



2nd Delta MVCD-Oxitec Public Educational Webinar, May 24th 2022
Oxitec's Scientific Publications, Independent Validation, and Data Transparency

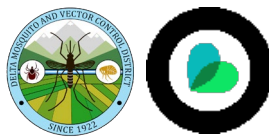
Introductions – Panelists With You Today



**Rajeev
Vaidyanathan**
Director of U.S. Programs
Oxitec



**Kevin
Gorman**
Chief Development Officer
Oxitec



Delta MVCD-Oxitec Public Educational Webinars

Introduction to our Webinar Series

Delta MVCD and Oxitec are hosting a series of public educational webinars to share information with residents of Tulare County 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 info@oxitec.com.
- Questions and answers will be published in writing after the event with external or related online resources/references.

Delta MVCD-Oxitec Public Educational Webinars

Welcome to Webinar #2!

Today's Agenda:

- Oxitec's Scientific Publications, Independent Validation and Data Transparency
- Recent Community Engagement & Chance to Join the Project!
- Your Questions, Answered



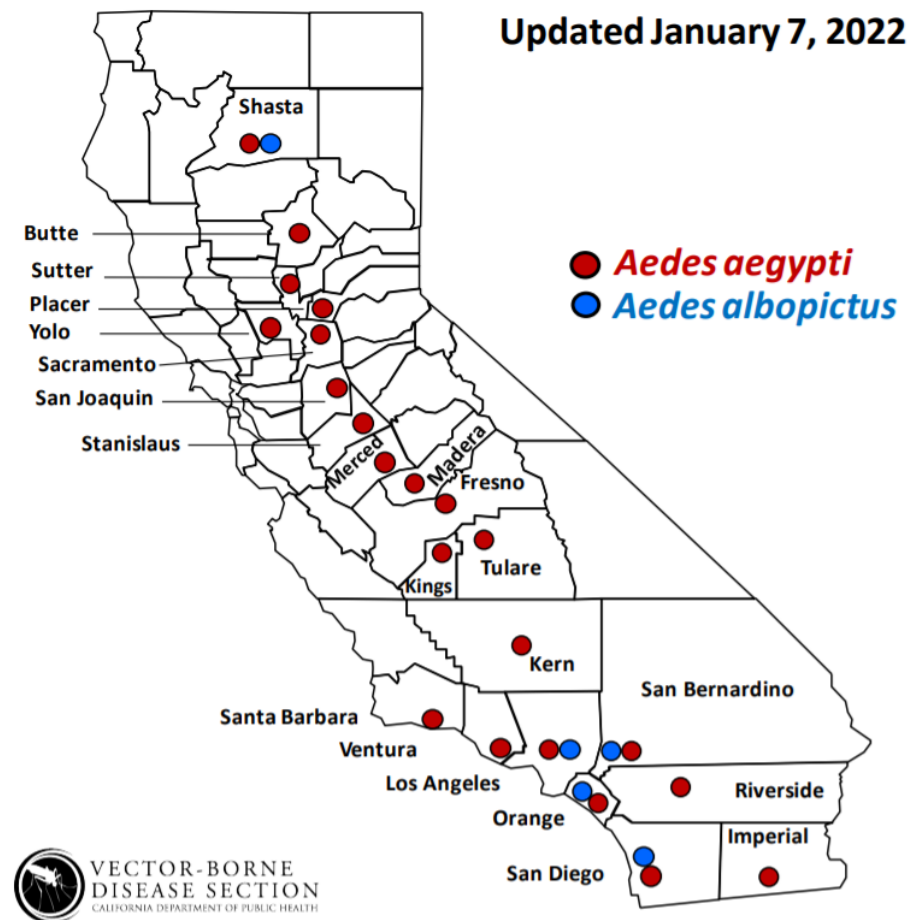
Photo by [Paul Hanaoka](#) on [Unsplash](#)

Documentation, resources, references, and other information are available at oxitec.com/california

Why Now, Why California?

Invasive *Aedes aegypti*, pyrethroid resistance, and challenges unique to *Aedes aegypti*

- Potential risk of local dengue, Zika, chikungunya, and yellow fever transmission.
- **2013:** *Ae. aegypti* detected in **Fresno, Madera, and San Mateo Counties.**
- **2014:** *Ae. aegypti* persisted in those 3 counties and were also detected in **Kern, Tulare, Los Angeles, and San Diego Counties.**
- **2015:** Detected in **Imperial and Orange Counties.**
- **Inherent challenges to *Ae. aegypti* control.** Cryptic harborages, oviposition & larval sites, daytime behavior.
- **Insecticide resistance:** Need more tools in our toolbox.

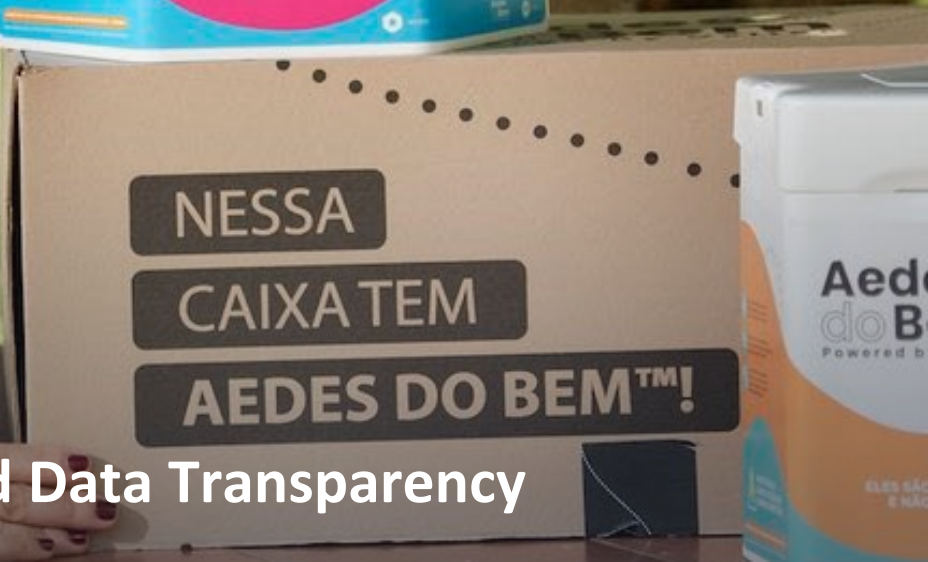


Ten Districts in California Expressed Interest

These mosquito control districts spanned the state!

