Hernando County Mosquito Control Products

Sandra Fisher-Grainger, MPH

Director, HCMCD

Federal Law

- Environmental Protection Agency
 - FIFRA: The Federal Insecticide, Fungicide, and Rodenticide Act is a United States federal law that set up the basic U.S. system of pesticide regulation to protect applicators, consumers, and the environment.
 - A pesticide is any substance or mixture of substances intended for preventing, destroying, repelling, or mitigating any pest, or intended for use as a plant regulator, defoliant, or desiccant, or any nitrogen stabilizer.
 - This is true even if the substance being used is a naturally occurring soil bacterium, it's the fact that it is used to control a pest that makes it a pesticide.

THE LABEL IS THE LAW

All registered pesticide products must display labels that show the following information clearly and prominently:

- Name, brand, or trademark product sold under
- Name and address of the producer or registrant
- Net contents
- Product registration number
- Producing establishment's number
- Ingredient statement
- Warning or precautionary statements
- Directions for use
- Use classification

SPECIMEN LABEL — SPECIMEN LABEL — SPECIMEN LABEL — SPECIMEN LABEL — SPECIMEN LABEL

Summit" ... responsible solutions:

EACH DUNK® KILLS MOSQUITOES FOR 30 DAYS or More



Can be Used in Fish Habitats Place In Containerized Standing Water Wherever It Accumulates Near the Household: Flower Pots - Tree Holes - Bird Houses - Rain Barrels - Roof Gutters Old Tires - Unaced Swimming Pools - Animal Watering Troughs

"Potnosy, 100 Acete acegup (AA) international Taxic Units (TUDyer miligram primary powder The percent active impredient does not incicate product performance and potency measurements are not federally standardized. EPA Registration No. 6216-47 EPA Est. No. 6218 ND-2

MADE IN USA

MOSQUITO BITS®, MOSQUITO DUNKS® are registered trademarks of Summit Chemical Co.

ATTENTION: This specimen label is provided for informational use only. This product may not yet be available for sale in your state or area. The information found in this label may differ from the information found on the product label you are using. Always follow the instructions for use and precautions on the label of the product you are using.

Biological Mosquito Control Mosquito Dunks® EACH DUNK® KILLS MOSQUITOES FOR 30 DAYS OR LONGEF

PRECAUTIONARY STATEMENTS Hazard to Humans: Avoid breathing dust. Causes moderate eye irritation. Avoid contact with eyes or clothing. Wash thoroughly with scap and water after handling and before eating, drinking, chewing gum, using tobacco or using the trillet

Environmental Hazards: Do not apply directly to treated, finished drinking water reservoirs or drinking water receptacles when the water is intended for human consumption.

FIRST AID

 Hold eye open, and rinse slowly and gently with water for 15-20 minutes.
 Perrove contact lenses, if present, after the first 5 minutes, then continue rinsing eye. Call a poison - Call a poison control center or doctor for treatment advice.

HOT LINE NUMBER Have the product container or label with you when calling a poison control center or doctor, or going for treatment. You may also contact 1-800-222-1222 for emergency medical treatment information.

GENERAL INFORMATION

1

GENERAL INFORMATION MOSQUITO DUNKS® hoat on water and will keep on working for 30 days or longer under typical environmental conditors. While foating, hey dwyk release o incorperem, biological mosquito larvicide at the water's keir can be inservice gradualij setties in the water where its each by mosquito larvae growing there MOSQUITO DUNKS® may be used in lypes of container. MOSQUITO DUNKS® may be used in trebut dinining water, where mosquito larvae grow Alemate wetting and driving will not druce their directiveness.

DIRECTIONS FOR USE It is a violation of federal law to use this product in a manner inconsistent with its labeling.

OUTDOOR USE AROUND THE HOUSE Use one (1) MOSQUITO DUNK® for up to 100 square feet of water surface, regardless of depth. They can be used whole or broken into portions and applied to containerized standing

water found near the home such as: Bird Baths - Flower pots - Rain barrels and roof gutters Tree Holes - Animal watering troughs Old automobile tires - Water Gardens

MOSQUITO DUNKS® can be used in any containerized standing water, except finished, treated drinking water found near the home.

State Laws

Statute 388

- Mosquito control is not mandatory for every county
- These laws provide public policy for arthropod control, power to perform work, and power to do all things necessary
- Covers mileage, commissioners, requirements, State aid, equipment, budget reporting, Florida Medical Entomology Lab, Florida Coordinating Council on Mosquito Control
- Administrative Code 5E-13
 - More specific
 - 13.036
 - Ensures adulticiding applications are made only when necessary
 - Demonstrable increase must be verified through surveillance
 - Trapping
 - Landing Rates
 - Visual Confirmation
 - All surveillance and treatment records retained for 3 years.
 - For HCMC, we also take into consideration the species with high numbers in our traps

