FKMCD-Oxitec Public Educational Webinar #10
Preparing for the FKMCD-Oxitec Pilot Project:
Overview of Field Design and Management
26 January 2021
Introductions – Panelists With You Today

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FKMCD and Oxitec are hosting a series of public educational webinars to share information with residents of the Florida Keys and provide forums to answer questions.

- Webinars are open to everyone
- Webinars are recorded and made available for everyone after the event.
- All questions relating to the webinar topic(s) will be answered (some in batches if questions are similar)
- If time runs out, we will accept questions in writing via florida@oxitec.com
- Questions and answers will be published in writing after the event with external or related online resources/references

Upcoming:
1. **Roundtable Discussion: Controlling *Aedes aegypti*, the Vector of Dengue, Zika, Heartworm and Other Diseases** – coming in February!
2. **Community Partnerships: The Role Communities Play in our Pilot Project** – coming in March!
Welcome to Webinar #10!

Today’s Agenda:

• Preparing for the FKMCD – Oxitec Pilot Project
• Overview of Field Design and Management
• Your Questions Answered

Documentation, resources, references, and other information are available at keysmosquitoproject.com
Why now, Why the Florida Keys? – Health and the Environment

• Dengue is an ongoing challenge with over 65 confirmed locally-acquired cases in Monroe County in 2020
• The threat of other diseases such as Zika, chikungunya and yellow fever persists
• Insecticide resistance in local mosquitoes
• Need more tools in our toolbox
• Environmental impact is a major consideration, including for human health
• Using species-specific tools minimizes harmful impacts
• Nine national and state agencies concluded Oxitec male mosquitoes pose no risk to human or environmental health

Photo: Jaret Daniels
Endangered Schaus’ swallowtail butterfly lives near the recent dengue outbreak

Dengue Cases in Florida Since 1987

*As of 10/27/2020
**Aedes aegypti is not native to the Americas.** It was most likely transported from Africa by Portuguese ships sometime in the 16th century, **bringing viral diseases with it.**

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Recent History of *Aedes aegypti*: Vector Genomics and Epidemiology Records

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[A link to CDC resources on vector control](https://www.cdc.gov/chikungunya/resources/vector-control.html)
Oxitec’s *Aedes aegypti* Mosquito Technology (OX5034)

**OXITEC’S ADEAE AEGYPTI**

- **Targeted Suppression**
  - Male-only releases (male mosquitoes do not bite)
  - Traceable in the field
  - Self-limiting in the environment

- **Safe, Non-toxic, Non-allergenic**
  - No females produced
  - Low-tech, egg-based devices enabled

- **Proven Effectiveness**
  - Easy track-and-trace in the field
  - Non-toxic, non-allergenic
How Does the Self-Limiting Gene Work?

- Females cannot survive to adulthood
- Male OX5034 mosquitoes are unaffected
- Males pass on one copy of self-limiting gene to achieve significant suppression
- Male-only production reduces 90% of production complexity
- Enables egg release devices

20 million
male OX5034 mosquitoes released in Brazil

1 billion
OX513A mosquitoes produced for release globally

Zero
Negative Impact
OX5034 Demonstrated Effectiveness & Safety

Results:
✓ Safe – no unintended impacts
✓ Males only – no female release
✓ Fully self-limiting – no persistence
✓ Significant suppression (see graph)
✓ 90% reduction in operations
✓ 94%+ public acceptance

Pilot Project #1 for Mini-Capsule Product – 1,000 Person Area
Indaiatuba, Brazil – 17 Week Treatment Ending March, 2020

- 98% weekly high
- 92% 4-week mean
- 90% reduction in operations
- 94%+ public acceptance

Results:
- Safe – no unintended impacts
- Males only – no female release
- Fully self-limiting – no persistence
- Significant suppression (see graph)
- 90% reduction in operations
- 94%+ public acceptance

Graph showing:
- Rapid onset of suppression 6+ weeks ahead of trajectory
- Over 90% suppression achieved in 14 weeks
- Anticipated trajectory

6 Weeks
Faster to Suppression than OX513A

90%
More Efficient Production & Deployment
How Are OX5034 Mosquitoes Delivered to the US?

1. Eggs packaged in mini capsules
2. Boxes placed in out-of-the-way areas
3. No female release & no biting
4. Only male adults in the box
5. No tetracycline in the box
6. No tetracycline in Florida
7. Boxes will be placed in out-of-the-way areas
Do Oxitec Mosquitoes Bite?

**No.**

Oxitec mosquitoes do not bite.

Only female mosquitoes bite

There will be no Oxitec female mosquitoes

Oxitec male mosquitoes are safe and non-toxic

**MALE MOSQUITOES CANNOT BITE**

<table>
<thead>
<tr>
<th>FEMALE:</th>
<th>MALE:</th>
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<tr>
<td>Biting mouthparts</td>
<td>Non-biting mouthparts</td>
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The mouthparts of males mean they are physically unable to bite people
How Oxitec Manages Field Pilots & Data Collection

1. Regulatory Pilots
   - Small
   - High statistical power
   - Protocol approved by regulators
   - Biology/efficacy measured

2. Demonstration Pilots
   - Larger pilot to demonstrate area-wide performance
   - Designed w/ regulator
   - Compared with control

3. Operational Deployment
   - Deployed as vector control tool to suppress vector population over an area
OX5034 performs like a larvicide.

