

Science for Your Protection



Two Plus One: The Combination of Two Passive and One Active Mosquito Trap May Well Be an Aedes (Stegomyia) Control Tool Worthy of Attention

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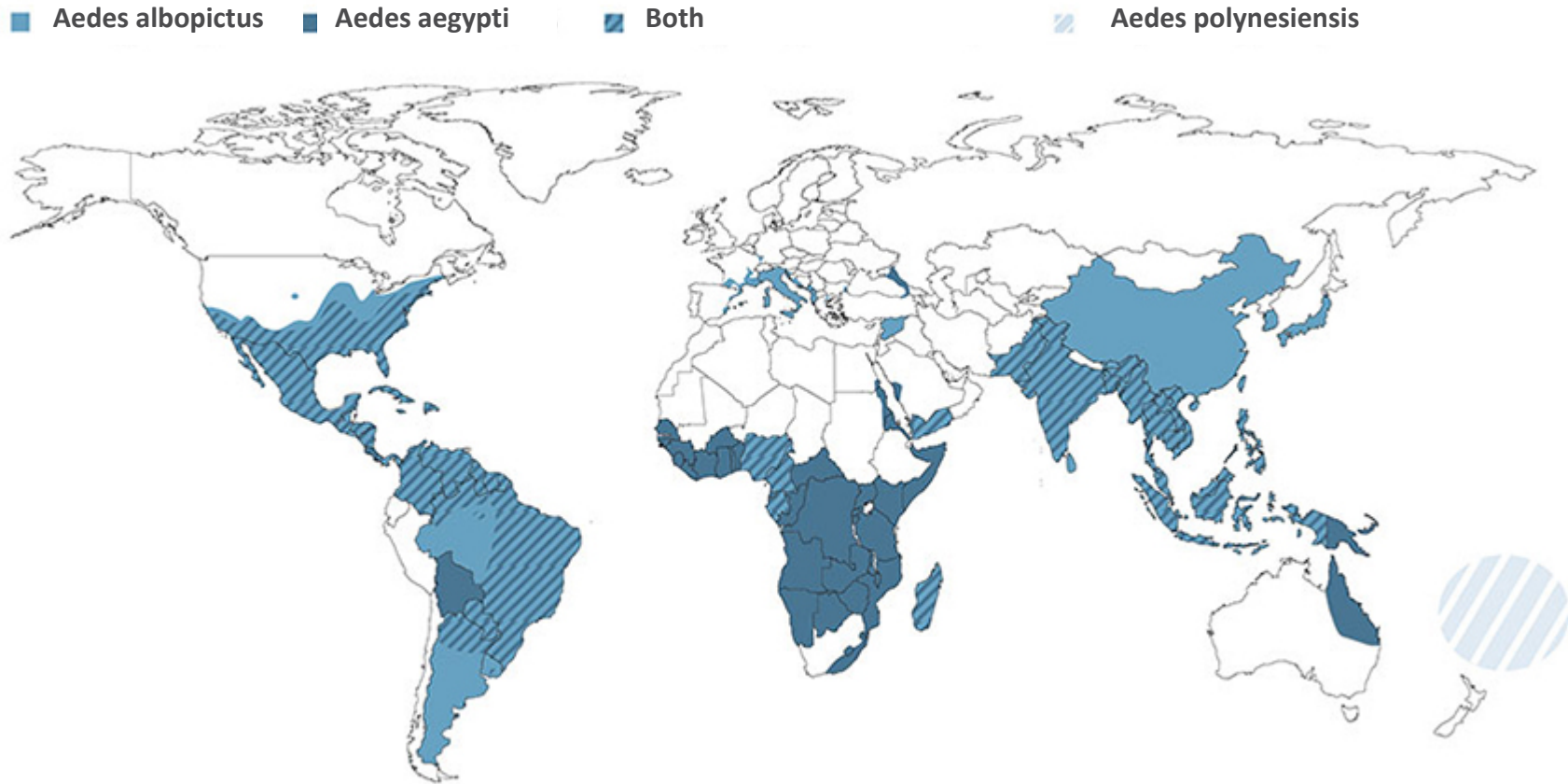
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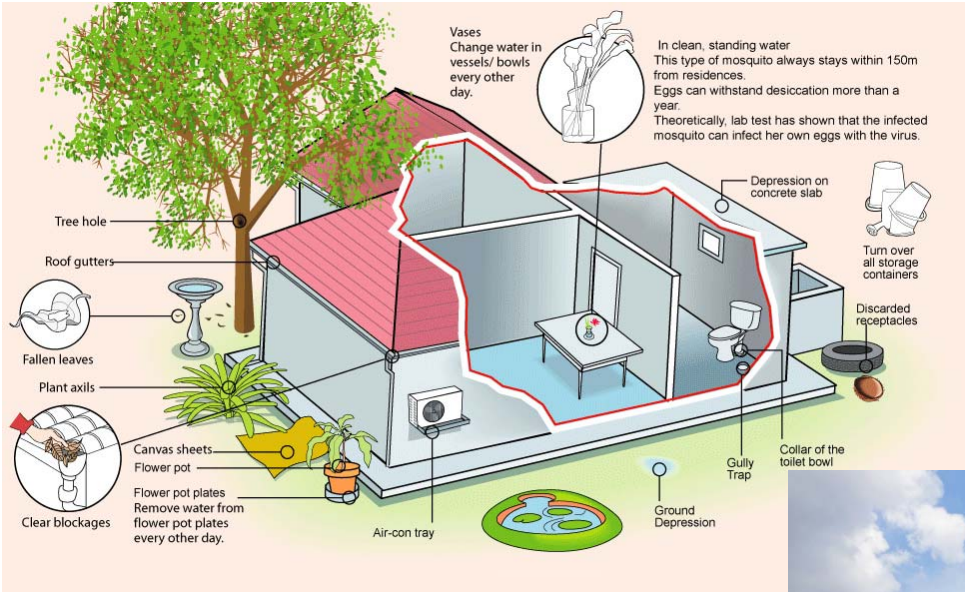


