



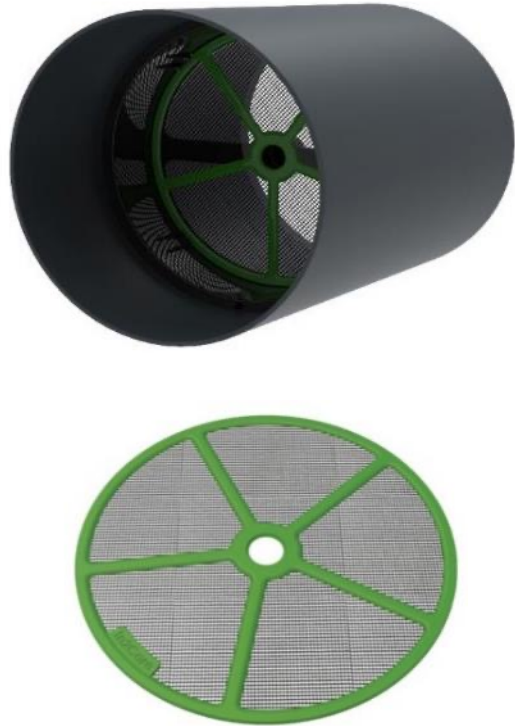
Effective mosquito control; In2Care's research and developments

GMCA Meeting, Oct 2023

In2Care research-based products

In2Care® EaveTubes

- ❌ Not US EPA approved
- ❌ Targets Malaria mosquitoes



In2Care® Mosquito Station

- ✅ US EPA approved
- ✅ Designed for container breeding Aedes and Culex mosquitoes



In2Care® EaveTubes – a Positive Human Story



- ❑ In2Care®EaveTubes are in the process of approval from the World Health Organization (WHO)
- ❑ Technology that uses the natural airflow to attract the mosquitoes
- ❑ Static coating gauze with fast killing insecticide inserted in tube
- ❑ Fast killing insecticide kills resistant malaria mosquitoes that try to enter the house
- ❑ The **development** of In2Care Eave Tubes was **partially funded with \$10.2M** from the Bill & Melinda Gates Foundation, in collaboration with Penn State University



BILL & MELINDA
GATES foundation

THE LANCET

ARTICLES | VOLUME 397, ISSUE 10276, P805-815, FEBRUARY 27, 2021

Impact and cost-effectiveness of a lethal house lure against malaria transmission in central Côte d'Ivoire: a two-arm, cluster-randomised controlled trial

Eleanore D Sternberg, PhD * ✉ • Jackie Cook, PhD * • Ludovic P Ahoua Alou, PhD • Serge Brice Assi, PhD • Alphonsine A Koffi, PhD • Dimi T Doudou, PhD • et al. [Show all authors](#) • [Show footnotes](#)

