



Hernando County Mosquito Control Products

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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.

BIOLOGICAL
MOSQUITO CONTROL



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 • Unused Swimming Pools • Animal Watering Troughs

ACTIVE INGREDIENTS: *Bacillus thuringiensis* sub-species israelensis strain
BMP 144 solids, spores and insecticidal toxins* 10.31%
INERT INGREDIENTS: 89.69%
TOTAL 100 %

*Values: 7000 Acres (kg/ai) (AA) International Test Units (ITU) per milligram primary powder
The actual value reported does not include product performance and potency measurements are
not laboratory standard.

EPA Registration No. 6216-47 EPA Est. No. 6216 MD 2

MADE IN USA

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

**KEEP OUT OF REACH OF CHILDREN
CAUTION**

Summit®
...responsible solutions.
235 South Brown Street, Baltimore, MD 21204
800-227-4064 / 410-522-0861
Baltimore, Maryland • 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 LONGER

PRECAUTIONARY STATEMENTS

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

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

IF IN EYES:

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

MOSQUITO DUNKS® float on water and will keep on working
for 30 days or longer under typical environmental conditions.
While floating, they slowly release a long-term, biological
mosquito larvicide at the water's surface. This larvicide
gradually settles in the water where it is eaten by mosquito
larvae growing there. MOSQUITO DUNKS® may be used in
all types of containerized standing water sites, except finished,
treated drinking water, where mosquito larvae grow. Alternate
wetting and drying will not reduce their effectiveness.

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
- Unused swimming pools
- 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