- Each expressed an **interest to participate on pilot projects.**
- Their names were formally submitted in our initial EUP amendment to the EPA, later narrowing this down to Tulare, Stanislaus, Fresno and San Bernardino counties.
- Some counties/districts have had abundant populations of *Aedes aegypti* since 2013-2014.
- Others detected this invasive pest as recently as 2020.





Oxitec's Scientific Publications, Independent Validation and Data Transparency

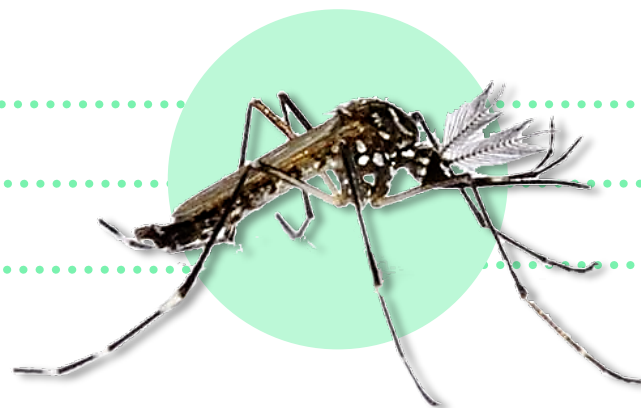
Oxitec's *Aedes aegypti* Male Mosquitoes

Oxitec male mosquitoes mate with invasive female pests, and only the male offspring of these encounters survive

✓ TARGETED SUPPRESSION

✓ SAFE, NON-TOXIC, NON-ALLERGENIC

✓ PROVEN EFFECTIVE



♥ Self-limiting gene

♥ Marker gene

MALE-ONLY RELEASES
(male mosquitoes do not bite!)

TRACEABLE IN THE FIELD

SELF-LIMITING IN THE ENVIRONMENT



Oxitec's Technology: Over 100 Scientific Peer-Reviewed Articles

<https://www.oxitec.com/en/our-technology#publications>



Peer Review and the Scientific Method



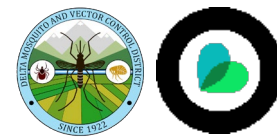
Peer Review and the Scientific Method

Who Are Peer Reviewers?

- Scientific experts in the field
- Proven scientific record
- Selected by journals following a rigorous process
- Independent – No competing interests
- Anonymous
- No remuneration

What Do They Judge?

- Novelty and originality
- Topicality and relevance
- Scientific integrity (study design, data collection and analysis)
- Consistency (results vs conclusions)
- Language, style and use of references
- Ethical standards



Peer-Reviewed: Development In Multiple Mosquito Species

OPEN ACCESS Freely available online



The Orthologue of the Fruitfly Sex Behaviour Gene *Fruitless* in the Mosquito *Aedes aegypti*: Evolution of Genomic Organisation and Alternative Splicing

Marco Salvemini^{1*}, Rocco D'Amato¹, Valeria Petrella¹, Serena Aceto¹, Derric Nimmo², Marco Neira², Luke Alphey^{2,3}, Lino C. Polito¹, Giuseppe Saccone¹

¹Department of Biological Sciences – Section of Genetics and Molecular Biology, University of Naples “Federico II”, Naples, Italy, ²Oxitec Limited, Oxford, United Kingdom, ³Department of Zoology, University of Oxford, Oxford, United Kingdom

Abstract

BMC Biology



Research article

Open Access

Late-acting dominant lethal genetic systems and mosquito control
Hoang Kim Phuc¹, Morten H Andreasen¹, Rosemary S Burton¹, Céline Vass¹, Matthew J Epton¹, Gavin Pape¹, Guoliang Fu², Kirsty C Condon^{1,2}, Sarah Scaife², Christl A Donnelly³, Paul G Coleman^{3,4}, Helen White-Cooper¹ and Luke Alphey^{*1,2}

Mem Inst Oswaldo Cruz, Rio de Janeiro, Vol. 108(4): 529-531, June 2013 529

DsRed2 transient expression in *Culex quinquefasciatus* mosquitoes

André Barretto Bruno Wilke^{1/†}, Sarah Scaife², Luke Alphey^{2,3}, Mauro Toledo Marrelli¹

¹Departamento de Epidemiologia, Faculdade de Saúde Pública, Universidade de São Paulo, São Paulo, SP, Brasil

²Oxitec Ltd, Oxford, United Kingdom ³Department of Zoology, University of Oxford, Oxford, United Kingdom

Culex quinquefasciatus mosquitoes have been successfully genetically modified only once, despite the efforts

Marinotti et al. *Malaria Journal* 2013, **12**:142
<http://www.malariajournal.com/content/12/1/142>



RESEARCH

Open Access

Development of a population suppression strain of the human malaria vector mosquito, *Anopheles stephensi*

Oswaldo Marinotti¹, Nijole Jasinskiene¹, Aniko Fazekas¹, Sarah Scaife², Guoliang Fu², Stefanie T Mattingly¹, Karissa Chow¹, David M Brown³, Luke Alphey^{2,4} and Anthony A James^{1,3*}

OPEN ACCESS Freely available online



Female-Specific Flightless (fsRIDL) Phenotype for Control of *Aedes albopictus*

Geneviève M. C. Labbé^{1,2}, Sarah Scaife¹, Siân A. Morgan¹, Zoë H. Curtis¹, Luke Alphey^{1,3*}