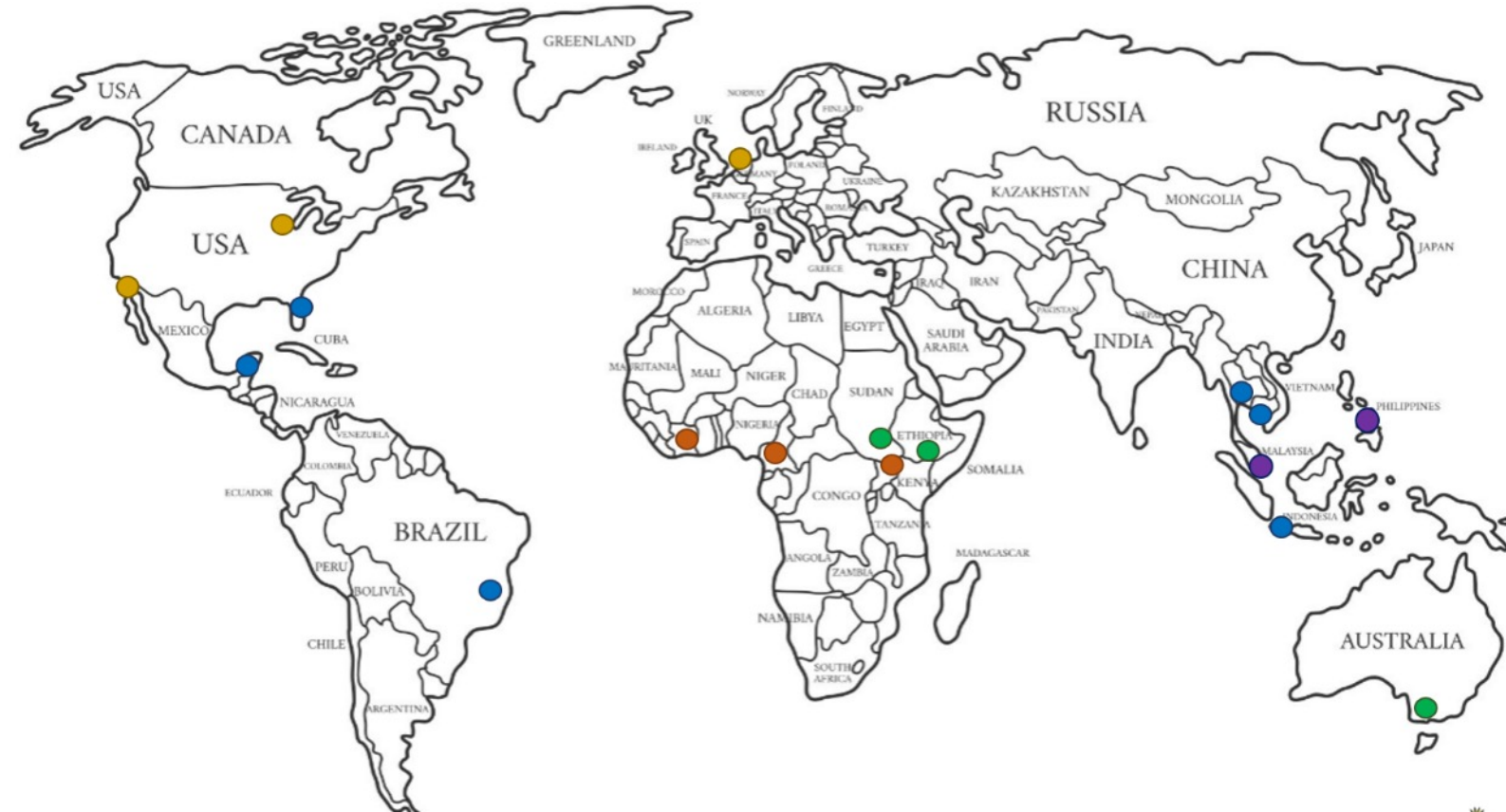
[Open Access](#) • Published: February 27, 2021 • DOI: [https://doi.org/10.1016/S0140-6736\(21\)00250-6](https://doi.org/10.1016/S0140-6736(21)00250-6)

Finding: 47% reduction in Malaria on top of bednets and community protection

Continuous research

Recent & ongoing studies:

- **Dengue trials**
- **Malaria trials (Eave Tube)**
- **Density & Efficacy trials**
- **New mosquito species**
 - *An. stephensi*
 - *Ae. notoscriptus*
- **Culex attractants**



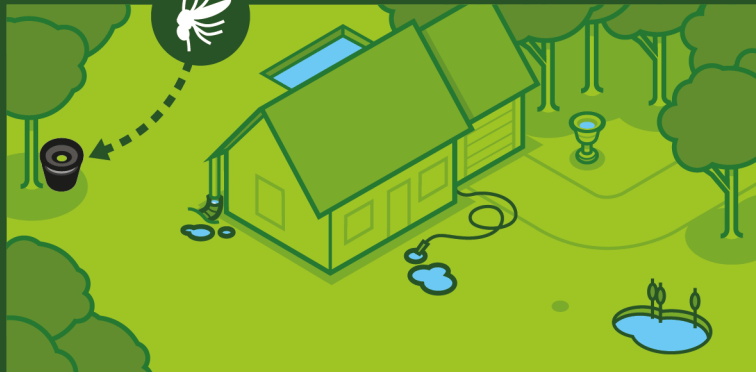
Key Scientific collaborators:



In2Care® Mosquito Station

- ❑ In2Care is the **only mosquito transfer system** available on the market
- ❑ It uses the mosquito to spread larvicide to surrounding breeding sites
- ❑ Effectively reduces mosquito population over a long period of time

 In2Care®



ATTRACT

- Mosquito spreads larvicides to breeding sites
- Kills mosquitoes in and around the yard
- 3X coverage

regular mosquito trap



ONLY TRAPPING

- Many mosquitoes appear from breeding sites
- Only kills mosquitoes that enter the trap
- More traps required per yard



In2Care®

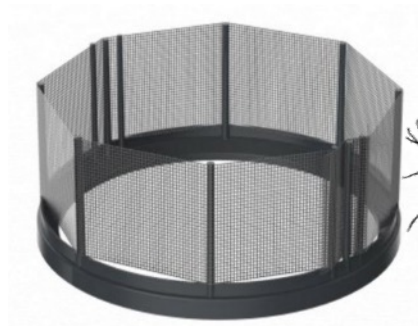
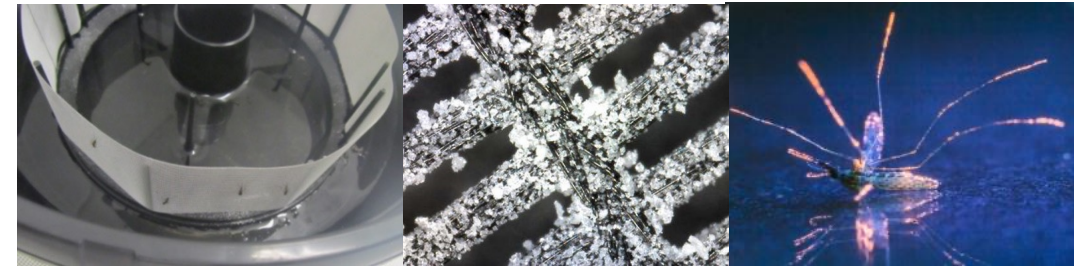