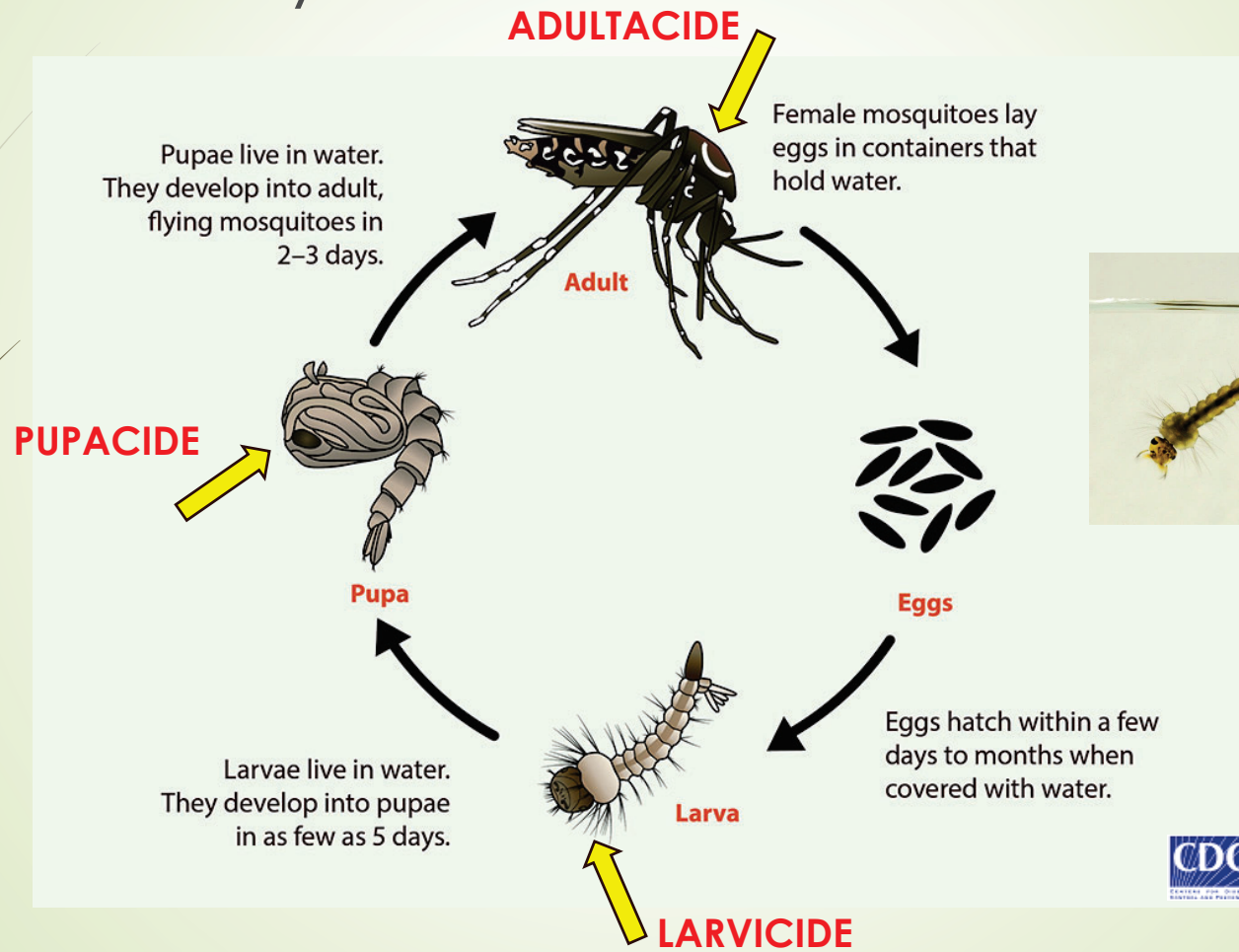
Administrative Code 5E-13

- 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

CHAPTER 388	
MOSQUITO CONTROL	
388.0101	Declaration of legislative intent.
388.011	Definitions.
388.021	Creation of mosquito control districts.
388.101	District boards of commissioners; term of office.
388.111	District boards of commissioners; vacancies.
388.121	District boards of commissioners; organization.
388.123	Commissioners; bond.
388.141	Commissioners; compensation.
388.151	District boards of commissioners; meetings.
388.161	District boards of commissioners; powers and duties.
388.162	Direction of the program.
388.171	Power to perform work.
388.181	Power to do all things necessary.
388.201	District budgets; hearing.
388.211	Change in district boundaries.
388.221	Tax levy.
388.231	Restrictions on use, loan, or rental of equipment; charges.
388.241	Board of county commissioners vested with powers and duties of board of commissioners in certain counties.
388.251	Delegation of authority to county health department.
388.261	State aid to counties and districts for arthropod control; distribution priorities and limitations.
388.271	Prerequisites to participation.
388.281	Use of state matching funds.
388.291	Source reduction measures; supervision by department.
388.301	Payment of state funds; supplies and services.
388.311	Carry over of state funds and local funds.
388.321	Equipment to become property of the county or district.
388.322	Record and inventory of certain property.
388.323	Disposal of surplus property.
388.341	Reports of expenditures and accomplishments.
388.351	Transfer of equipment, personnel, and supplies during an emergency.
388.361	Department authority and rules; administration.
388.371	Enforcement.
388.381	Cooperation by counties and district.
388.391	Control measures in municipalities and portions of counties located outside boundaries of districts.
388.401	Penalty for damage to property or operations.
388.411	Public lands; arthropod control.
388.43	Florida Medical Entomology Laboratory.
388.45	Threat to public or animal health; declarations.
388.46	Florida Coordinating Council on Mosquito Control; establishment; membership; organization; responsibilities.

CHAPTER 5E-13	
MOSQUITO 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-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 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

Life Cycle



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 non-target 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

APPEARANCE	FORMULATION TYPE	LENGTH OF CONTROL
	Liquid	Single brood
	Liquid suspension concentrate	Single brood
	Corn cob granule	Single brood, 7+ days
	Silica granule	Multi brood, 30 days
	Silica granule in water soluble pouch	Multi brood, 30 days
	Dust-free tablet	Multi brood, 30 days
	Dust-free tablet	Multi brood, 180 days
	Bi-layer tablet	Multi brood, 60 days





Natular in Action



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 pesticides for pest control
- Trade names
 - Altosid
 - Nyguard



