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OXITEC

Oxitec
Animal Biotech Summit

21st September 2016

CONFIDENTIAL

Forward-Looking Statements

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This presentation contains information regarding OX513A, a proprietary strain of *Aedes aegypti* mosquito developed by Oxitec Limited, a subsidiary of Intrexon Corporation. OX513A has regulatory approvals for import and contained testing in Brazil, Cayman Islands, Panama, France, India, Malaysia, Singapore, Thailand, USA and Vietnam. Open field trials have taken place in Grand Cayman, Malaysia, Panama and Brazil with national technical approval for commercial release (e.g. biosafety) received in 2014.

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Aedes aegypti

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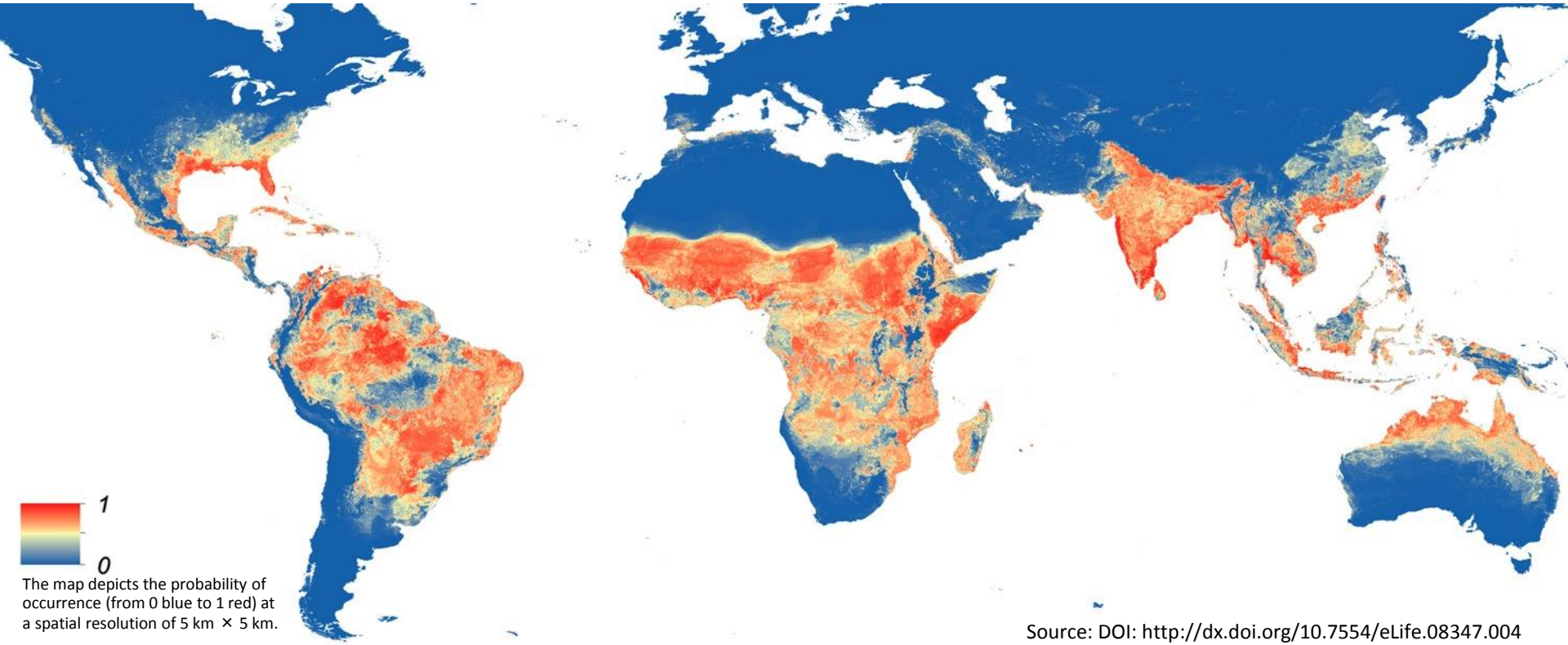
Aedes aegypti is the primary dengue vector for Zika; it is an invasive species in over 100 Countries today

Global map of the predicted distribution of *Ae. aegypti*



The map depicts the probability of occurrence (from 0 blue to 1 red) at a spatial resolution of 5 km × 5 km.