The problem



These mosquitoes are vectors for Dengue, Chikungunya, Zika, and other diseases

The problem



Conventional control strategies fail



Conventional control strategies fail



Conventional control strategies fail



New approaches



Release of sterile males, genetically modified mosquitoes, and replacement of mosquito populations are difficult to implement in urban environments and probably very expensive



nic mosquitoes swarm out of a container in Piracicaba, Brazil.

Brazil will release billions of lab-grown mosquitoes to combat infectious disease. Will it work?

By Kelly Servick | Oct. 13, 2016, 9:00 AM



Advancing the World Mosquito Program's *Wolbachia* method in Brazil

09/10/2017

Why traps are interesting

Advantages of traps in the control of urban mosquitoes

- Environmental friendly – no use of insecticides
- You can see the collected mosquitoes!
Provides valuable feedback of mosquito situation
- The trap concept is easy to understand (Everybody knows Mouse traps)
- The collected mosquitoes can be used for monitoring
Cost for monitoring might be reduced significantly



New generation of mosquito traps: suction



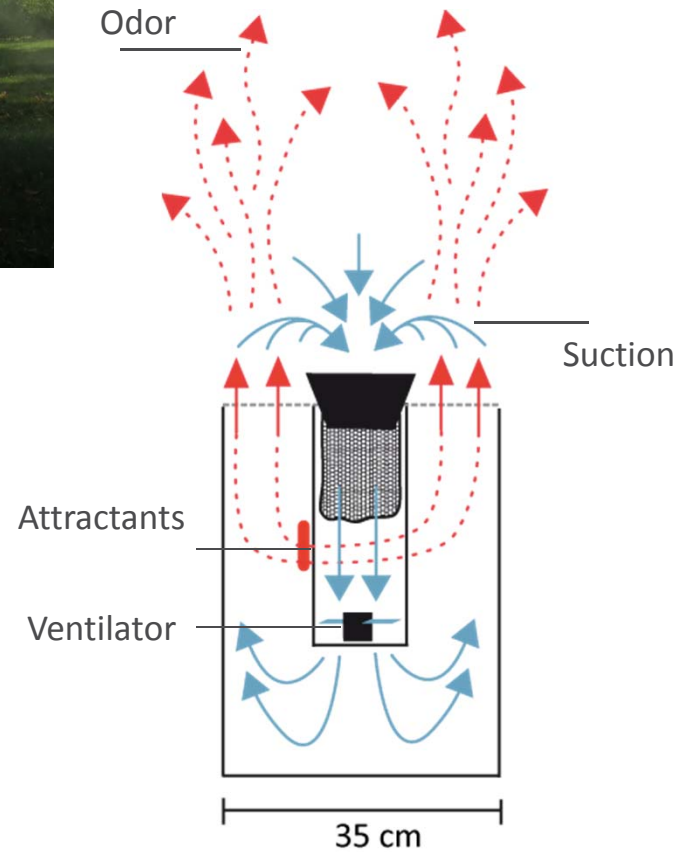
Convection currents of a human body



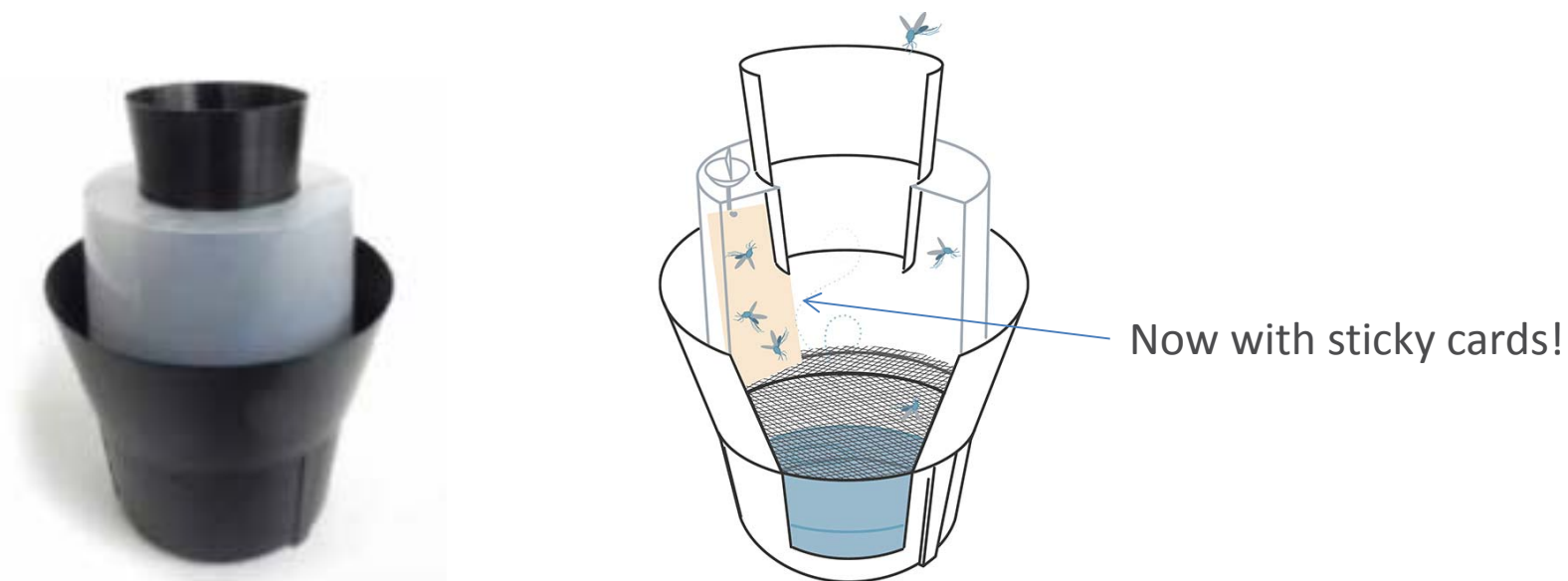
Biogents trap



Black-White contrast



New generation of mosquito traps: passive



The BG-GAT trap was developed to monitor gravid *Aedes aegypti* females.

Dr. S.A. Ritchie from the James Cook University, Cairns, Australia.

