- Application rates:
DeltaGard: applied at mid label rate
Zenivex® E20: applied at maximum label rate
- DeltaGard applied at a lower rate provided better control than the competitive standard
- DeltaGard provided excellent control even at a distance of 400ft!

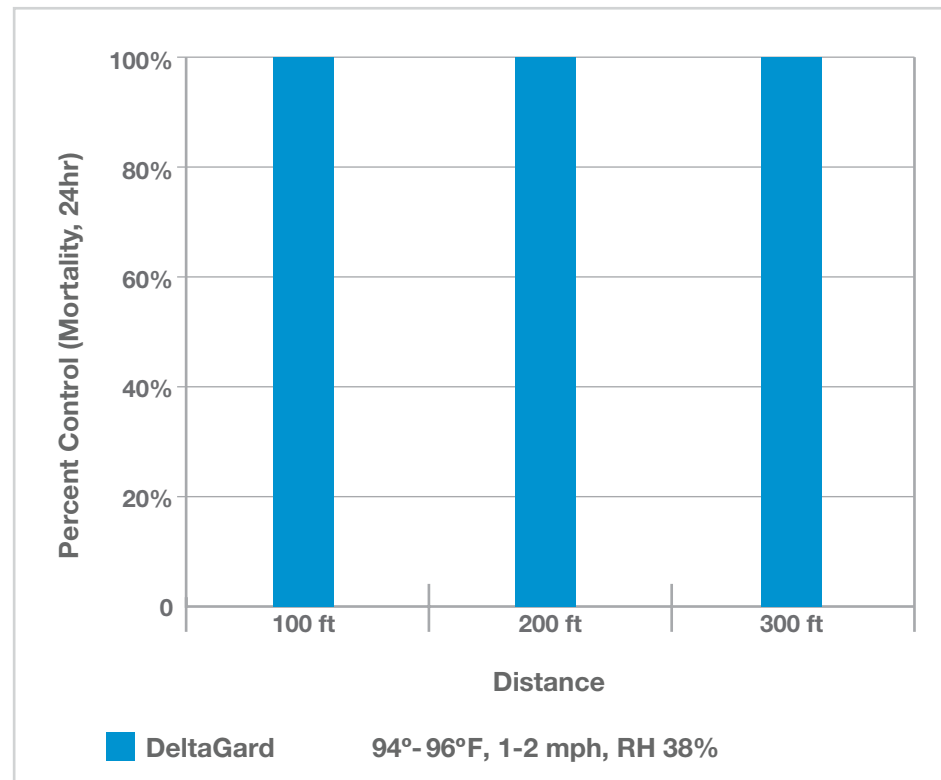


*Only DeltaGard Insecticide was assessed at 400 feet.