¹Oxitec Limited, Oxford, United Kingdom, ²Division of Biology, Imperial College London Silwood Park, Ascot, United Kingdom, ³Department of Zoology, University of Oxford, Oxford, United Kingdom

Abstract

Peer-Reviewed: Development In Multiple Mosquito Species

Full independent evaluation and assessments demonstrate potential of the technology for control of:

- ✓ *Aedes aegypti*
- ✓ *Aedes albopictus*
- ✓ *Culex quinquefasciatus*
- ✓ *Anopheles stephensi*

Application
to a range
of disease
vectors

Oxitec
mosquitoes
offer
advantages

Minimal
effect on
fitness



Peer Reviewed: Full Biosafety of Oxitec Insects

BMC Biology



Research article

Open Access

Late-acting dominant lethal genetic systems and mosquito control

Hoang Kim Phuc¹, Morten H Andreasen¹, Rosemary S Burton¹, Céline Vass¹, Matthew J Epton¹, Gavin Pape¹, Guoliang Fu², Kirsty C Condon^{1,2}, Sarah Scaife², Christl A Donnelly³, Paul G Coleman^{3,4}, Helen White-Cooper¹ and Luke Alphey^{*1,2}

PLOS NEGLECTED TROPICAL DISEASES

RESEARCH ARTICLE

Assessment of the Impact of Potential Tetracycline Exposure on the Phenotype of *Aedes aegypti* OX513A: Implications for Field Use

Zoe Curtis^{1,2*}, Kelly Matzen¹, Marco Neira Oviedo^{1,3a}, Derric Nimmo¹, Pamela Gray¹, Peter Winskill^{1,2}, Marco A. F. Locatelli^{3,4}, Wilson F. Jardim^{3,4}, Simon Warner¹, Luke Alphey^{1,5a,b}, Camilla Beech¹

Research Article



Received: 11 August 2015 Revised: 9 September 2015 Accepted article published: 16 September 2015 Published online in Wiley Online Library: 16 October 2015
(wileyonlinelibrary.com) DOI 10.1002/ps.4151

Short-term suppression of *Aedes aegypti* using genetic control does not facilitate *Aedes albopictus*

Kevin Gorman,^{a*} Josué Young,^b Lleysa Pineda,^b Ricardo Márquez,^b Nestor Sosa,^b Damaris Bernal,^b Rolando Torres,^b Yamilitzel Soto,^b Renaud Lacroix,^a Neil Naish,^a Paul Kaiser,^a Karla Tepedino,^a Gwilym Philips,^a Cecilia Kosmann^a and Lorenzo Cáceres^b

available online

PLOS ONE

Oral Ingestion of Transgenic RIDL *Ae. aegypti* Larvae Has No Negative Effect on Two Predator *Toxorhynchites* Species

Oreanaiza Nordin¹, Wesley Donald¹, Wong Hong Ming¹, Teoh Guat Ney¹, Khairul Asuad Mohamed¹, Nor Azlina Abdul Halim¹, Peter Winskill^{3,4}, Azahari Abdul Hadi¹, Zulkamal Safi'in Muhammad¹, Renaud Lacroix³, Sarah Scaife³, Andrew Robert McKemey³, Camilla Beech³, Murad Shahnaz¹, Luke Alphey^{2,3}, Derric David Nimmo^{3*}, Wasi Ahmed Nazni¹, Han Lim Lee¹

¹ Medical Entomology Unit, Institute for Medical Research, Jalan Pahang, Kuala Lumpur, Malaysia, ² Department of Zoology, University of Oxford, Oxford, United Kingdom, ³ Oxitec Limited, Abingdon, Oxford, United Kingdom, ⁴ Medical Research Council Centre for Outbreak Analysis and Modelling, Department of Infectious Disease Epidemiology, Imperial College, London, United Kingdom

Hindawi
Psyche
Volume 2018, Article ID 7814643, 7 pages
https://doi.org/10.1155/2018/7814643



Research Article Self-Limiting OX513A *Aedes aegypti* Demonstrate Full Susceptibility to Currently Used Insecticidal Chemistries as Compared to Indian Wild-Type *Aedes aegypti*

Prabhakargouda B. Patil¹, Kevin J. Gorman², Shaibal K. Dasgupta¹, K. V. Seshu Reddy¹, Shirish R. Barwale¹ and Usha B. Zehr¹

¹ Gangubai Hanumanthrao Investment and Trading Limited (GHIT), P.O. Box 76, Jalna-Aurangabad Road, Dawahwadi, Badnagar, Jalna, Maharashtra State 431 303, India.

SCIENTIFIC REPORTS

OPEN Exposure to genetically engineered olive fly (*Bactrocera oleae*) has no negative impact on three non-target organisms

Received: 16 May 2017
Accepted: 30 August 2017
Published online: 13 September 2017

Thea Marubbi¹, Clare Cassidy^{1,3}, Esther Miller¹, Martha Koukidou¹, Enca Martin-Rendon¹, Simon Warner¹, Augusto Loni² & Camilla Beech^{1,4}

Peer-Reviewed: Full Biosafety of Oxitec Insects

Full independent evaluation and assessments demonstrate:

- ✓ No impact on non-target organisms
- ✓ No evidence of niche replacement
- ✓ No long-term persistence of the self-limiting gene
- ✓ Biology comparable to wild-type counterparts

**Non-toxic
and non-
allergenic**

**Rapidly
disappears
from the
environment**

**Insecticide
susceptible**



Peer-Reviewed: Field Performance of Oxitec Mosquitoes



RESEARCH ARTICLE

Suppression of a Field Population of *Aedes aegypti* in Brazil by Sustained Release of Transgenic Male Mosquitoes

Danilo O. Carvalho^{1,2*}, Andrew R. McKemey^{1*}, Luiza Garziera³, Renaud Lacroix¹, Chris A. Donnelly⁴, Luke Alphey^{1,5,6}, Aldo Malavasi³, Margaret L. Capurro^{2,7}