Dr. A.E. Eiras from the Universidade Federal de Minas Gerais, Belo Horizonte, Brazil and

Publications:

Eiras, A.E., Buhagiar, T.S., and Ritchie, S.A. (2014). Development of the Gravid Aedes Trap for the Capture of Adult Female Container-Exploiting Mosquitoes (Diptera: Culicidae). *J. Med. Entomol.* 51(1): 200-209

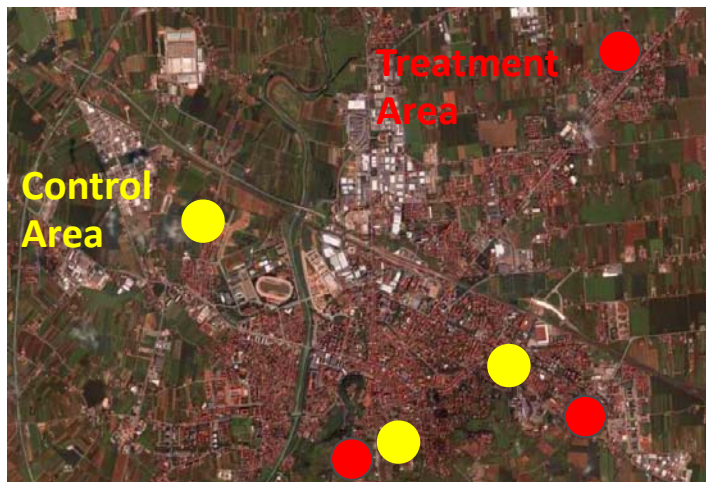
Ritchie, S.A., Buhagiar, T.S., Townsend, M., Hoffmann, A., Van den Hurk, A.F., McMahon, J., and Eiras, a.E. (2014) Field Validation of the Gravid Aedes Trap (GAT) for Collection of *Aedes aegypti* (Diptera: Culicidae). *J. Med. Entomol.* 51(1): 210-219.

Cesena, Italy – field tests with suction trap

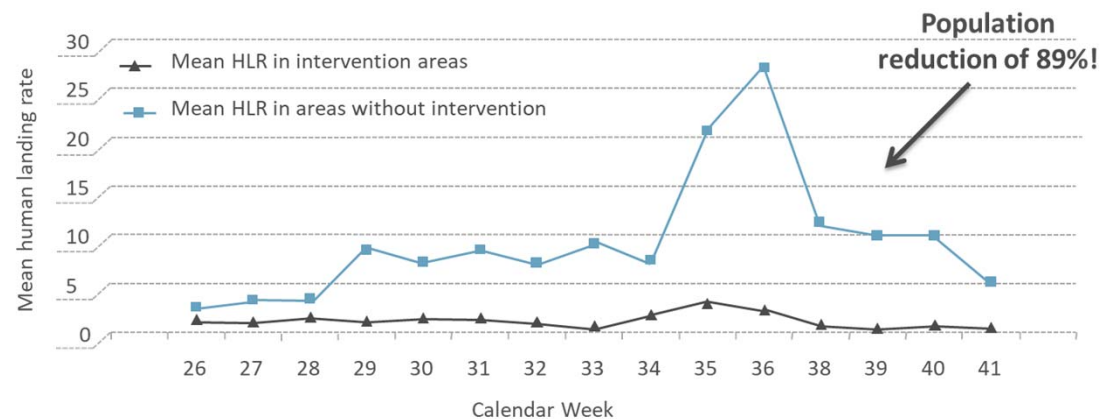


Aim: Evaluation of the influence of mosquito traps on local populations of *Aedes albopictus*

Specific areas in Cesena, Italy were randomly selected to be either treatment areas (with BG-Sentinel traps) or control areas (without traps) from June until October (average trap density: 1 trap per 150–350 m²).