 Bit State

 <td

CHAPTER 5E-13 MOSOUITO CONTROL PROGRAM ADMINISTRATION

- 5E-13.021 Definitions
- 5E-13.022 Eligibility for State Approved Program and/or Aid
- 5E-13.027 Certified Budgets, Filing 5E-13.030 State Aid Basis and Availability
- 5E-15.050 State Aid Basis and Availability 5E-13.031 District or County Use of Funds
- 5E-13.032 Program Directors, Employment and Classification
- 5E-13.0331 Use of Pesticides for Arthropod Control, Labels, Limitations, Precautions and Storage
- 5E-13.034 Penalty for Failure to Comply with Public Law 92-516, the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) of the U. S. Environmental Protection Agency and Their Rules
- 5E-13.036 Demonstrable Increase or Other Indicator of Arthropod Population Level
- 5E-13.037 Aircraft Application for the Control of Adult Arthropods
- 5E-13.0371 Mosquito Control Aircraft Registration, Inspection, Security, Storage, Transactions, Recordkeeping, Area-of-Application Information and Forms
- 5E-13.039 Protection of Natural Resources and of the Health, Safety, and Welfare of Arthropod Control Employees and the General Public
- 5E-13.040 Criteria for Licensure or Certification of Applicators 5E-13.041 Authorization for the Department to Promulgate Rules an
- 5E-13.041 Authorization for the Department to Promulgate Rules and Regulations More Stringent Than EPA (Repealed) 5E-13.042 Criteria for Arthropod Control That May Affect Environmentally Sensitive and Biologically Productive Public
 - Lands and Other Public Lands



Larvicides

- Bio-rational control materials that are relatively non-toxic with few ecological side effects
- All of our larvicides are non-toxic to humans
- Bti Bacillus thuringiensis israelensis, Bs-Bacillus sphaericus, Saccharopolyspora spinosa (Spinosad)
 - Naturally occurring soil bacteria
 - Either ingested through feeding and/or by contact
 - Bti/Bs produce a protein as crystals or spores that attack the gut wall, paralyzing the larvae
 - Spinosad attacks the nervous system
 - Species specific, breaks down rapidly, limited nontarget impacts
 - Non-toxic to humans, other mammals, fish, birds, beneficial insects, plants, and most aquatic organisms (not black fly larvae)
 - They are ineffective in acidic digestive systems
 - like dragonfly nymphs
 Trade names-Vectobac, AquaBac, Fourstar, Vectolex, Vectomax, Natular



Control healthy larva (a) and larva after 1 h exposure to Bti (b). Note in b the damage caused by the Bti, which can be seen in the form of openings and empty space created.

Alba-Tercedor, J., Vilchez, S. Anatomical damage caused by Bacillus thuringiensis variety israelensis in yellow fever mosquito Aedes aegypti (L.) larvae revealed by micro-computed tomography. Sci Rep 13, 8759 (2023)





Formulations

FORMULATION TYPE
Liquid
Liquid suspension concentrate
Corn cob granule
Silica granule
Silica granule in water soluble pouch
Dust-free tablet
Dust-free tablet
Bi-layer tablet

ATION	LENGTH OF CONTROL
	Single brood
spension ite	Single brood
granule	Single brood, 7+ days
nule	Multi brood, 30 days
nule in uble pouch	Multi brood, 30 days
tablet	Multi brood, 30 days
tablet	Multi brood, 180 days
ablet	Multi brood, 60 days





IGR – Insect Growth Regulators

- Methoprene and Pyriproxyfen
 Mimics the juvenile growth hormones that occur in an insect's body. Natural hormones control how long an insect remains in each larval or nymphal stage. IGRs stop further maturation.
 Very common in flea and tick control, other posticides for post control
 - pesticides for pest control
 - Trade names Altosid Nyguard



Pupacide

- Pupae do not feed
- Monomolecular films create a slick on the water's surface that clogs the pupae's breathing tubes
- They work on larvae as well, but selectively used for pupae
- Trade name Cocobear
 - 10% Mineral oil
 - Used in very small amounts



Adulticides

- Last resort when adult populations have increased, and evidenced through observation, landing rate counts or trap counts
- Only applied in the evenings and early morning hours when beneficial insects are not active but mosquitoes are
- One class of adulticides is Pyrethrin, a mixture of six chemicals that are toxic to insects. They are found naturally in some chrysanthemum flowers.
 - For ULV we use synthetic/man-made pyrethrins called pyrethroids which work by preventing their nervous systems from working properly
 - DUET used in the trucks- a combination of two pyrethroid active ingredients of sumithrin and prallethrin with piperonyl butoxide (a synergist that improves the efficacy of pyrethroids)
 - Aqua Zenivex and Aqua DUET are used in backpack/space sprays, active ingredient in Zenivex is Etofenprox.
 - We also use tau-fluvalinate and Bifenthrin, broad-spectrum pesticides for small area barrier sprays on non-flowering vegetation







Mavrik

ULV and Particle Size

- ULV stands for ultra-low volume because of the low volume of fluid that is required to create enough fog to cover very large areas.
- Large volumes of air at low pressure converts a liquid into droplets that can then be dispersed into the atmosphere.
- Label requires DUET volume median diameter (VMD) of droplets be between 8 and 30 microns and that 90% of the spray is contained in droplets smaller than 50 microns.
- Our trucks VMD is 13-20 microns, with 90% at about 17 microns.
 Backpack VMDs average 8 microns.
- DUET contains 0.075 lbs of Prallethrin/Gallon, 0.375 lbs of Sumithrin/Gallon and 0.375 lbs of Piperonyl Butoxide (PBO)/Gallon
- Calibration and droplet analysis performed annually.