Research Article

Received: 11 August 2015 | Revised: 9 September 2015 | Accepted article published: 16 September 2015 | Published online in Wiley Online Library: 16 October 2015
(wileyonlinelibrary.com) DOI 10.1002/ps.4151

Short-term suppression of *Aedes aegypti* using genetic control does not facilitate *Aedes albopictus*

Kevin Gorman,^{a*} Josué Young,^b Lleysa Pineda,^b Ricardo Márquez,^b Nestor Sosa,^b Damaris Bernal,^b Rolando Torres,^b Yamilitzel Soto,^b Renaud Lacroix,^a Neil Naish,^a Paul Kaiser,^a Karla Tepedino,^a Gwilym Philips,^a Cecilia Kosmann^a and Lorenzo Cáceres^b



RESEARCH ARTICLE

Dispersal of Engineered Male *Aedes aegypti* Mosquitoes

Peter Winskill^{1,2*}, Danilo O. Carvalho^{3*}, Margaret L. Capurro^{4,5}, Luke Alphey^{2,6,7}, Christi A. Donnelly^{1*}, Andrew R. McKemey^{2*}



RESEARCH ARTICLE

Assessment of the Impact of Potential Tetracycline Exposure on the Phenotype of *Aedes aegypti* OX513A: Implications for Field Use

Zoe Curtis^{1,2*}, Kelly Matzen¹, Marco Neira Oviedo^{1*}, Derric Nimmo¹, Pam Peter Winskill^{1,2}, Marco A. F. Locatelli^{3,4}, Wilson F. Jardim^{3,4}, Simon Warn Luke Alphey^{1,5,6*}, Camilla Beech¹

OPEN ACCESS Freely available online



Open Field Release of Genetically Engineered Sterile Male *Aedes aegypti* in Malaysia

Renaud Lacroix^{1,2*}, Andrew R. McKemey^{2*}, Norzahira Raduan^{1,3}, Lim Kwee Wee³, Wong Hong Ming³, Teoh Guat Ney³, Siti Rahidah A.A.³, Sawaluddin Salman³, Selvi Subramaniam³, Oreenaiza Nordin³, Norhaida Hanum A.T.³, Chandru Angamuthu³, Suria Marlina Mansor³, Rosemary S. Lees⁴, Neil Naish², Sarah Scaife², Pam Gray², Geneviève Labbé², Camilla Beech², Derric Nimmo², Luke Alphey^{2,5*}, Seshadri S. Vasan^{1,4}, Lee Han Lim^{3*}, Nazni Wasi A.³, Shahnaz Murad³

¹ Oxitec Sendirian Berhad, Kuala Lumpur, Wilayah Persekutuan, Malaysia, ² Oxitec Limited, Oxford, Oxfordshire, United Kingdom, ³ Medical Entomology Unit, Institute for Medical Research, Kuala Lumpur, Wilayah Persekutuan, Malaysia, ⁴ Centre for Research in Biotechnology for Agriculture, University of Malaya, Kuala Lumpur, Wilayah Persekutuan, Malaysia, ⁵ Department of Zoology, University of Oxford, Oxford, Oxfordshire, United Kingdom



Correspondence | Published: 10 September 2012

Successful suppression of a field mosquito population by sustained release of engineered male mosquitoes

Angela F Harris, Andrew R McKemey, Derric Nimmo, Zoe Curtis, Isaac Black, Siân A Morgan, Marco Neira Oviedo, Renaud Lacroix, Neil Naish, Neil I Morrison, Amandine Collado, Jessica Stevenson, Sarah Scaife, Tarig Dafa'alla, Guoliang Fu, Caroline Phillips, Andrea Miles, Norzahira Raduan, Nick Kelly, Camilla Beech, Christi A Donnelly, William D Petrie & Luke Alphey

Research Article

Received: 17 February 2014 | Revised: 10 July 2014 | Accepted article published: 31 July 2014 | Published online in Wiley Online Library: 1 September 2014
(wileyonlinelibrary.com) DOI 10.1002/ps.3873

Mating competitiveness and life-table comparisons between transgenic and Indian wild-type *Aedes aegypti* L.

Prabhakargouda B Patil,^{a*} BP Niranjan Reddy,^{a*} Kevin Gorman,^b KV Seshu Reddy,^{a*} Shirish R Barwale,^a Usha B Zehr,^a Derric Nimmo,^b Neil Naish^b and Luke Alphey^b



SPECIAL ISSUE - STERILE INSECT TECHNIQUE

DOI: 10.1111/eea.12618

Effect of interruption of over-flooding releases of transgenic mosquitoes over wild population of *Aedes aegypti*: two case studies in Brazil

Luiza Garziera¹, Michelle Cristine Pedrosa^{1,2}, Fabrício Almeida de Souza¹, Maylen Gómez¹, Márcia Bento Moreira³, Jair Fernandes Virginio¹, Margaret Lara Capurro² & Danilo Oliveira Carvalho^{2*}

Peer-Reviewed: Field Performance of Oxitec Mosquitoes



7
OX513A field studies published

Strong mating and dispersal

Operational viability

STRAIN	COUNTRY	LOCATION	YEAR	INDEPENDENT SCIENTIFIC REVIEW
1st Gen (OX513A)	Grand Cayman	East End	2009	Harris et al (2011) Nature Biotech., 29:1034-1037
	Grand Cayman	East End	2010	Harris et al (2012) Nature Biotech. 30:828-830
	Malaysia	Pahang	2011	Lacroix et al (2012) PLoS One, 7(8): e42771
	Brazil	Itaberaba	2012	Carvalho et al (2015) PLoS Negl Trop Dis 9(7): e0003864.
		Mandacaru	2012-2013	Garziera et al (2017) Entomol. Experiment. Appl. 164, 327–339 (2017).
		Pedra Branca	2013-2015	
Panama	Nuevo Chorrillo	2014	Gorman et al (2016) Pest Man. Sci. 72(3):618-28. doi: 10.1002/ps.4151.	
2nd Gen (OX5034)	Brazil	Indaiatuba – adult release	2018-2019	Publication expected later in 2022
	USA	Florida Keys – egg release	2021-	Project ongoing