Monitoring: Human landing rates



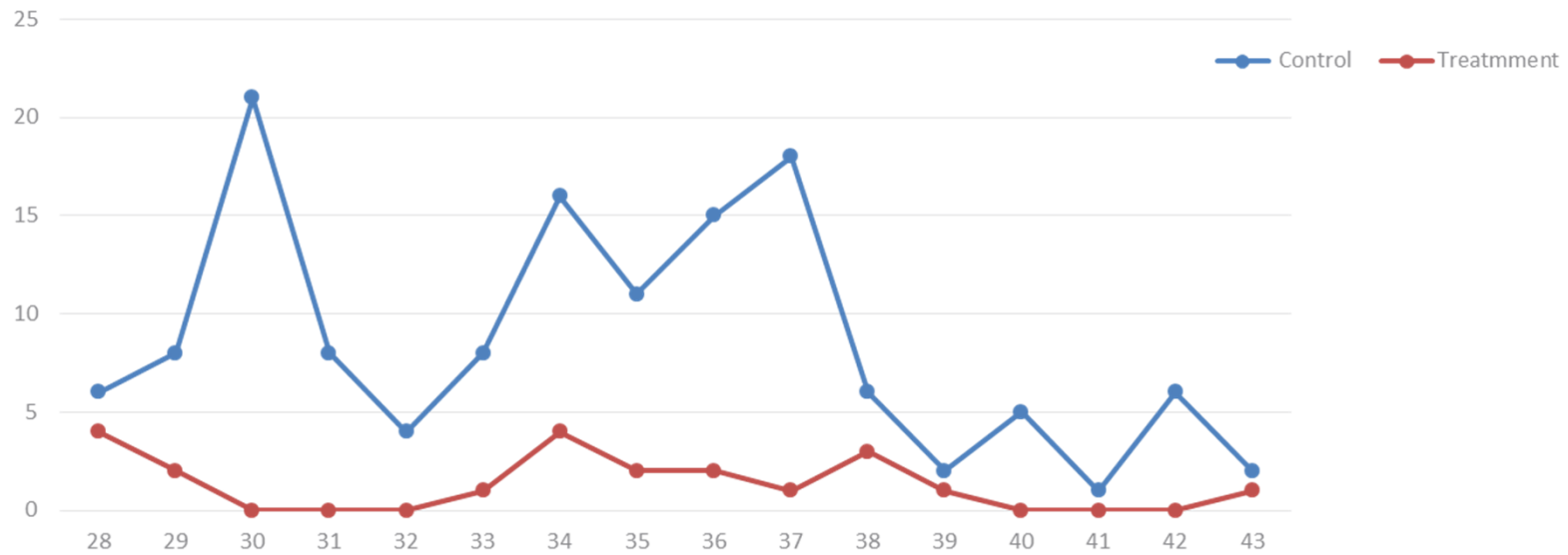
Publication: Englbrecht C., Gordon S., Venturelli C., Rose A., and Geier M. (2015). Evaluation of BG-Sentinel Trap as a Management Tool to Reduce *Aedes albopictus* Nuisance in an Urban Environment in Italy, *Journal of the American Mosquito Control Association*, 31(1):16-25.

Houston, Texas trial with suction traps



- Control houses – no trap
- Treatment houses – 1 trap

Ae. albopictus females in HLC



Manuscript in preparation

Manaus publication, Brazil



Aim: Evaluation of the influence of mosquito traps on local populations of *Aedes aegypti*

- In a recent study conducted in Manaus, Brazil (Degener et al. 2014), mass trapping with Biogents traps deployed at an average density of one per 385 m² significantly reduced (60%) the abundance of adult female *Ae. aegypti* in the rainy season, when the mosquito population was high.
- These results demonstrate for the first time a reduction of female *Ae. aegypti* by mass trapping with Biogents traps in an urban area.



Cluster randomised controlled trial with 775 houses.
Reduction



Publication: Degener, C.M., Eiras, A.E., Azara, T.M.F., Roque, R.A., Rösner, S., Codeço, C.T., Nobre, A.A., Rocha, E.S.O., Kroon, E.G., Ohly, J.J., Geier M. (2014). Evaluation of the effectiveness of mass trapping with BG-sentinel traps for dengue vector control: a cluster randomized controlled trial in Manaus, Brazil. *J. Med. Entomol.* 51, 408–420.

Added benefit of suction traps



- During the 17 month of mass trapping, BGS intervention traps collected 675,641 mosquitoes: 620,704 (91.9%) of the genus *Culex* (59% females), 54,586 (8.1%) *Ae. aegypti* (78% females), and 351 (0.1%) *Ae. albopictus* (83% females).
- The high abundance of *Culex* mosquitoes, with collections of up to 278 females per 24 h, suggests a high nuisance caused by this mosquito during the evenings and nights.
- Removal of this species from the area helps to protect against diseases which are transmitted by *Culex* mosquitoes.
- Households that used the traps reported a noticeable reduction in the nuisance from mosquitoes. The traps were very well accepted by the home owners.