Source: DOI: http://dx.doi.org/10.7554/eLife.08347.004

Originated from North Africa	Adults only fly up to 200 yards approx. lifetime	Widespread insecticide resistance
Spread by human transport	Lives in and around the home	Highly effective vector

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The Impact of Zika Is Growing

Pics 1-4: Lianne Milton/Panos Pictures for The Washington Post

Ernesto Benavides/Agence France-Presse — Getty Images

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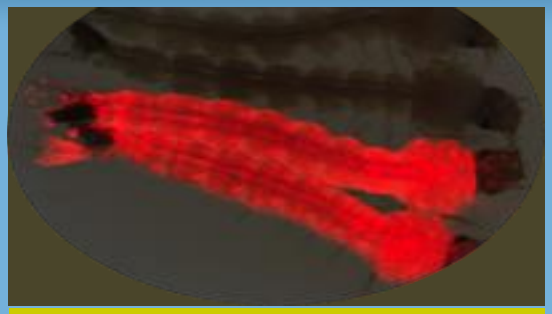
How Oxitec's Technology Works

Inject genes into insect egg

Self Limiting Gene

- Inherited and offspring do not survive to adulthood
- Repressed with an antidote during male insect production, allowing low cost multiplication
- After releases stop, genes do not persist in the environment



Fluorescent Marker Gene

- Fluorescent protein detected by special light
- Identifies helpful mosquitoes vs. pest ones
- Monitoring of pest population suppression
- Releases can be adjusted based on tracking data

Oxitec male mosquitoes are produced for release and mate with pest females

Offspring die before they can reproduce and transmit disease

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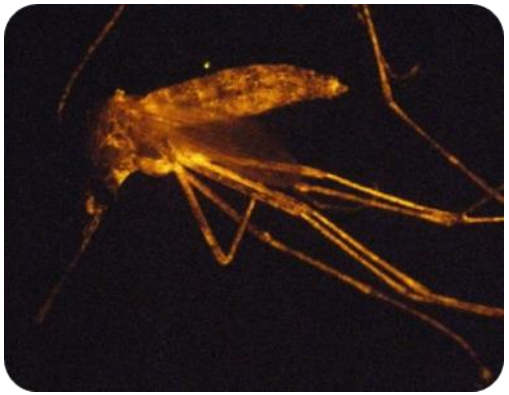
Key Benefits

Efficiency

- Targeted delivery: males are attracted to wild females
- Insects and offspring contain a marker gene that is easy to monitor - “track and trace”
- Local deployment by local people



Safety

- Male releases (only female mosquitoes bite)
- Genetic change is not toxic or allergenic

Environment

- Species-specific pest control, no off-target effects
- Neither insects nor progeny persist over time in the environment

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OX513A – Development and Approvals

2002
OX513A created

2009+
Cayman trials

2010+
Brazil trials

2014+
Panama trials

2014-2016
Brazil: CTNBio national approval
US: FDA Final FONSI and EA
Global: WHO PAHO/CARPHA recommendation
Piracicaba project (65,000 people) started
Grand Cayman project started