Peer-Reviewed: Development In Agricultural Pests

Reavey et al. *BMC Biotechnology* (2022) 22:5
https://doi.org/10.1186/s12896-022-00735-9

BMC Biotechnology

RESEARCH ARTICLE Open Access

Self-limiting fall armyworm: a new approach in development for sustainable crop protection and resistance management

Catherine E. Reavey¹, Adam S. Walker¹, Stephen P. Joyce¹, Lucy Broom^{1,4}, Alan Willse², Kyla Ercit¹, Mattia Poletto¹, Zoe H. Barnes¹, Thea Marubbi¹, Bartłomiej J. Troczka¹, David Treanor¹, Katherine Ben Granville¹, Vanessa de Mello¹, Joss Teal¹, Edward Sulston¹, Anna Ashton¹, Luxziyah Akilan¹, Oliver Stevens¹, Nerys Humphreys-Jones¹, Simon A. J. Warner^{1,3}, Sian A. M. Spinner¹, Nathan R. Graham Head², Neil I. Morrison¹ and Kelly J. Matzen¹✉

First Field Release of a Genetically Engineered, Self-Limiting Agricultural Pest Insect: Evaluating Its Potential for Future Crop Protection

Anthony M. Shelton^{1*}, Stefan J. Long¹, Adam S. Walker², Michael Bolton^{2,3}, Hilda L. Collins¹, Loïc Revuelta², Lynn M. Johnson⁴ and Neil I. Morrison²

¹Department of Entomology, AgrITech, New York State Agricultural Experiment Station, Cornell University, Geneva, NY, United States
²Oxitec Ltd, Milton Park, Abingdon, United Kingdom
³School of Biological Sciences, Norwich Research Park, University of East Anglia, Norwich, United Kingdom
⁴Cornell Statistical Consulting Unit, Cornell University, Ithaca, NY, United States

PROCEEDINGS OF THE ROYAL SOCIETY B
BIOLOGICAL SCIENCES

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Research articles
Genetic elimination of field-cage populations of Mediterranean fruit flies

Philip T. Leftwich, Martha Koukidou, Polychronis Rempoulakis, Hong-Fei Gong, Antigoni Zacharopoulou, Guoliang Fu, Tracey Chapman, Aris Economopoulos, John Vontas and Luke Alphey

Published: 07 October 2014 | https://doi.org/10.1098/rspb.2014.1372

BMC Biology

Home About Articles Submission Guidelines

Research article | Open Access | Published: 16 July 2015

Pest control and resistance management through release of insects carrying a male-selecting transgene

Tim Harvey-Samuel, Neil I. Morrison ✉, Adam S. Walker, Thea Marubbi, Ju Yao, Hilda L. Collins, Kevin Gorman, T. G. Emyr Davies, Nina Alphey, Simon Warner, Anthony M. Shelton & Luke Alphey

BMC Biology 13, Article number: 49 (2015) | Cite this article

14k Accesses | 25 Citations | 704 Altmetric | Metrics

PROCEEDINGS OF THE ROYAL SOCIETY
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Genetic elimination of field-cage populations of Mediterranean fruit flies

Philip T. Leftwich^{1,2}, Martha Koukidou¹, Polychronis Rempoulakis^{1,3}, Hong-Fei Gong¹, Antigoni Zacharopoulou⁴, Guoliang Fu¹, Tracey Chapman², Aris Economopoulos³, John Vontas³ and Luke Alphey^{1,5,6}✉

¹Oxitec Limited, 71 Innovation Drive, Milton Park, Oxford OX14 4RQ, UK
²School of Biological Sciences, University of East Anglia, Norwich Research Park, Norwich, Norfolk NR4 7TJ, UK
³Faculty of Biotechnology and Applied Biology, Department of Biology, University of Crete, Heraklion, Crete, Greece
⁴Department of Biology, Division of Genetics, Cell and Developmental Biology, University of Patras, Patras, Greece
⁵Department of Zoology, University of Oxford, South Parks Road, Oxford OX1 3PS, UK
⁶The Pirbright Institute, Ash Road, Woking GU24 0NF, UK

Cite this article: Leftwich PT et al. 2014 Genetic elimination of field-cage populations of Mediterranean fruit flies. *Proc. R. Soc. B*

OPEN ACCESS Freely available online

Engineered Repressible Lethality for Controlling the Pink Bollworm, a Lepidopteran Pest of Cotton

Neil I. Morrison^{1,2}, Gregory S. Simmons^{3,4}, Guoliang Fu^{1,2}, Sinead O'Connell¹, Adam S. Walker¹, Tarig Dafa'alla¹, Michelle Walters³, John Claus³, Guolei Tang³, Li Jin^{1,2}, Thea Marubbi¹, Matthew J. Epton², Claire L. Harris¹, Robert T. Staten³, Ernest Miller³, Thomas A. Miller⁵, Luke Alphey^{1,2*}

Abstract
The sterile insect technique (SIT) is an environmentally friendly method of pest control in which insects are mass-produced, irradiated and released to mate with wild counterparts. SIT has been used to control major pest insects including the pink bollworm (*Pectinophora gossypiella* Saunders), a global pest of cotton. Transgenic technology has the potential to overcome

BMC Biology 2012, 10:51
www.biomedcentral.com/1741-7007/10/51

RESEARCH ARTICLE Open Access

Control of the olive fruit fly using genetics-enhanced sterile insect technique

Thomas Ant^{1,2}, Martha Koukidou¹, Polychronis Rempoulakis^{1,3}, Hong-Fei Gong¹, Aris Economopoulos³, John Vontas³ and Luke Alphey^{1,2*}