Passive trap

Mass trapping by GAT in Brazil



Dengue, Zika e Chikungunya

ARMADILHA CONTRA O *Aedes aegypti*
Transmissor de Dengue, Zika e Chikungunya

UFMG
UNIVERSIDADE FEDERAL DE MINAS GERAIS

PIUMHI
GOVERNADOR ANTONIO TEÓFILO

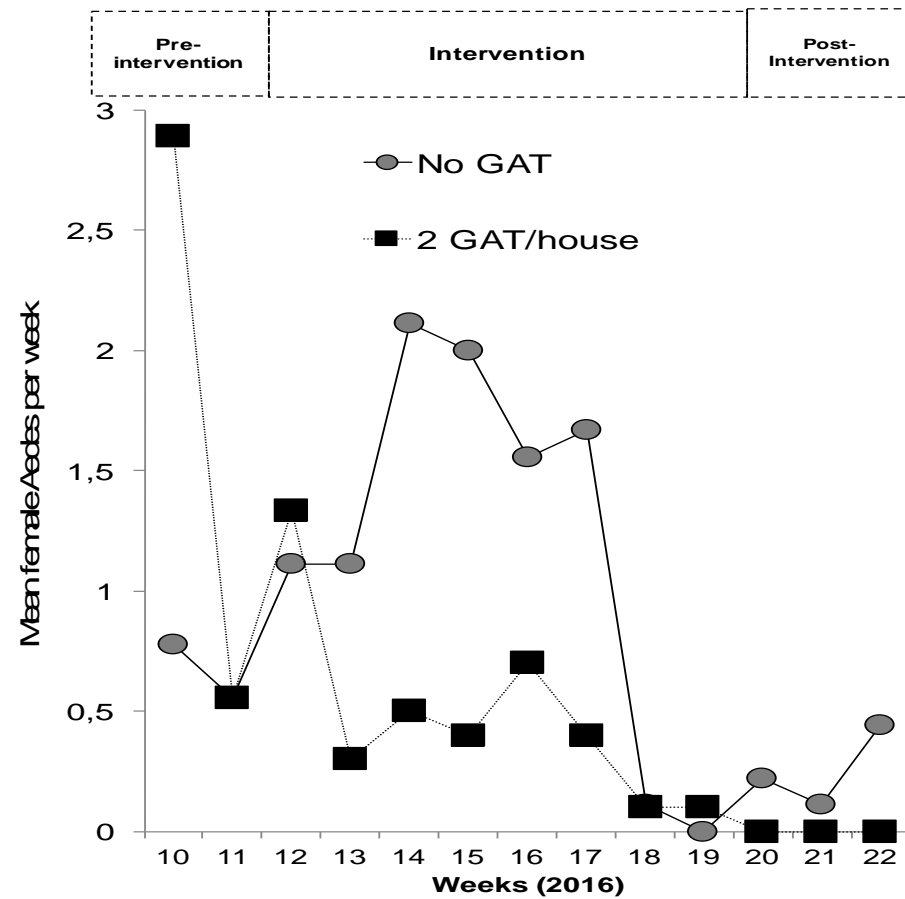
Secretaria Municipal de Saúde
AÇÃO E RESULTADO

Este estudo é importante e necessita do seu apoio e participação. Sua ajuda tem papel fundamental para o sucesso desta pesquisa.

Aviso importante:
Morador, caso você esteja fora de casa no dia da instalação da armadilha, pedimos a gentileza de avisar outro morador a respeito da visita.

Em caso de dúvidas, entre em contato com o pesquisador responsável:
Luiz Henrique Vieira Mota
(Coordenador de Endemias)
Setor de Endemias: 37 3371-9255

Um projeto da UFMG em parceria com a Secretaria de Saúde de Piumhi.



Citizen Action Through Science Approach



Washington, DC, USA



Community Mosquito Control UP

GAT (Gravid Aedes Trap) Mosquito Control

We are a group of residents in the Town of University Park, Maryland employing the Gravid Aedes Trap (GAT) to control local populations of the Asian Tiger mosquito, *Aedes albopictus*, and possibly also those of the tropical yellow fever mosquito, *Aedes aegypti*. The GAT can also be used to survey mosquitoes so we can identify hot-spots and optimize interventions. If you are using one or more traps (or want to), please click [here](#) to complete an online form so you get information and updates.