ARIZONA

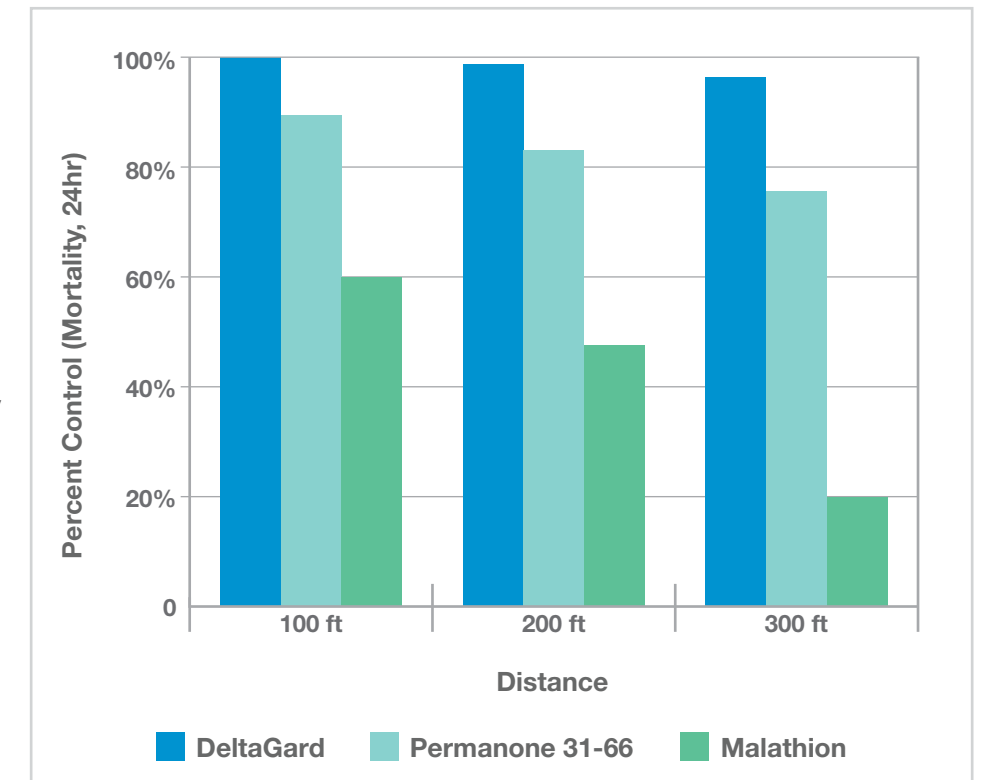
DeltaGard Insecticide provided exceptional control in dry climates and extreme conditions

- Field collected *Psorophora columbiae* with known OP resistance
- Application: mid label rate
- Temperature: 94°-96°F
- Relative Humidity – 38%



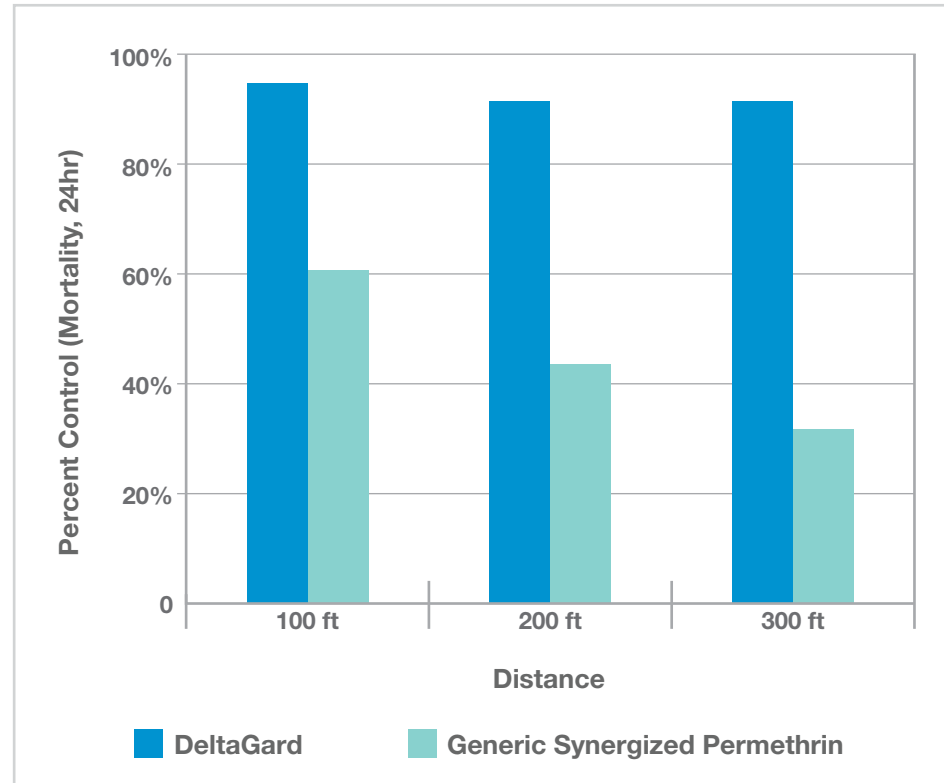
LOUISIANA

- Highly resistant strain of *Culex quinquefasciatus*:
DeltaGard: applied at high-level rate
Permanone®: applied at low label rate
Fyfanon®: applied at maximum label rate
- Rapid control with DeltaGard, noted by cooperating Mosquito Abatement District; 100% mortality in ~30 minutes!
- DeltaGard outperformed both synergized permethrin and malathion and successfully controlled a very difficult species