1,662 Views
0 CrossRef citations to date
3 Altmetric

Preventative releases of self-limiting *Ceratitis capitata* provide pest suppression and protect fruit quality in outdoor netted cages

Romisa Asadi ✉, Rachid Elaini, Renaud Lacroix, Thomas Ant, Amandine Collado, Lucy Finnegan, ...show all
Pages 182-193 | Received 12 Mar 2018, Accepted 25 Mar 2019, Published online: 23 Apr 2019

Download citation | https://doi.org/10.1080/09670874.2019.1601293 | Check for updates

Full Article | Figures & data | References | Citations | Metrics | Licensing | Reprints & Permissions

Abstract

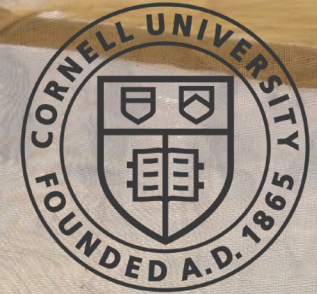


Peer-Reviewed: Development In Agricultural Pests

Promising
and
sustainable
crop
protection

Strong field
performance

Dilution of
insecticide
resistance



Full independent evaluation and assessments
demonstrate technical development in agricultural pests:

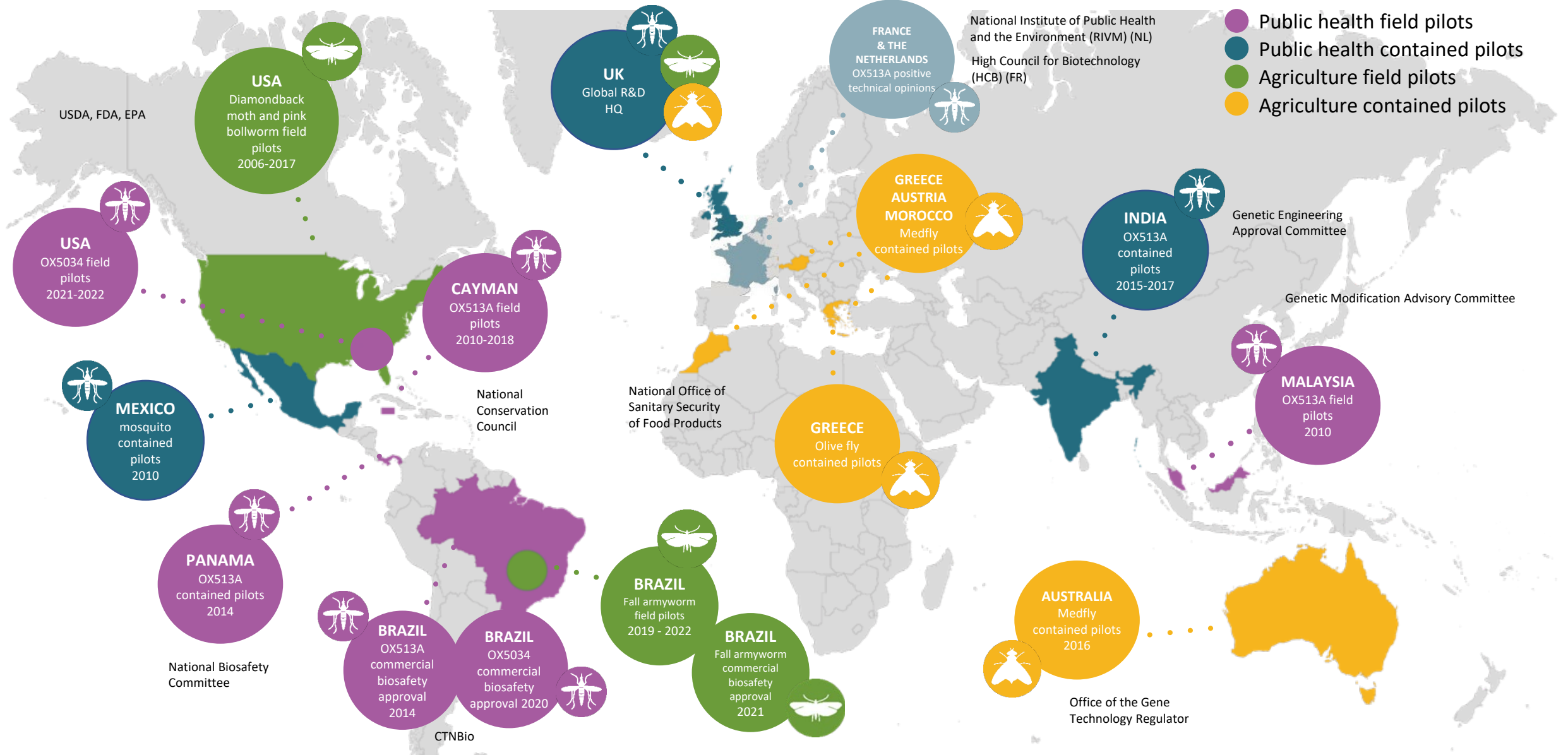
- ✓ Fall armyworm
- ✓ Mediterranean fruit fly (fruit)
- ✓ Pink bollworm (cotton)
- ✓ Diamondback moth (field crops)
- ✓ Olive fly (olives)



Oxitec's Technology: Reviewed By Independent Regulators



10+ Years of Successful Regulatory Decisions



Overview of EPA's Scientific Assessment and Approval

Key Elements:

- 14-month in-depth process
- Exhaustive scientific review
- Risk assessment
- Multi-agency support
- Public comment & responses



By the Numbers:

- 70+ documents submitted
- 25 commissioned studies
- 4,500+ pages, including 2,500+ pages of scientific peer-reviewed literature

Data Requirements Fulfilled by Oxitec (partial list)

Environmental Assessments:

- Fish
- Birds
- Mammals
- Plants
- Aquatic Invertebrates
- Insects
- Endangered Species