Unique technology to use mosquitoes to spread larvicide

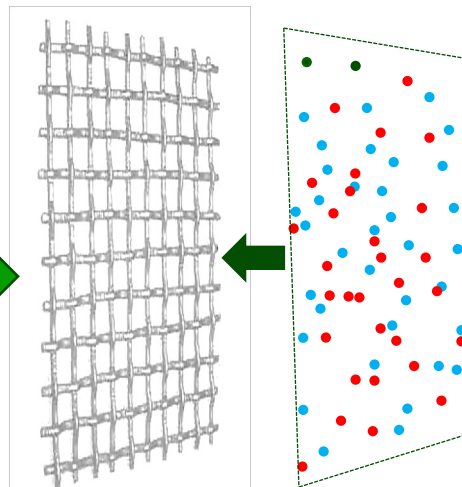
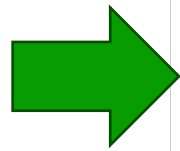
Actives applied in an effective way: on gauze with static charge

Static charged coating enables binding of powder particles

- (two biocides):
- Fungus spores (adulticide)
 - PPF particles (larvicide)

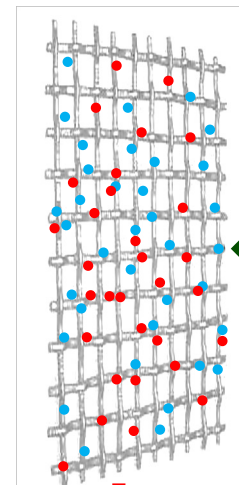
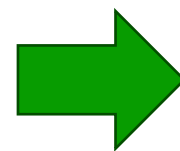


Mosquito picks up biological actives inside trap



Positively charged coating

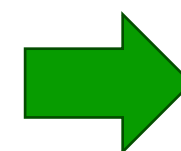
Negatively charged powders



Powdered coating



Mosquito with a stronger positive charge



Powdered mosquito

Unique combination of larvicide and adulticide

Larvicide: Pyriproxyfen

- ✔ Insect Growth Regulation PPF is spread around by mosquitoes (autodissemination)
- ✔ Kills larvae in & around the station
- ✔ PPF is effective at very low concentrations - kills at <10 ppb
- ✔ Safe: WHO-recommended for drinking water



Adulticide: *Beauveria bassiana* (Bb)

- ✔ Slow-killing entomopathogenic fungus
- ✔ Kills adult mosquito after spreading PPF & reduces biting
- ✔ *Bb* GHA strain: used world-wide for biological pest control



In2Care Station and In2Mix Refill

In2Care®Station (durable plastic)

In2Mix®Refill (Active Ingredient)

Green cap/time indicator

Lid

Floater

Container



Sachet, including:

2 attractant tablets

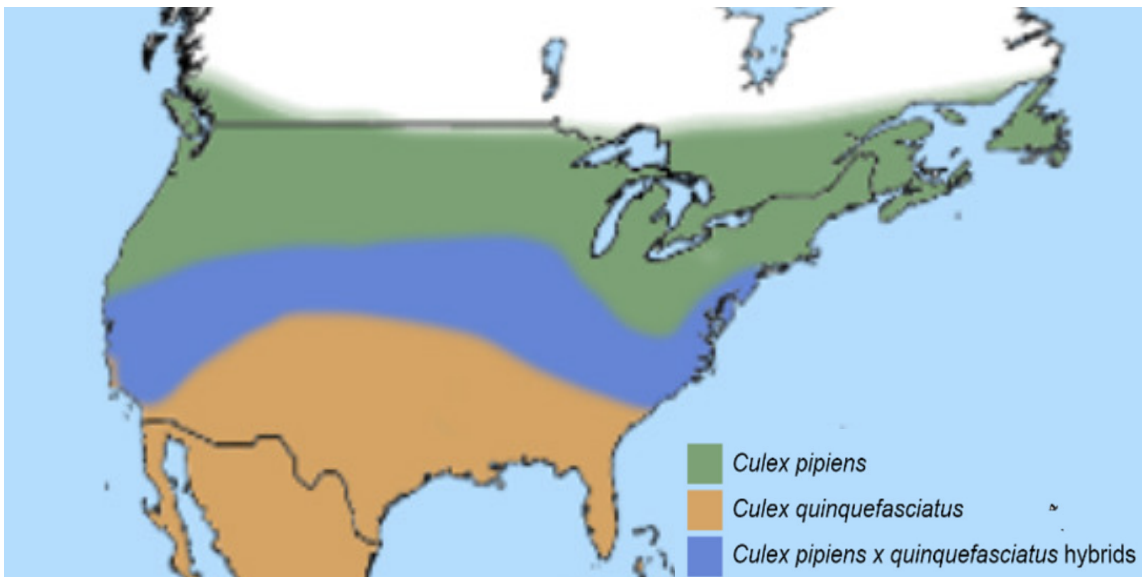
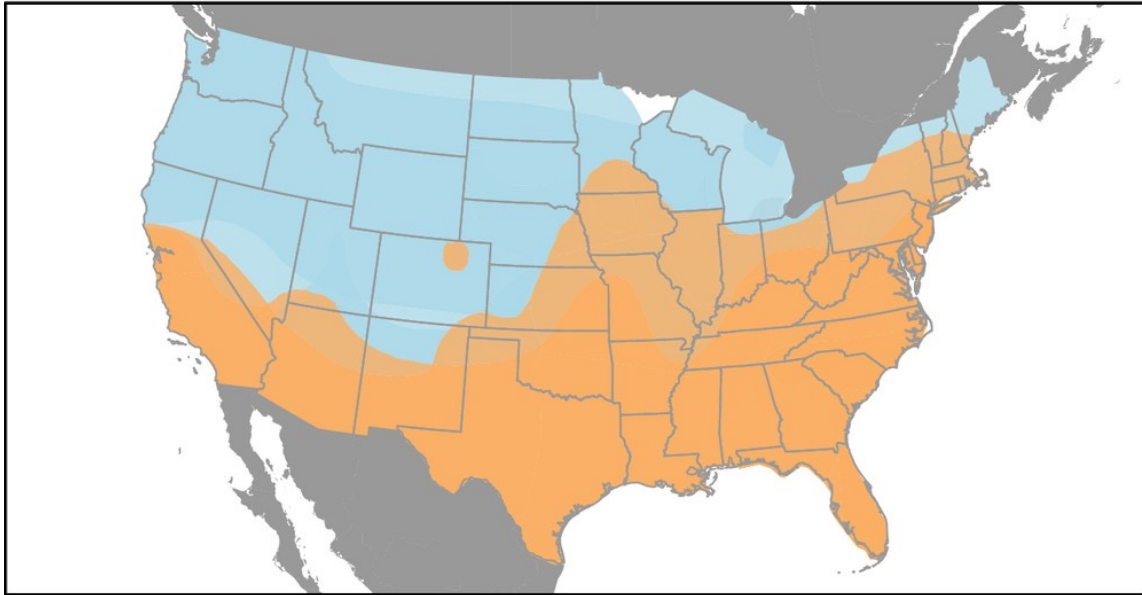
0.5g In2Mix powder