FLORIDA

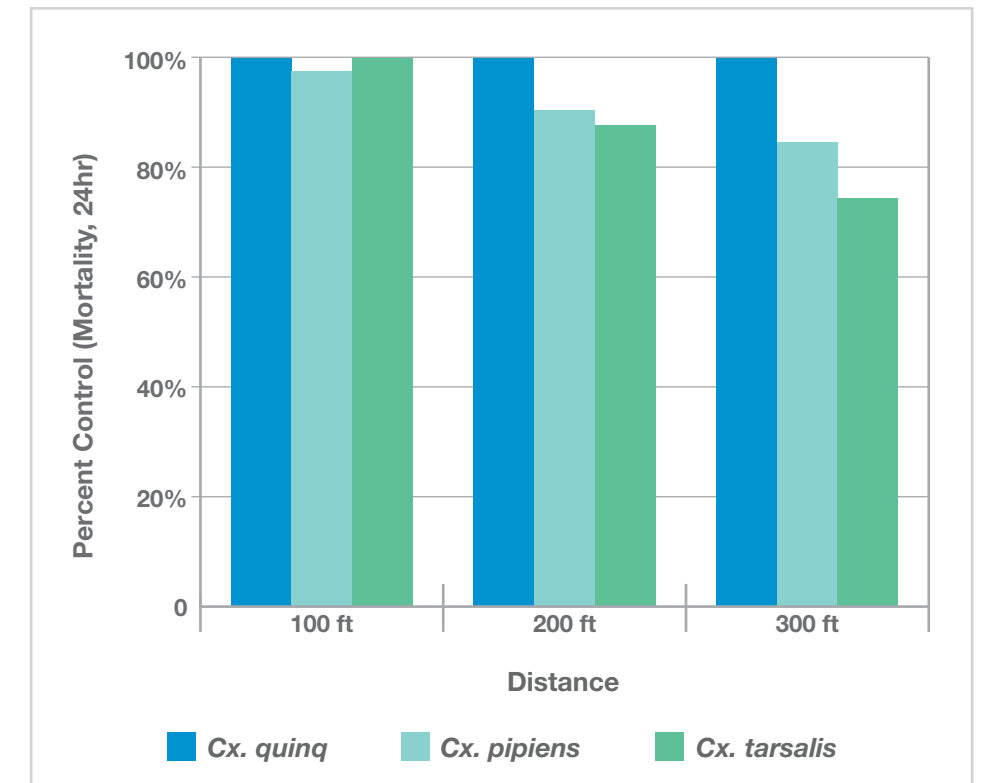
- Three species of mosquitoes used: *Aedes aegypti*, *Aedes taeniorhynchus*, and a susceptible colony of *Culex nigripalpus*
- Known resistance in *Aedes aegypti* with permethrin resistance as well as knockdown resistance
- Application rate:
 DeltaGard: applied at the low label rate;
 Generic synergized permethrin: applied at maximum label rate
- DeltaGard controlled field collected mosquitoes, including a strain with known permethrin and KDR resistance; DeltaGard at the low label rate provided excellent control, while generic synergized permethrin failed to provide acceptable results