DUET application rate is 1 oz/acre



Pesticide Usage

		Larvicides					Α	dulti	cides		Oth	er	Rainfall
,	/ear	Gallons	Pounds	Pouch/Briquet	Acres	# Treatments	Aldulticide	Acres	# Treatments	Fish	Dump	# Treatments	Inches in Season
	2023	4.76	297	1,121	190	1,131	122.77	15,890	602, 36 by truck	447	1,430	328	34.21
	2022	4.67	633	1,246	300	1,494	154.56	16,249	476, 37 by truck	827	670	282	38.78
/	2021	3.67	1,120	3,140	351	3,268	160.15	23,494	638, 57 by truck	946	734	312	47.12
	2020	4.52	530	2,897	551	2,913	160.28	22,149	535, 54 by truck	1,299	729	375	
	2019	5.36	783	2,571	534	2,239	205.35	26,688	326, 37 by truck	1,230	551	290	



Non-chemical methods of control

Wolbachia

- Wolbachia is an insect bacterium, that does not infect humans or animals
- Over 60% of insects infected, primarily in the Order Diptera (sand flies, blowflies, House Fly, midges, some mosquito species)
- No genetic engineering
- Only female mosquitoes bite. Male mosquitoes do not bite. Both feed on nectar.
- Wolbachia introduced to Ae. aegypti mosquito eggs, they are reared to adults, separated by sex, then only the males are released from the ground. Females may be kept for breeding or destroyed.
- When male Ae. aegypti mosquitoes with Wolbachia mate with wild female mosquitoes that do not have Wolbachia, the eggs will not hatch.
- Reduces the ability of mosquitoes to transmit disease, not just by lowering the population but also by making it harder for the viruses to reproduce inside the mosquito.
- ONLY Aedes aegypti species



*Government of Western Australia Department of Health



When male mosquitoes with *Wolbachia* mate with wild female mosquitoes without *Wolbachia*, those females will lay eggs but they won't hatch.



When male mosquitoes with *Wolbachia* mate with females with *Wolbachia*, all of their offspring will carry *Wolbachia*.



When female mosquitoes with Wolbachia mate with males without Wolbachia, only the female's offspring will carry Wolbachia.

*EliminateDengue.com

Sterile Insect Technique

- Public Health, Agriculture & Livestock- tsetse fly (African trypanosomiasis, also known as sleeping sickness), mosquitoes, Screwworms, Fruit Flies, Pink Bollworm, Codling Moth
- No genetic engineering
- Mosquitoes are reared from eggs and separated by sex
- Males are sterilized in a lab with radiation and then released to mate with females, but no offspring are produced.
- ONLY Aedes aegypti species

Public Health



Livestock



*Entomology Today

Agriculture



*Insect Science

Genetically Modified Mosquitoes-Oxitec

- Only used in the Florida Keys in Floridarequired review and permitting by the EPA
- Self-limiting gene inserted from other organisms
- Repressed with an antidote (tetracycline) during insect production
- In the presence of tetracycline, the insects survive and reproduce in the rearing facility; however, when the males are released into the wild, their offspring cannot access the antibiotic and they die before becoming adults.
- Gene is inherited: Offspring do not survive to adulthood
- After releases stop, genes do not persist in the environment
- ONLY Aedes aegypti species



HC Mosquito Control

- We do not have the budget or capability to deploy any of these methods of control
 - The first two require large facilities with insectaries and dedicated staff.
 - Oxitec is a purchased service, not prepared by the district.
- The department is not associated with, affiliated with, or in any way receiving funds or any other assistance from the Bill & Melinda Gates Foundation or the World Mosquito Program, which does not release Wolbachia mosquitoes in the US.

Aquatic Weed Treatments

- When requested by Waterways
- All technicians are licensed in aquatic weed treatments
- Last treatments were Hunter's Lake in 2021, and Hunter's Lake and Bystre Lake in 2022
- Herbicides
 - Weedar 64 2, 4-Di-chloro-phenoxy-aceitic acid, dimethylamine salt 46.8%
 - Mimics natural plant growth hormones, overstimulates plant cells causing abnormal plant growth and death
 - Predominately toxic to broad leaf plants, much less toxic to mammals, birds, fish, reptiles, shellfish, insects, worms, fungi and bacteria
 - Does not occur in soils and water at levels harmful to animals and microorganisms, does not concentrate in foodchains or persist in croplands
 - Applied at 2 to 4 pints per acre, at 2 to 4 ppm
 - Tribune Diquat dibromide 37.3%
 - Interferes with the photosynthesis within green plant tissue, also a growth inhibitor
 - Used at very low rates and safe for aquatic life, low to no bioconcentration
 - Applied at 0.25 to 0.5 gallons per acre, with concentrations up to 0.37 ppm

Thank you