Please check this site regularly for new information.

This site is intended to provide information and communication to all University Park residents trying to control *Aedes* mosquitoes in their yards and gardens.

The community based and driven research on the use of GATs to control *Aedes* in UP is guided by [Prof. Dina Fonseca](#), Rutgers University.

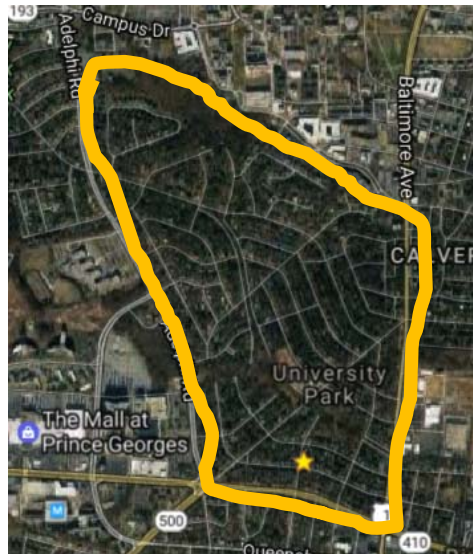
A unique feature of invasive *Aedes* mosquitoes is that they lay eggs in small water holding containers in people's

The Gravid Aedes Trap (GAT).

The GAT lures and kills *Aedes* females looking for a container to lay their eggs (see picture on the right). By killing the females before they lay the eggs you prevent mosquito populations from building over the summer. Although the use of traps to kill egg laying females has been shown to decrease exposure to mosquito borne diseases (click [here](#) for info), this community-driven project is unique to University Park, Maryland.



Citizen Action Through Science Approach



On Oct 10, 2017 the researcher Dina Madeira Fonseca shared an update on their project:

[Helping those that help themselves](#)

[Go to project](#)



Dina Madeira Fonseca
added an **update**

Oct 10, 2017

Two months and 9 BGS cross-town surveillance campaigns later

As it turns out even after over 900 GAT were purchased and deployed by residents there are still areas of high and very low GAT coverage within the town. However, we made use of that heterogeneity to assess the direct effects of GAT coverage against a socioeconomic homogenous background and source reduction information. Results across locations in town with different levels of GAT coverage are VERY encouraging. Manuscript in preparation. Will keep you posted.

Town has agreed to purchase the remaining GATs that will be available to residents for 2018 deployment. Dina will present results to town meeting on October 16.

About 1000 **G**raavid **A**edes **T**raps placed in 500 households (2 traps per premise). Home owner place traps and remove actual and potential breeding sites.

Up to 80% reduction of *Aedes albopictus* in premises with traps.

Manuscript in preparation.