CALIFORNIA

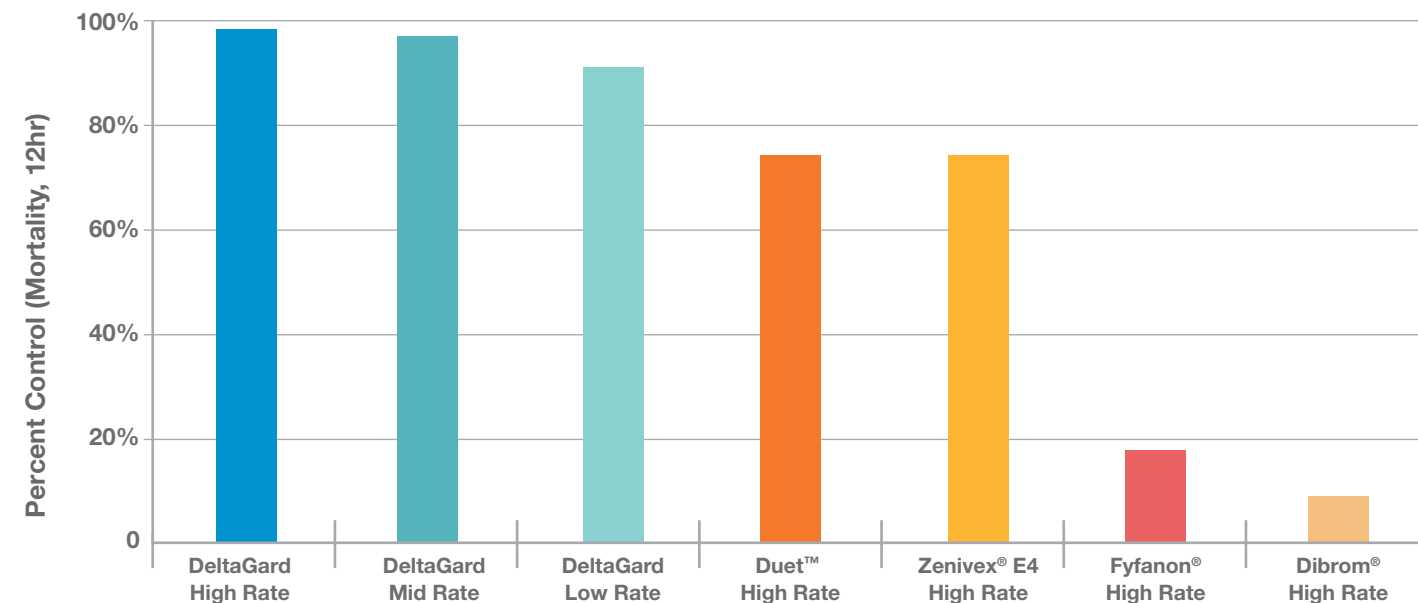
DeltaGard at mid label rate provides excellent control of all mosquito species when compared to synergized phenothrin applied at the maximum label rate (Anvil® 10+10). Anvil failed to provide acceptable control for both the resistant lab colony as well as field collected mosquitoes. DeltaGard demonstrated its excellent ability to control resistant strains, achieving average control of greater than 90%.

DELTAGARD INSECTICIDE (MID RATE)