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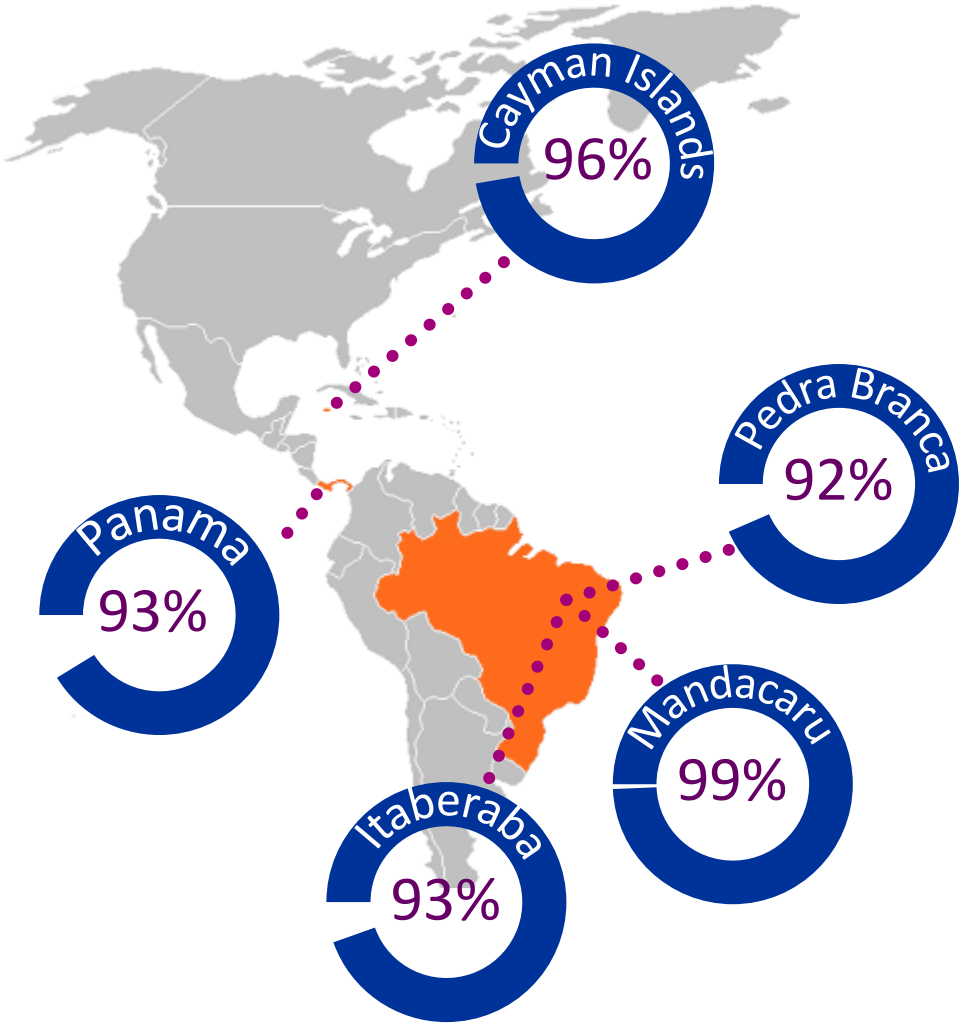
Oxitec Mosquito Trial Results



>90% suppression of *Aedes aegypti* in field trials and projects across Cayman Islands, Brazil, and Panama

Cayman: Mosquito Research Control Unit
Brazil: University of São Paulo and Moscamed
Panama: The Gorgas Institute