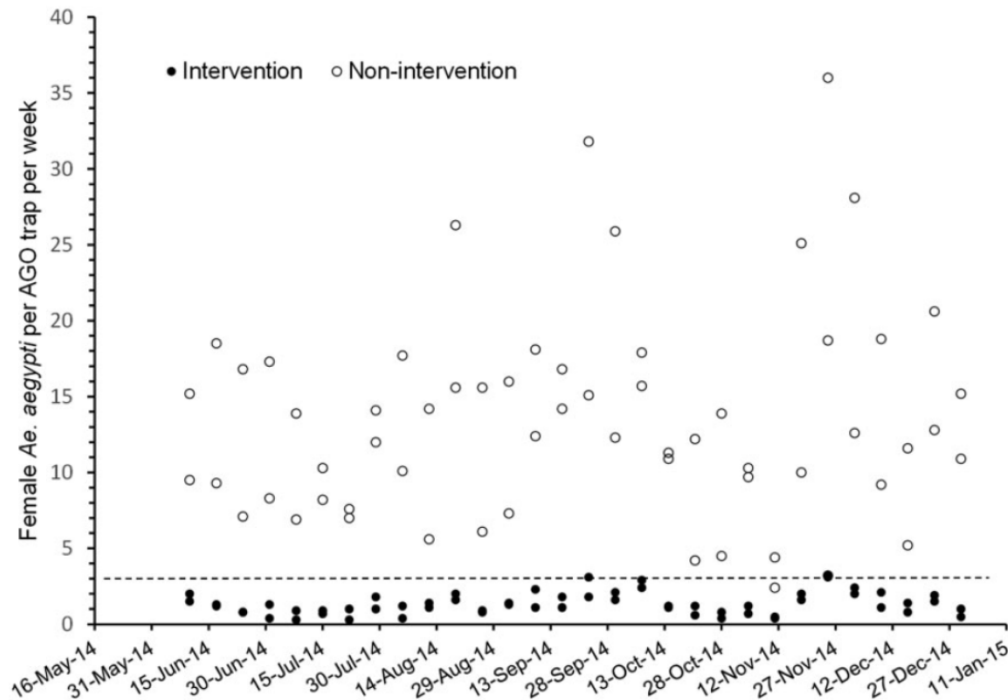
Growing scientific evidence



Large scale field trial in Puerto Rico



AGO Gravid traps: Dr. R. Barerra et al. 2017



- 90,000 AGO Traps
- 3 traps per home combined with source reduction
- Complete city treatment

- AGOs significantly reduced numbers of *Ae. aegypti*.
- 91% Reduction of mosquito population



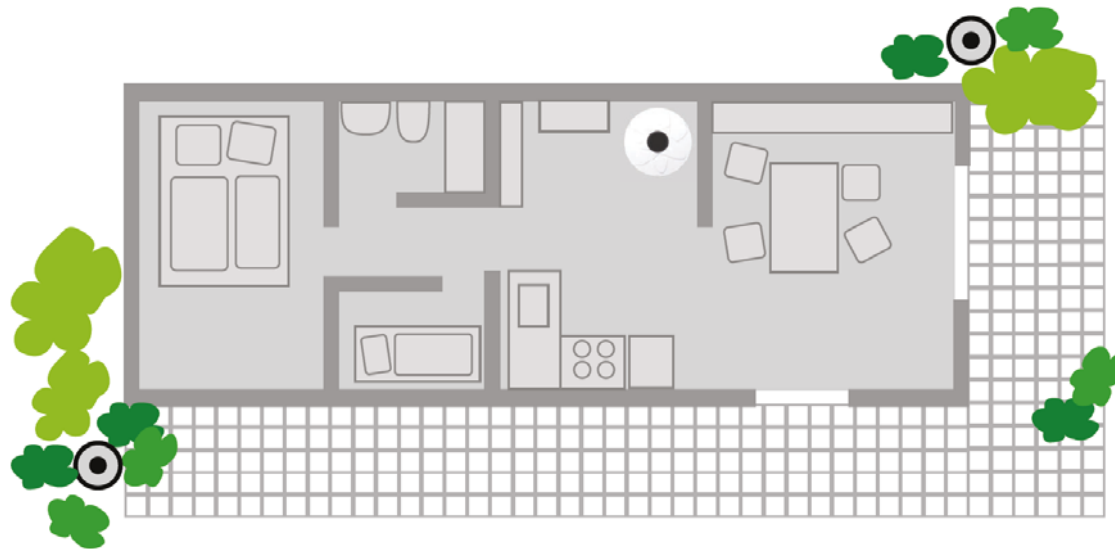
Barrera, R., Acevedo, V., Felix, G. E., Hemme, R. R., Vazquez, J., Munoz, J. L., & Amador, M. (2017). Impact of Autocidal Gravid Ovitrap on Chikungunya Virus Incidence in *Aedes aegypti* (Diptera: Culicidae) in Areas With and Without Traps. *Journal of medical entomology*, 54(2), 387-395.

New mass trapping intervention: 2 plus 1 concept



We propose a new strategy to control Tiger mosquitoes on the household level by using a combination of initial source reduction, followed by mass trapping using a set of two complementing trap types: 1 suction trap for host seeking females inside the house and 2 passive traps for gravid females outside.

Applied in large scale the proposed costs for traps and attractants are about 60 USD per household in the first year, and 30 USD each following year.



2 GAT Traps (outdoor)



1 Suction Trap (indoor)