Powdered gauze



Servicing every 4-6 weeks

Estimated range of *Aedes* and *Culex* in the US



Ae. aegypti



Ae. albopictus



Cx. pipiens



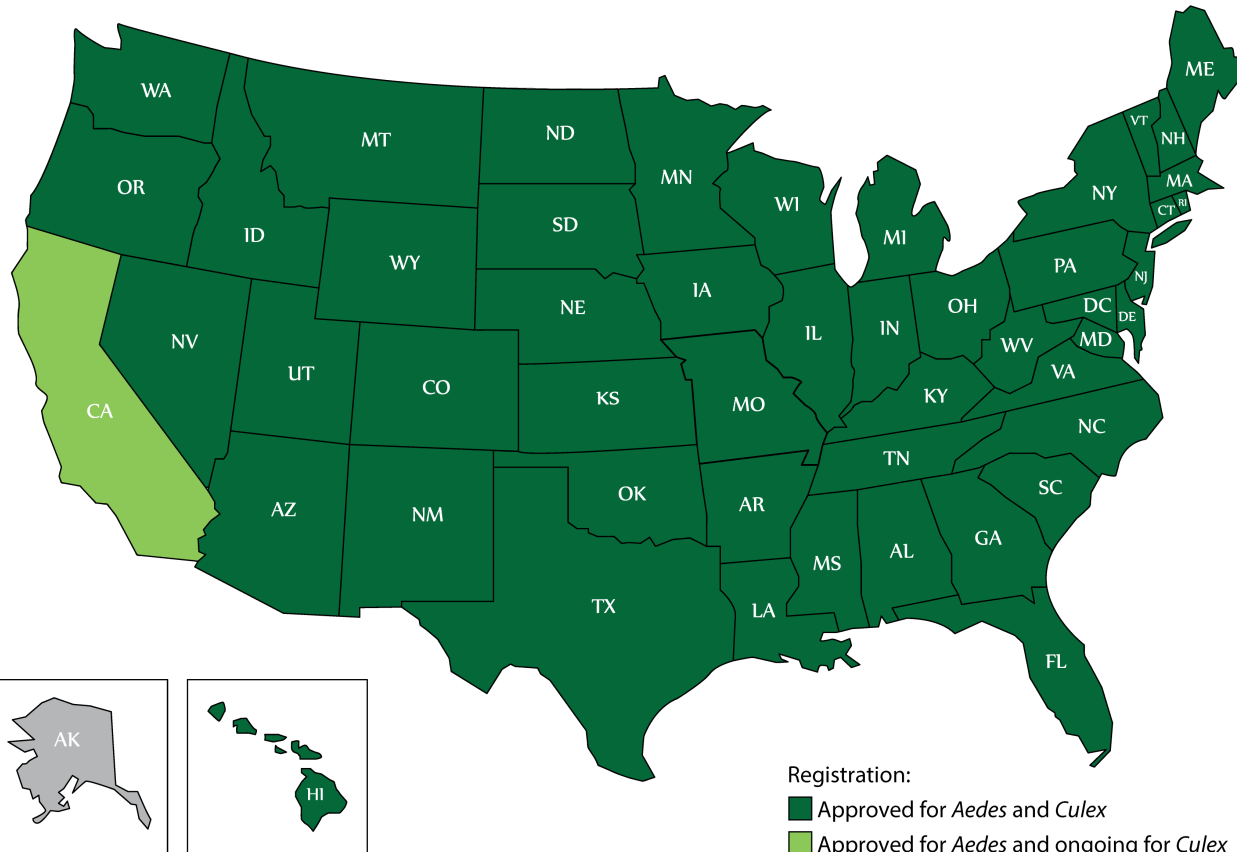

Cx. quinquefasciatus



Michelle V. Evans, Tad A. Dallas, Barbara A. Han, Courtney C. Murdock, John M. Drake (2017) Data-driven identification of potential Zika virus vectors. *eLife* 6:e22053

In2Care Mosquito Stations approved for both Aedes & Culex

In2Care Mosquito Stations approved for Aedes & Culex in **all** States except in California

PYRIPROXYFEN	GROUP	7C	INSECTICIDE
<i>Beauveria bassiana</i> Strain GHA	GROUP	UN	INSECTICIDE

In2Mix®

For use in the In2Care® Mosquito Station

- Controls *Aedes* mosquitoes that may transmit Zika, Chikungunya, and Dengue Fever
- Controls container-breeding *Culex* larvae that could develop into adults that may transmit West Nile virus
- Kills *Aedes* and *Culex* adult mosquitoes within 9 days
- Controls mosquito larvae in surrounding breeding places

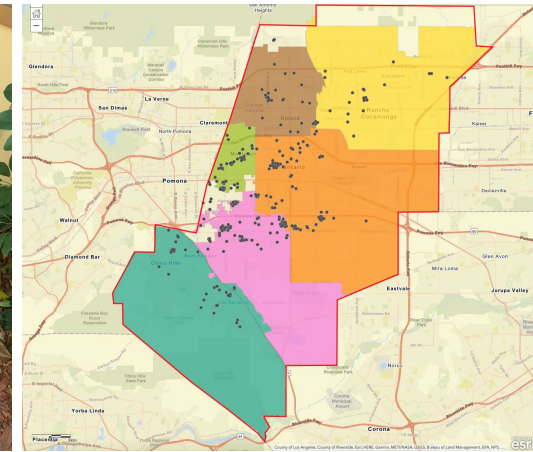
SHAKE WELL BEFORE USE

Active Ingredients:	%w/w
Pyriproxyfen (CAS No. 95737-68-1)	74.03%
<i>Beauveria bassiana</i> strain GHA* (CAS No. 63428-82-0)	10.00%
Other Ingredients:	15.97%
	Total 100.00%

* Contains not less than 4.5 X 10⁸ viable spores/gm.