Health Assessments:

- Trait Penetrance
- Oral Toxicity
- Inhalation Toxicity
- Ocular Toxicity
- Dermal Toxicity
- Allergenicity
- Vector Competence

Mosquito Characterization and Performance:

- Insecticide Susceptibility
- Trait Penetrance
- Tetracycline Response
- Stability of Genetic Traits
- Trait Persistence
- Field Data (Brazil)
- Protein Stability
- Arbovirus Screening
- Introgression Analysis
- Complete SOPs
- Analytical Methodologies

EPA Conclusion: Oxitec Mosquitoes are Safe for Humans, Wildlife, and the Environment

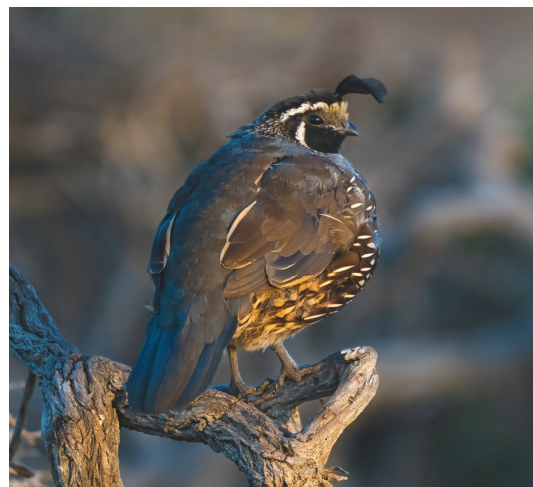
Independently validated: no effects on endangered species or critical habitat, whether direct or indirect.

SAFE FOR

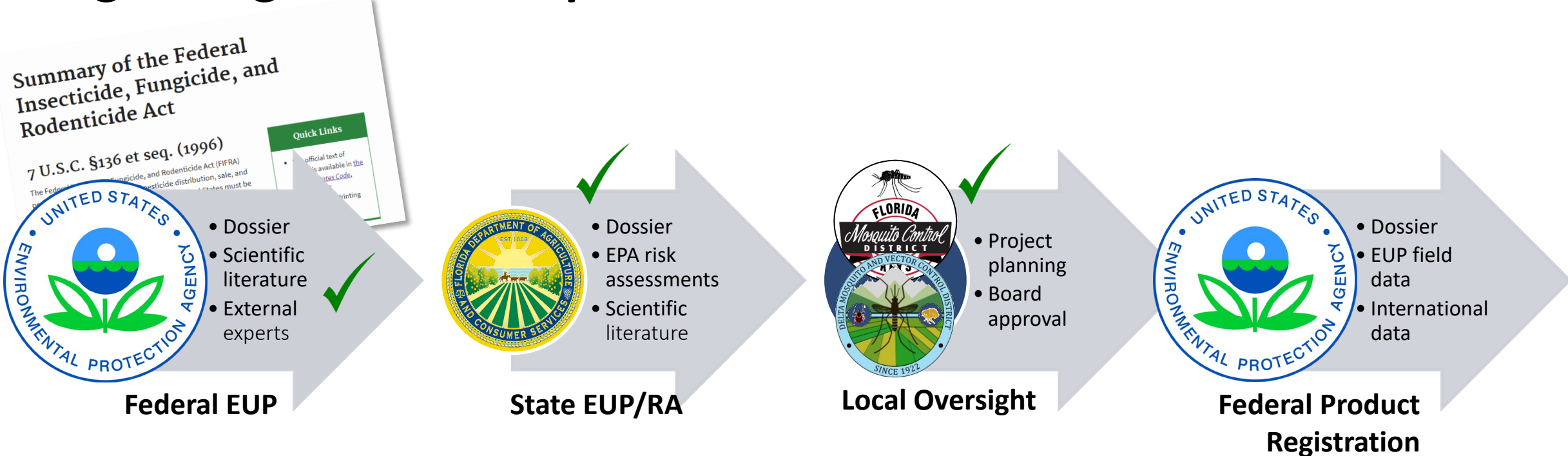
- Fish
- Birds
- Mammals
- Plants
- Invertebrates
- Other aquatic animals



'OX5034 male mosquitoes do not bite people or wildlife'



Regulating Oxitec Mosquitoes in the US



Dossiers:

- Environmental Impact
- Human Health
- Feeding Studies
- Technical Data
- Operating Procedures

Oxitec mosquitoes regulated as a 'biopesticide' by EPA

Protocols, metrics, and analysis are predetermined by EPA

Wolbachia mosquitoes are regulated under the same rules

National Biosafety Approval in Brazil

Oxitec's *Aedes aegypti* mosquitoes evaluated by an independent body of 27 academic experts that comprise Brazil's regulator CTNBio.



2020 – Oxitec mosquitoes receive full biosafety approval

- Free to release anywhere without license or restriction.
- Over 20 million released protecting thousands of people without any adverse effect.
- Available for sale commercially (aedesdobem.com.br).



World-Class Partners, Collaborators and Regulatory Record



Select Partners and Underwriters



Select Current and Historical Collaborators



Positive Regulatory Approvals and Opinions



Florida Keys 2021 Results Overview

Key Performance Outcomes

- ✓ Oxitec's self-limiting gene maintains effectiveness in the field
- ✓ Dose rates are suitable for use
- ✓ Oxitec males performed excellently
- ✓ Box dosing established effective overflooding against invasive species
- ✓ Oxitec males mated successfully
- ✓ Oxitec progeny accessed cryptic breeding sites (this is good)
- ✓ No females released



NEWS | 18 April 2022

Biotech firm announces results from first US trial of genetically modified mosquitoes

Oxitec reports that its insects behaved as planned but a larger trial is needed to learn whether they can reduce wild mosquito populations.