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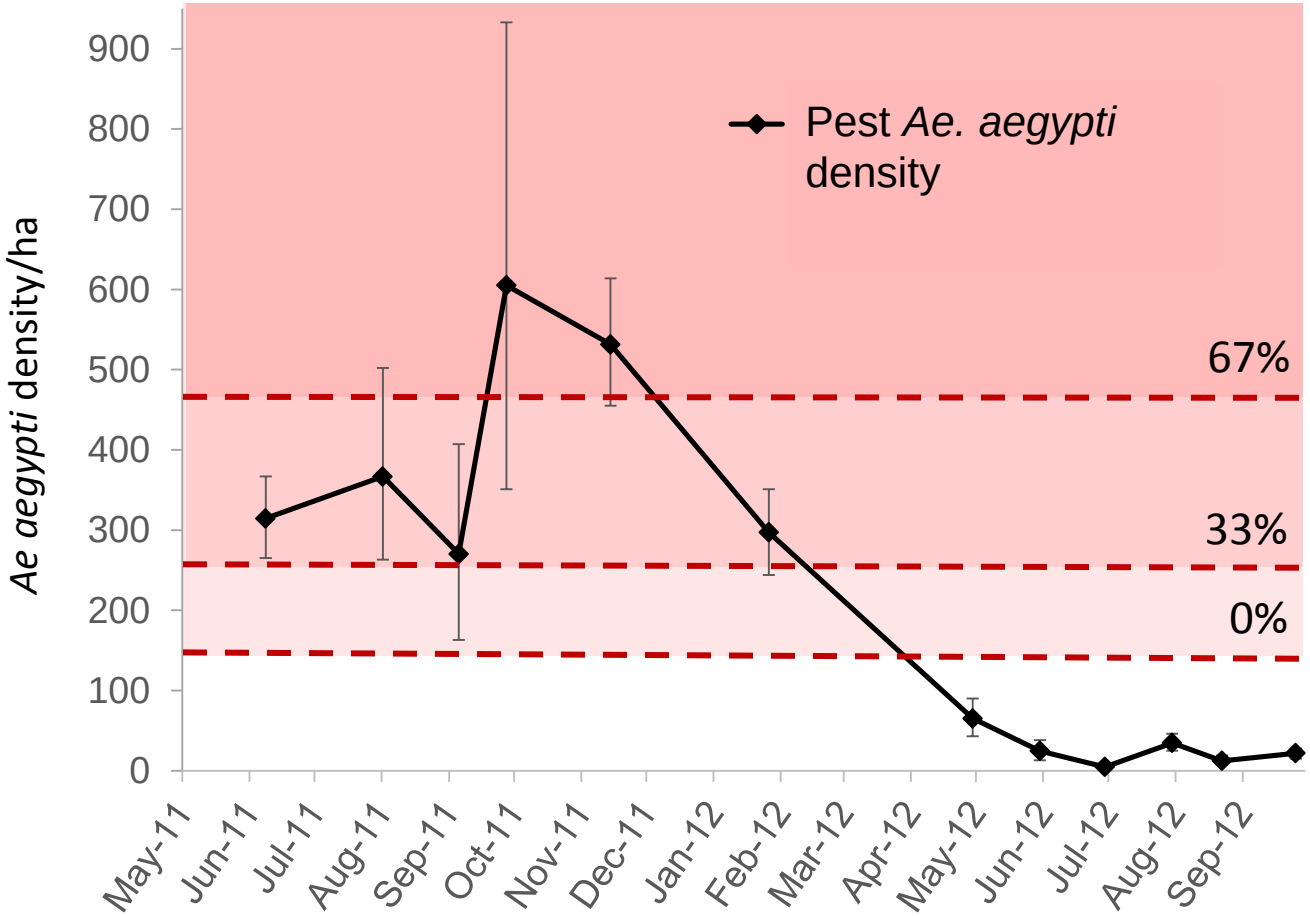
Models indicate Oxitec has the potential to Reduce the Pest Population Below Disease Transmission Thresholds

Adult *Ae. aegypti* density in Itaberaba trial



Dengue transmission threshold (0, 33 & 67% herd immunity)

In trials to date, Oxitec has achieved up to 90+% reduction which would take the pest population below the modelled disease transmission threshold, even for 0% herd immunity*