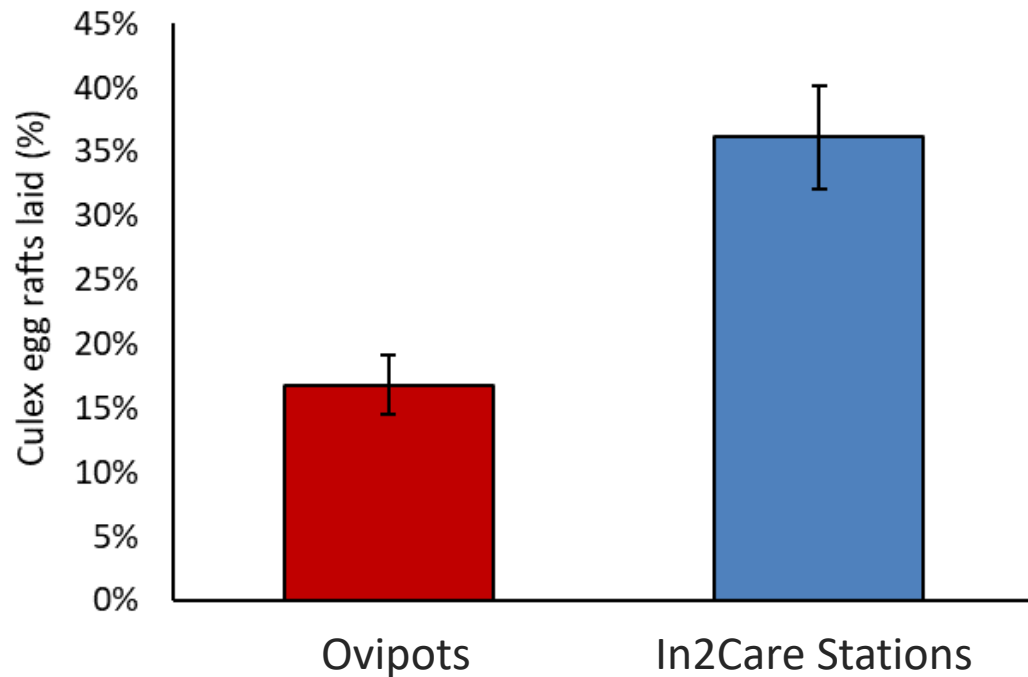
Culex efficacy studies – Approved by EPA

1. Cage Tests against lab-reared *Culex quinquefasciatus* mosquitoes in The Netherlands
2. Semi-Field Test against wild-type *Culex quinquefasciatus* mosquitoes in Florida by the University of Florida
3. Field Tests on wild *Aedes* and *Culex* mosquito populations in San Bernardino County, California by West Valley Mosquito & Vector Control District.



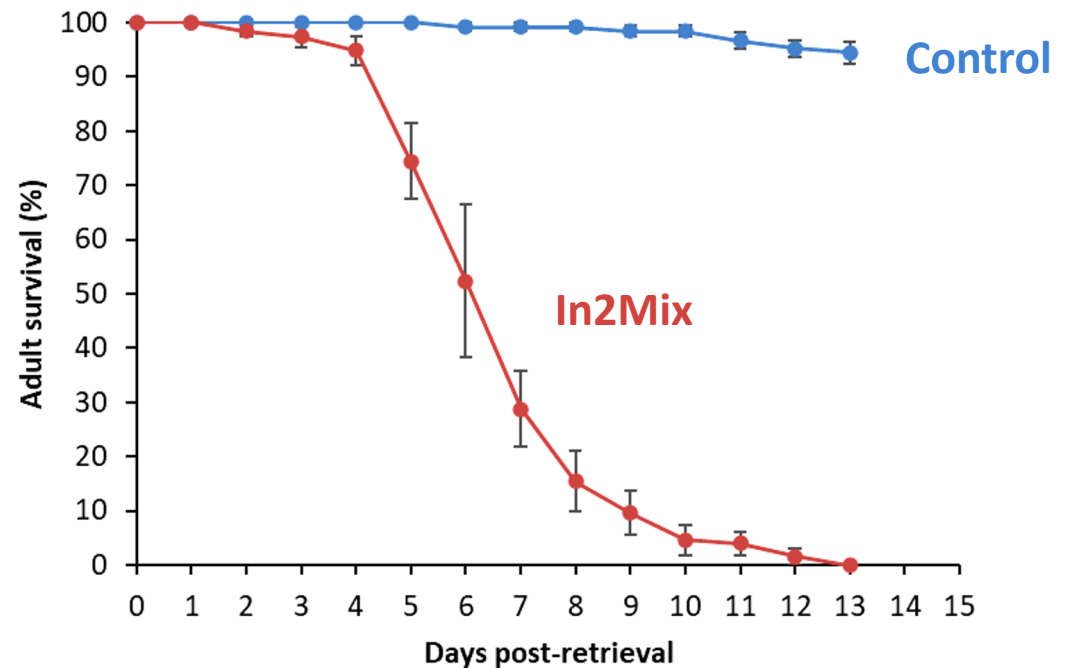
Culex efficacy studies - Results

Attractiveness



- █ Egg-laying *Culex* attracted to In2Care Stations
- █ Also resting *Culex* observed in the field