It only kills female larvae of the next generation.

<table>
<thead>
<tr>
<th>METRIC</th>
<th>DESCRIPTION</th>
<th>USEFUL FOR</th>
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<tbody>
<tr>
<td>Abundance</td>
<td>The number of wild <em>Ae. aegypti</em> in a trap</td>
<td>Checking baseline population levels and changes</td>
</tr>
<tr>
<td>Overflooding ratio</td>
<td>The ratio of Oxitec males to wild males</td>
<td>Achieving optimal dose rate</td>
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<tr>
<td>Mating fraction</td>
<td>The proportion of females mated by Oxitec</td>
<td>Evaluating the proportion of the population treated</td>
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<tr>
<td>Efficacy</td>
<td>The percentage of treated females that die</td>
<td>Confirming 100% effective against treated females</td>
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How We Collect Data

1. **Egg Collection Ovitraps**
   - Small plastic cups
   - Monitors the numbers of eggs laid by *Ae. aegypti* females

2. **Adult Mosquito Collection**
   - Captures adults
   - Monitors ratios and numbers of *Ae. aegypti* adults

3. **Lab-based Monitoring/QC**
   - Stereo microscopes
   - Used to track performance and confirm quality
FKMCD-Oxitec Pilot Project

Purpose

1. Broaden the toolbox to protect communities against invasive species and diseases
2. Preserve both the quality of life for residents and the delicate Florida Keys ecosystem
3. Evaluate this safe, innovative tool for fighting *Aedes aegypti*

Project Components

1. Community Engagement
2. Mark-Release-Recapture
3. Project A: Single-point Releases
4. Project B: Area-wide Releases

- ~130 Boxes Placed
- ~28 Weeks Total
- 0 Females Released

*Project: Evaluate Oxitec’s Aedes aegypti Just Add Water Technology*

Just add water: Safe, non-biting males are hatched in small boxes using small mini-capsules.
Project Locations and Mosquito Releases

**Project A (single-point release)**
- 1 box per week
- 9 small areas
- ~12 weeks

**Project B (multi-point release)**
- Small number of devices placed per week in up to 6 areas
- ~16 weeks
Pilot Project Design

Project Design Elements

1. Single-point release, trapping males and offspring
2. Multi-point release, trapping offspring
3. Replicated and compared to untreated areas
4. Specific locations to be determined
5. Timing: 2021-2022 (including baseline monitoring)

Evaluation Elements

1. Male flight range and longevity
2. Duration of effect (residual activity)
3. Evaluation of natural breeding sites
4. % kill of female mosquitoes
5. % of the wild population treated
Florida Keys Pilot Project Timeline - 2021

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<tr>
<th>PRE-SEASON</th>
<th>MOSQUITO SEASON</th>
<th>POST-SEASON</th>
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<tr>
<td>Community engagement</td>
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<tr>
<td>Staff training &amp; preparations</td>
<td>Pre-release mosquito monitoring</td>
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<td></td>
<td>Release of Oxitec mosquitoes</td>
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<tr>
<td></td>
<td>Monitoring &amp; evaluation</td>
<td>Post-release monitoring</td>
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Recent Community Engagement

Beginning in spring 2021, the Florida Keys Mosquito Control District (FKMCD) and Oxitec will evaluate the effectiveness of Oxitec mosquitoes to control the invasive, disease-spreading Aedes aegypti mosquito in the Florida Keys.

- Oxitec mosquitoes are safe and self-limiting.
- Unlike male mosquitoes, Oxitec's male mosquitoes do not bite. Female mosquitoes bite and spread disease.
- The Aedes aegypti mosquito is the known vector of diseases including Dengue and Zika and is becoming more resistant to traditional pesticides.

Please visit keysmosquitocontrol.com for additional resources.

Virtual Tour: Inside Oxitec Labs Worldwide

FKMCD - #Oxitec Public Educational Webinar #9:
51 views • 1 month ago

FKMCD - #Oxitec Public Educational Webinar #8:
90 views • 2 months ago

Virtual Tour: Inside #Oxitec Labs Worldwide
458 views • 2 months ago

FKMCD - #Oxitec Public Educational Webinar #7:
68 views • 2 months ago
Get Involved!

- Request a box
- Request a trap
- Sign up for updates
- Volunteer as a Project Ambassador

JOIN THE PROJECT!
Any and all questions on this evening’s topics are welcome!

(If we run out of time tonight, email florida@oxitec.com and we will attempt to answer your question if it isn’t included in the growing FAQ or post-event summary we publish online at oxitec.com/florida and keysmosquitoproject.com)