*Focks *et al* (2000) Am J Trop Med Hyg

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Public Engagement

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Production and Release

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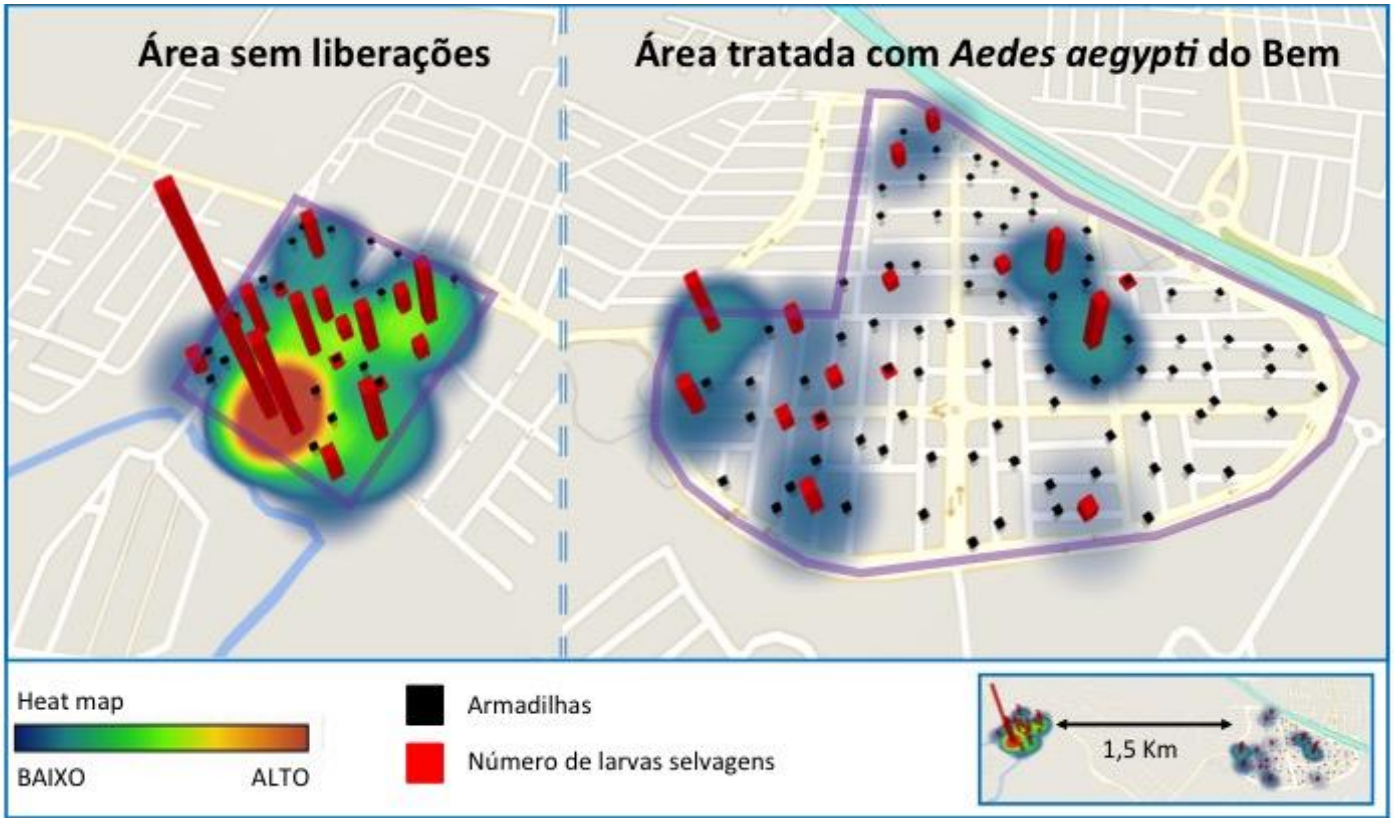
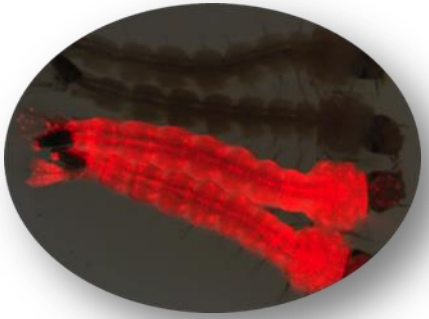
Monitoring: Snapshot of Piracicaba Program