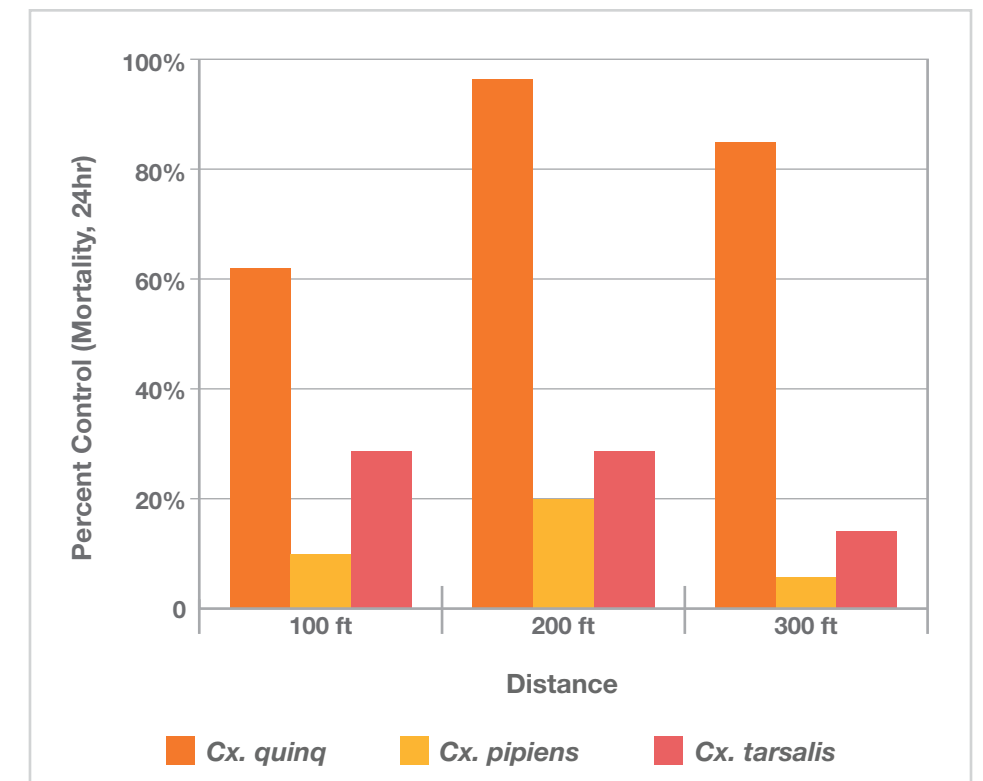
MISSISSIPPI

At all three label rates, DeltaGard Insecticide displayed excellent efficacy against the difficult-to-control mosquito *Anopheles quadrimaculatus*. All competitive products were applied at maximum label rates, and none could achieve the control provided by DeltaGard at its lowest label rate.



<i>Culex. quinquefasciatus</i>	Susceptible lab colony
<i>Culex. pipiens</i>	Pyrethroid Resistant Strain
<i>Culex. tarsalis</i>	Field collected

ANVIL 10+10 (HIGH RATE)



HONEY BEES / POLLINATORS

When used according to label directions and Integrated Mosquito Management best practices, mosquito adulticides pose little risk to pollinators. Do not apply this product or allow drift when bees are foraging the treatment area, except when applications are made to prevent or control a threat to public and/or animal health as determined by a state, tribal or local health or Vector Control agency on the basis of documented evidence of disease-causing agents in vector mosquitoes, or the occurrence of mosquito-borne disease in animal or human populations, or if specifically approved by the state or tribe during a natural disaster recovery effort.

360° VECTOR CONTROL

From the laboratory to the field, all over the world, Bayer works with mosquito control professionals to provide superior solutions for protecting public health, quality of life and the outdoor economy as part of our 360° Vector Control initiatives, which include History and Expertise, Training and Education, Partnerships, Global Advocacy, and Portfolio & Innovation.



An example of Bayer's Advocacy is the video entitled "Vector Control And Why It's Important To You". This video is designed to raise awareness of the public health threat posed by mosquitoes in the United States. Mosquito abatement districts can download a copy of the video by visiting <http://www.backedbybayer.com/vector-control/resource-library> and are encouraged to share it with their community by:

- Posting the video on their district's website
- E-mailing a link to the video to constituents
- Showing the video during educational programs
- Incorporating the video into any other communications vehicles, such as e-newsletters and social media channels



For a copy of the DeltaGard Insecticide label, material safety sheet or more information, go to BackedByBayer.com or call 1-800-331-2867.

Make DeltaGard part of your integrated mosquito control program by calling ADAPCO today at 800-367-0659. When you're Backed By Bayer, you have exactly what you need to get the job done right. And now, we're making getting that job done easier and more efficient than it has ever been before. It's Science for a Better Life.



ALWAYS READ AND FOLLOW LABEL INSTRUCTIONS.

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