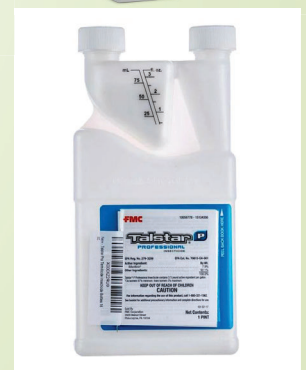
Pupacide

- 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



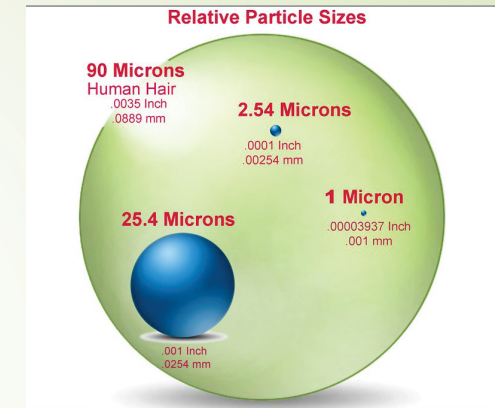
Adulticides

- 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



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



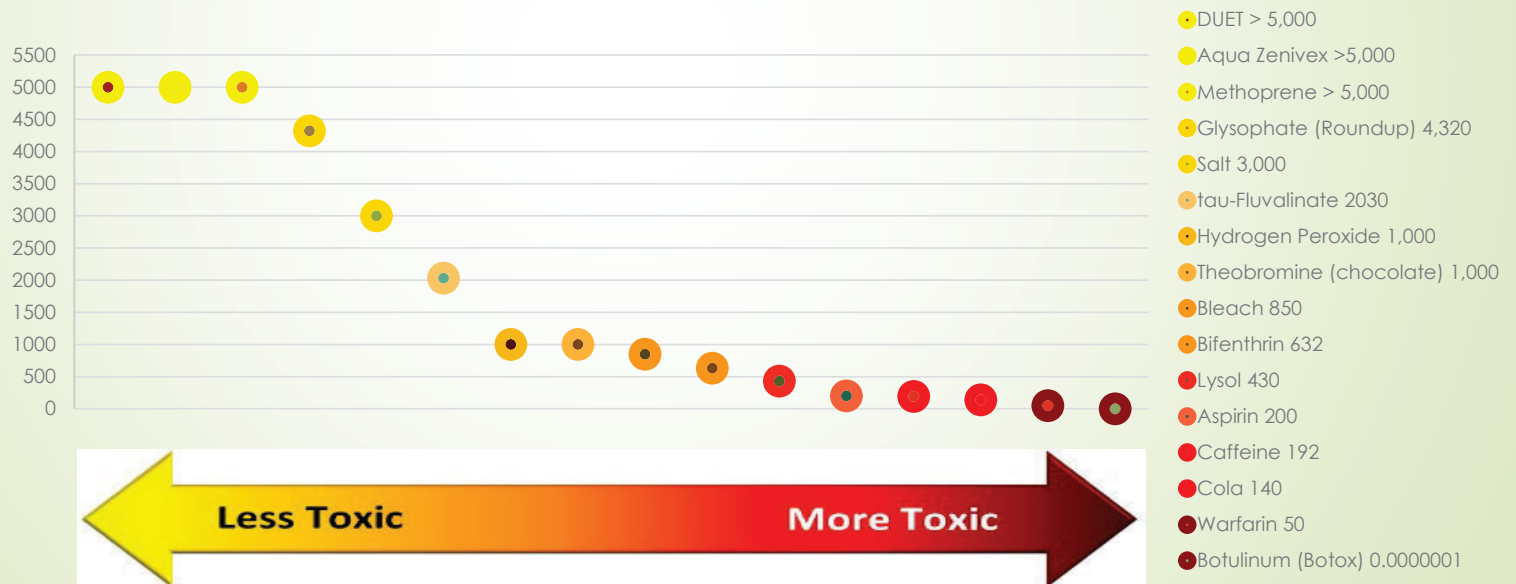
Pesticide Usage

	Larvicides					Adulticides			Other			Rainfall
Year	Gallons	Pounds	Pouch/Briquet	Acres	# Treatments	Adulticide	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	

Toxicity and Lethal Dose

- Lethal dose (LD50) is **the amount of an ingested substance that kills 50 percent of a test sample**. It is expressed in milligrams per kilogram of weight. mg/kg.
- Pesticides are tested on a number of animals, the LD50s I am sharing used rats for all of them, the most common test subjects.
- The lower the number the more toxic it is because it takes less of the substance to kill the subjects.