Infestation map CECAP/Eldorado
Week of 21-28 December 2015





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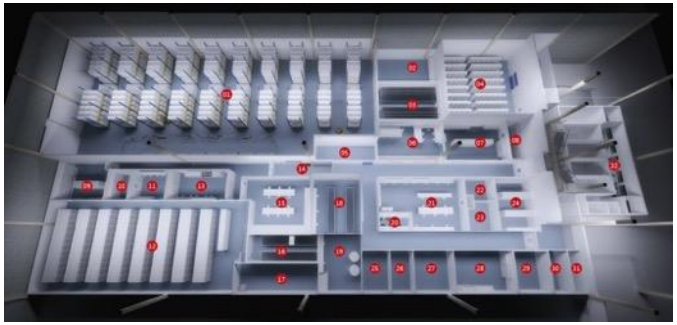
New Production Facility in Piracicaba



Current build in Piracicaba – ready October 2016

- >5,000m^2
- 60 millon OX513A males/week
- 300,000 – 1,500,000 people protected

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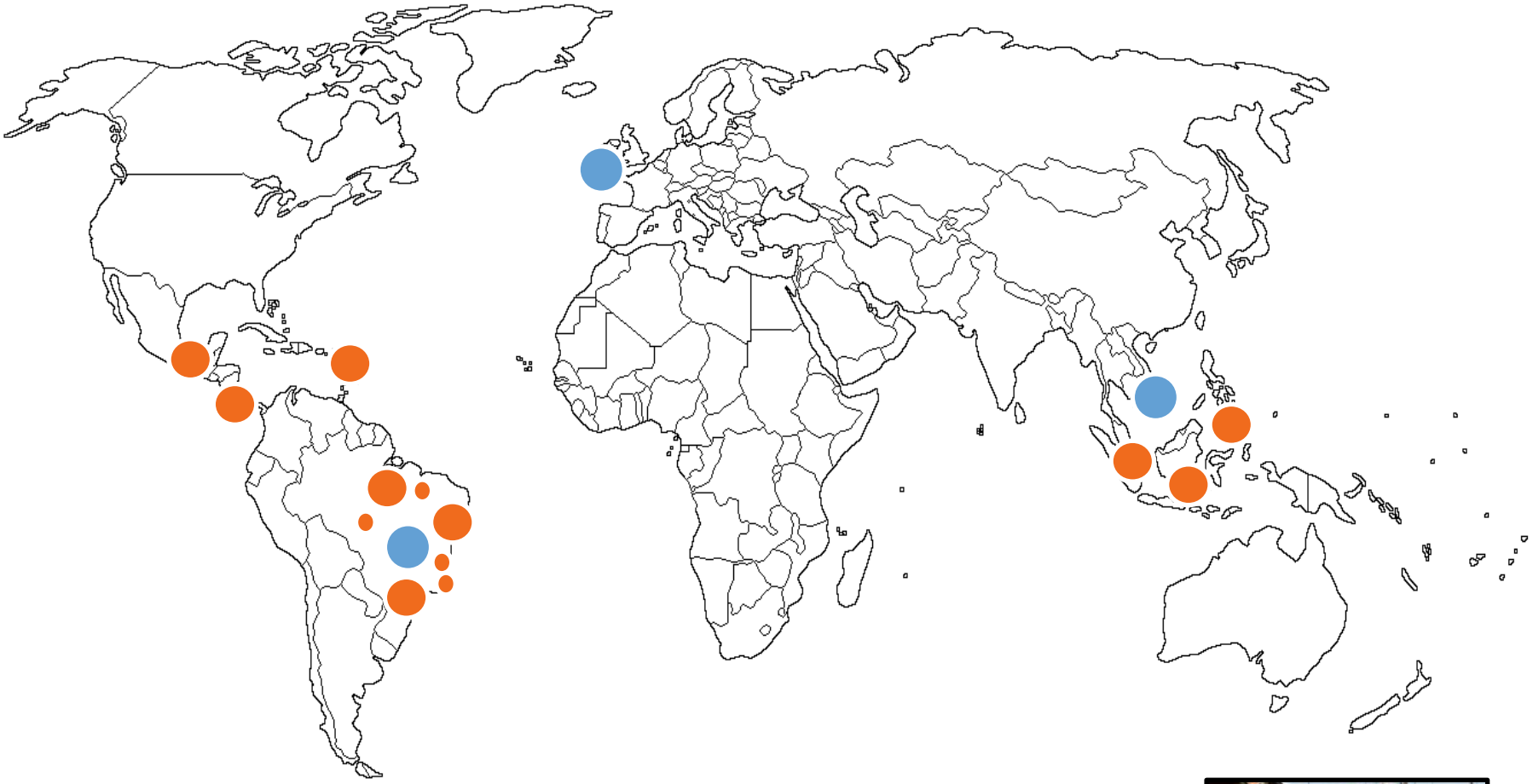
Global Supply