Emily Waltz



Biotechnology firm Oxitec ran the first open-air test of genetically modified mosquitoes in the United States by placing boxes of its eggs in selected spots in the Florida Keys. Credit: Joe Raedle/Getty

Independent Validation of Planned Project in Visalia

- Delta MVCD
- Independent Advisory Group
- California State Regulators
- Federal Regulators



Get Involved



oxitec.com/california



Proyecto Delta MVCD – Oxitec Para el Control de Mosquitos

Oxitec ha recibido la aprobación federal necesaria para llevar a cabo un proyecto piloto en el condado de Tulare, con el fin de evaluar la eficacia del uso de los mosquitos macho no picadores Friendly™ de Oxitec como medio de control de mosquitos. La aprobación estatal para el proyecto piloto está pendiente.

Oxitec se compromete a comunicarse con los residentes del condado de Tulare, y a escucharlos. Por favor, tómese un momento para compartir sus preferencias de comunicación con nosotros completando esta breve encuesta.



Complete la encuesta visitando:
oxitec.com/california



1st Delta MVCD-Oxitec Public Educational Webinar, April 26th 2022
An Introduction to Oxitec in California: A Project Based on Strong Partnerships with Local Governments, Communities, and Experts



Join our Delta MVCD – Oxitec Mosquito Project!

What is your name?*

How would you like to be involved?*

I would like to host a box

I would like to host a trap

Submit

The Delta Mosquito and Vector Control District (Delta MVCD) has invited Oxitec to collaborate on a field project in Visalia, California.

If approved by state regulators, the Delta MVCD and Oxitec will evaluate the effectiveness of Oxitec non-biting male mosquitoes to control the invasive, disease-spreading *Aedes aegypti* mosquito in the field.

Join the Project!

Host a release box or trap

Please visit
oxitec.com/california
for additional resources.



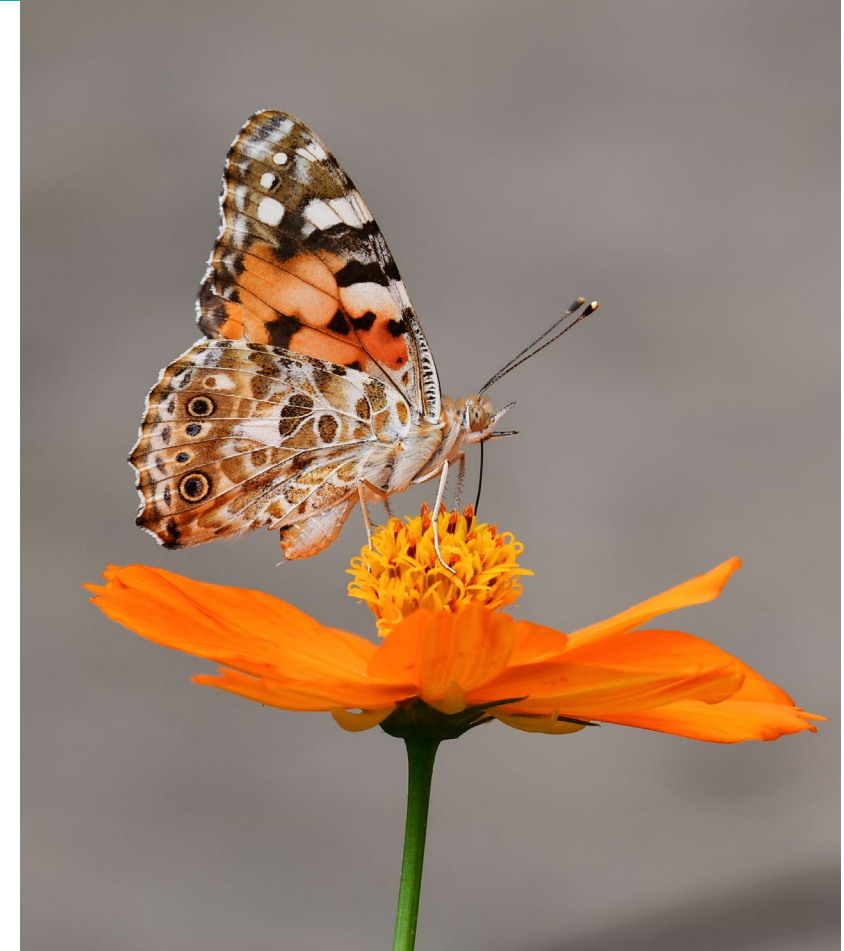
We Will Run a Series of Ten Interactive and Educational Webinars

- ✓ **An Introduction to Oxitec in California: A Project Based on Strong Partnerships with Local Governments, Communities and Experts**
- ✓ **Oxitec's Scientific Publications, Independent Validation, and Data Transparency**
- 3. **Oxitec in California: Community Engagement, Participation, and Consultation by Delta MVCD and Oxitec**
- 4. **Oxitec's Technology Part 1: How It Works and Why It Was Made to Empower Local Communities**
- 5. **Oxitec Technology Part 2: History, Partnerships, and a Decade of Results Around the World**
- 6. **California, Mosquitoes and Climate Change: Why Oxitec Was Invited to California and the Urgent Need for Innovative Pest Control Technologies**
- 7. **Oxitec in California: Piloting Oxitec's Friendly™ Mosquitoes in Partnership with the Delta MVCD**
- 8. **Oxitec's Technology and Sustainability: Providing Effective Mosquito Control While Preserving Biodiversity, Endangered Species and Protecting Our Environment**
- 9. **Inside Oxitec: Q&As with Oxitec's Senior Scientists and a Virtual Tour of Oxitec's Facilities Globally**
- 10. **Independent Views: Panel Discussion with Independent Experts on Oxitec's California Project and the Need for Sustainable Mosquito Control Technologies**

Question and Answers

Any and all questions on this evening's topics are welcome!

(If we run out of time tonight, email info@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/california and deltamvcd.org)





THANK YOU!

A summary of this event, as well as more Q&As, resources, facts, and background materials will be made available at oxitec.com/california