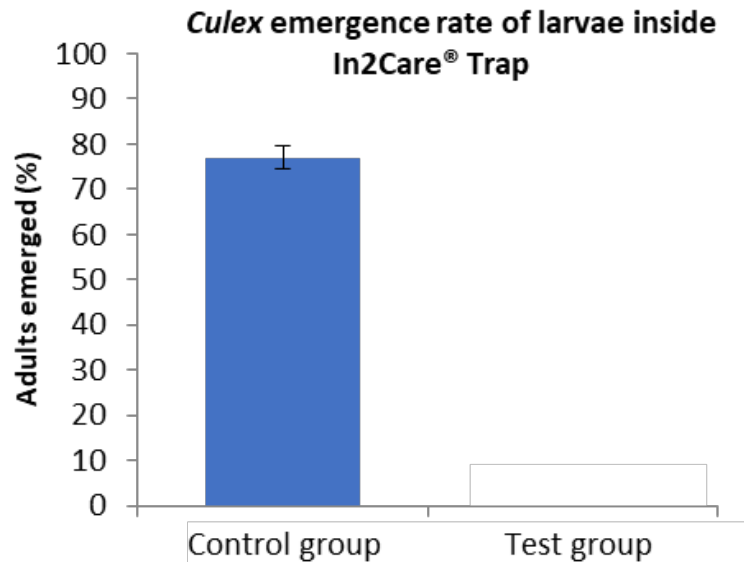
Adult mortality



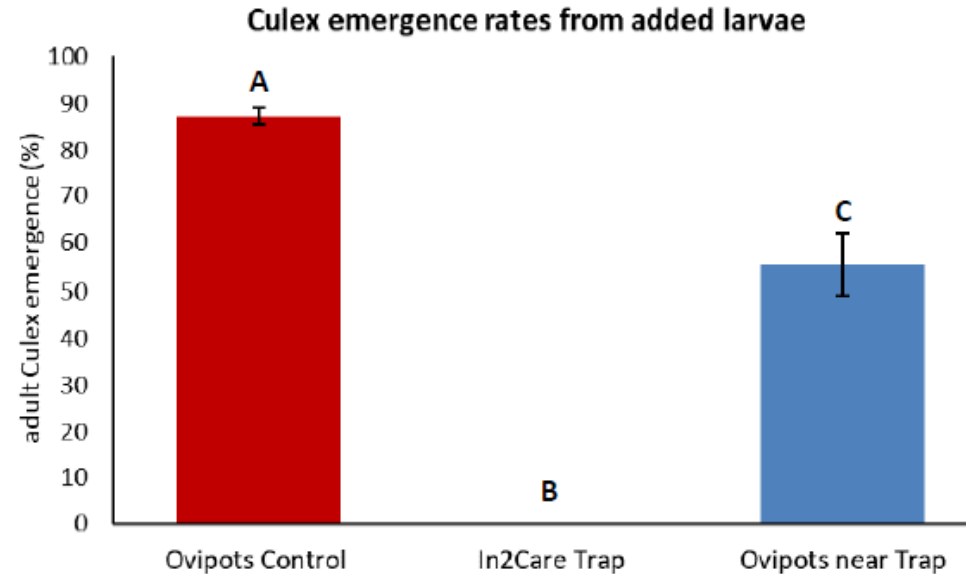
- █ Fungus in In2Mix effectively kills *Culex* adults
- █ Adults die after several days which allows for spreading of larvicide

Culex efficacy studies - Results (2)

Cage test



Semi-field test



Culex larvae in In2Care Station do not develop into adult mosquitoes → die as pupae

Culex spreads larvicide to surrounding breeding sites = “auto-dissemination”

→ Reduces development / emergence of new mosquitoes



Culex efficacy studies - Results (3)

Field trial in California (326 In2Care Stations):

- In2Care is attractive to breeding Aedes & Culex mosquitoes
- Larvicide effective for both species: 0% emergence of new mosquitoes
- High larvicide residual activity: >200 days & multiple rounds of use
- 95% of residents indicated good impact & wanted to keep using In2Care

Residual activity of inhibition of adult emergence (% IE) in In2Care® traps upon retrieval from the field.

Sachet refills	Trap in the field (days)	First round			Second round		
		Pupae collected	Adults emerged	% IE ± SE	Pupae collected	Adults emerged	% IE ± SE
Unused reservoir	n/a	322	305	5.3 ± 1.2	315	311	1.3 ± 0.6
0	27-28	242	0	100	98	0	100
1	54-57	136	0	100	258	0	100
2	85	53	0	100	100	0	100
3	113	1	0	100	104	0	100
4	137	1	0	100	0	0	100
6	200	365	0	100	309	0	100

Journal of the American Mosquito Control Association, 36(3):167–174, 2020
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DEPLOYMENT AND FACT ANALYSIS OF THE IN2CARE® MOSQUITO TRAP,
 A NOVEL TOOL FOR CONTROLLING INVASIVE *Aedes* SPECIES