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Thank You

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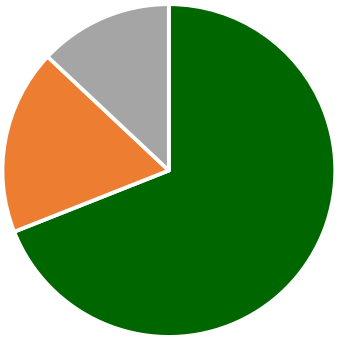
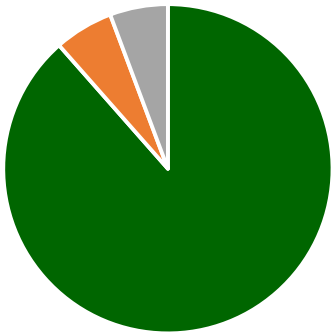
Strong Public Support

Cayman



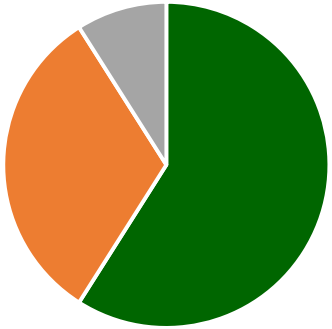
■ Support ■ Neutral ■ Oppose

Piracicaba, Brazil



■ Support ■ Neutral ■ Oppose

Florida,USA



■ Support ■ Neutral ■ Oppose

Purdue study shows 78% support in USA*

Photo credit: Alexandre Carvalho/Oxitec

* https://www.purdue.edu/newsroom/releases/2016/Q1/survey-public-supports-use-of-gmo-mosquitoes-to-fight-zika-virus.html

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New Threats Vectored by *Ae. aegypti* Continue to Emerge

Dengue

- Estimated 400 million cases per year worldwide
- $39 billion global annual economic impact

http://www.ncbi.nlm.nih.gov/pubmed/25409275/

Chikungunya

- First recorded in Caribbean late 2013
- 45 countries or territories across the Americas with more than 1.7 million suspected cases

http://www.cdc.gov/chikungunya/geo/

Zika

- Previous outbreaks but considered low threat
- Linked with microcephaly and Guillain-Barré syndrome. Brazil has an estimated 1.5 million Zika infections

Yellow Fever

- Known risk but immunization levels low

http://www.reuters.com/article/us-health-zika-brazil-exclusive-idUSKCN0VA331

Other

- *Aedes aegypti* is a potential threat as a vector for Venezuelan Equine Encephalitis virus and West Nile virus, etc.

http://ecdc.europa.eu/en/healthtopics/vectors/mosquitoes/Pages/aedes-aegypti.aspx

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