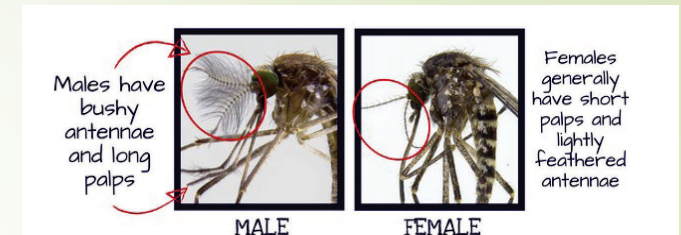
Milligrams per
Kilograms of
Weight



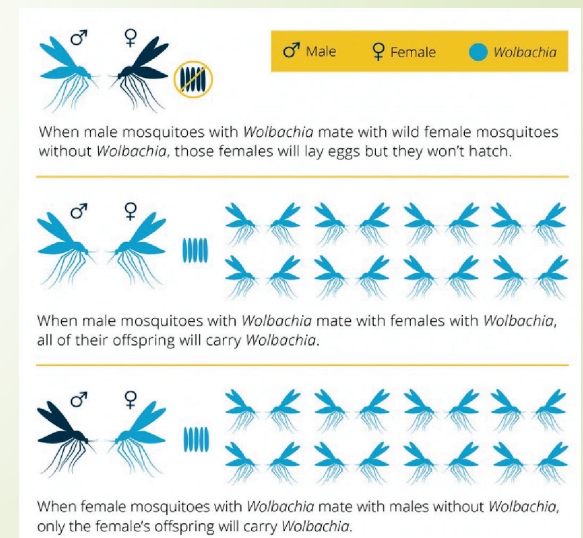
Non-chemical methods of control

➤ 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



*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

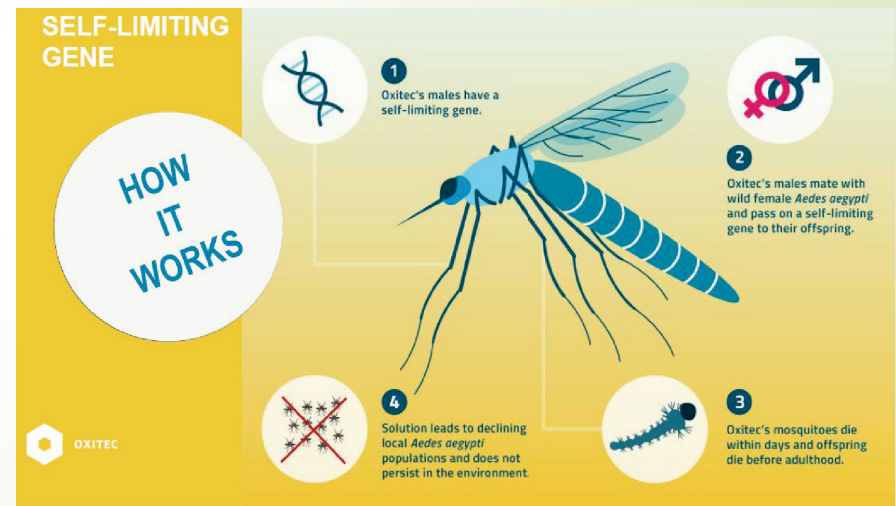
Agriculture



*Insect Science

Genetically Modified Mosquitoes- Oxitec

- Only used in the Florida Keys in Florida-required 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