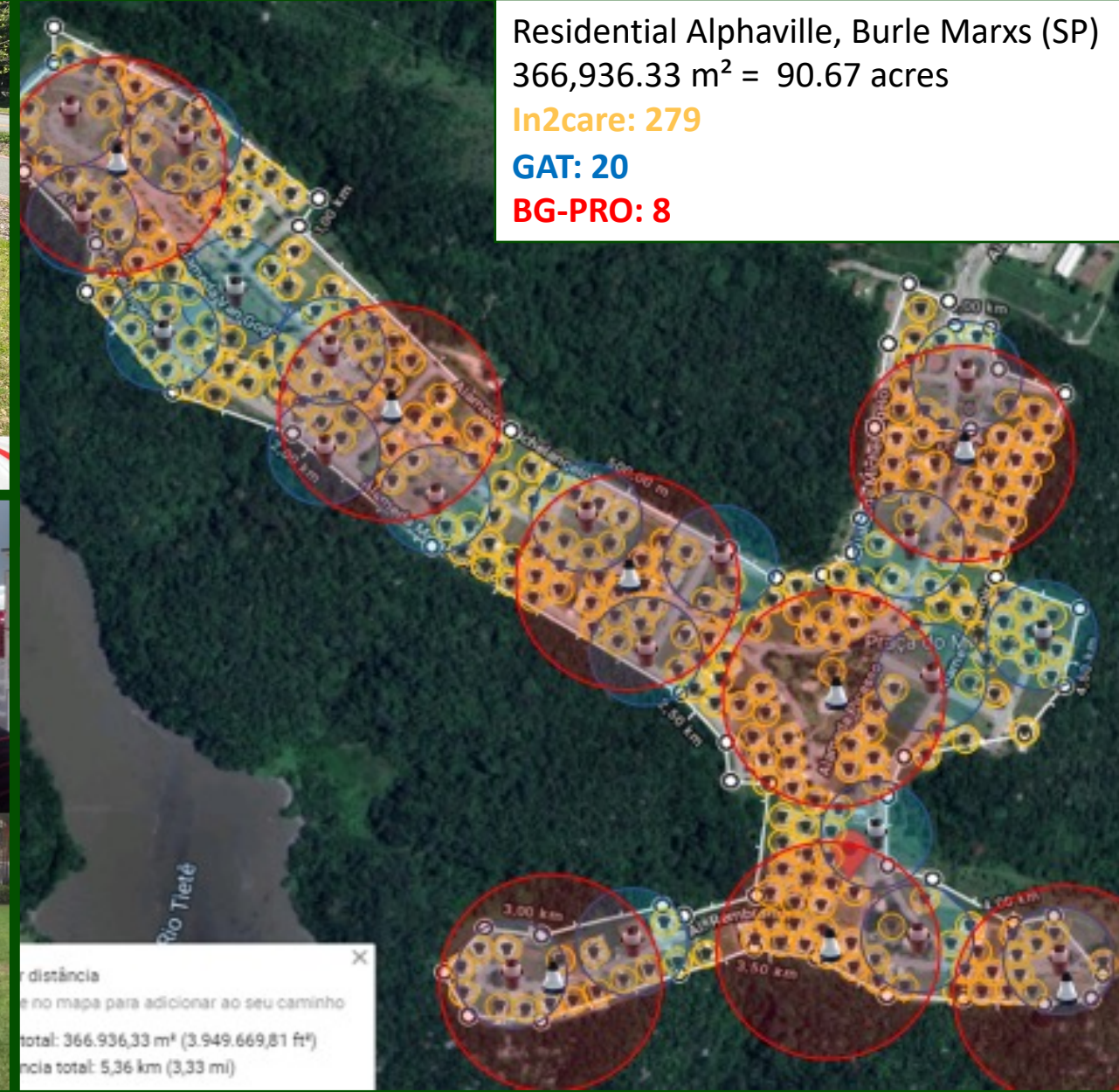
TIANYUN SU, PATRICK MULLENS, JENNIFER THIEME, ALFONSO MELGOZA, ROBERT REAL
 AND MICHELLE Q. BROWN

West Valley Mosquito and Vector Control District, 1295 E Locust Street, Ontario, CA 91761



Large scale projects and governmental projects

- USA
- Hong Kong
- Brazil
- Malaysia

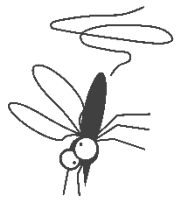


Residential Alphaville, Burle Marx (SP)
366,936.33 m² = 90.67 acres
In2care: 279
GAT: 20
BG-PRO: 8

Benefits of In2Care

- ❖ **Green, Sustainable and Safer solution** - no effect on beneficial insects like bees and butterflies and plastic made from 100% recycled materials
- ❖ Eliminates risk of chemical drifts and trespasses
- ❖ Improves conventional treatments – but also, effective as stand-alone tool in some cases
- ❖ Only spreads highly targeting biocides to mosquito breeding sites





In2Care[®]

Mosquito Control Solutions

To learn more, please reach out to:

info@in2care.org

www.in2care.org