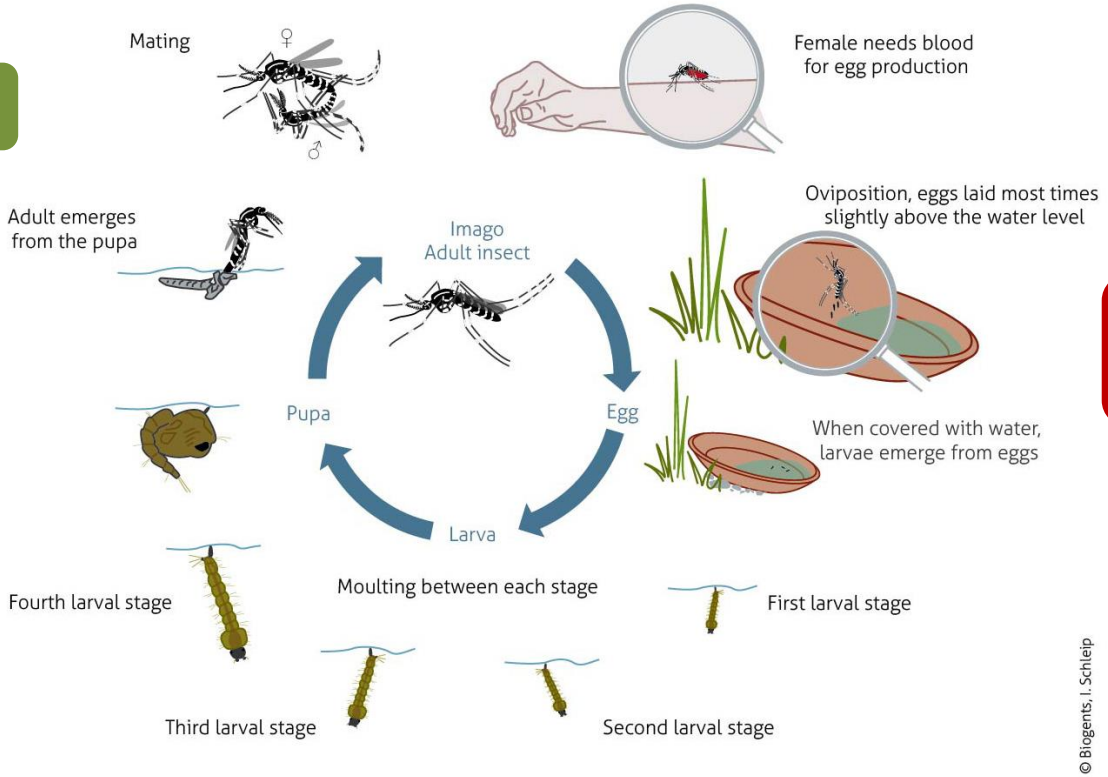
Integrated mosquito management: Mosquito traps as a powerful new tool in the backyard

Dr. Silke Göttler, Biogents AG

Biogents

Mosquito Biology

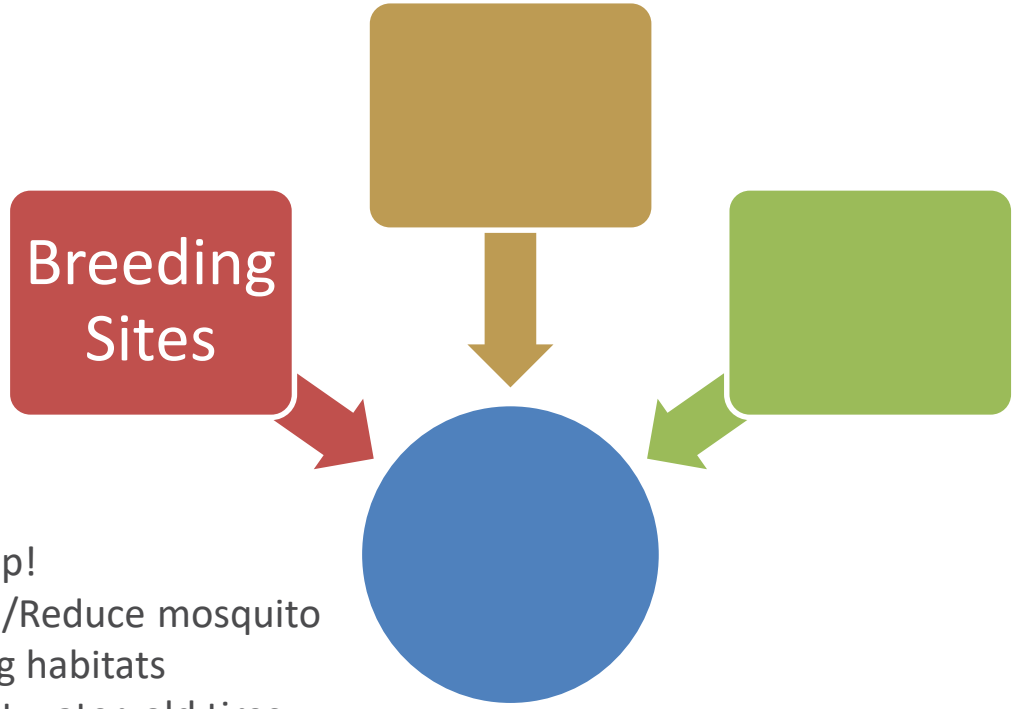
Adulticiding



Control mosquito breeding habitats

Larviciding

Breeding Sites

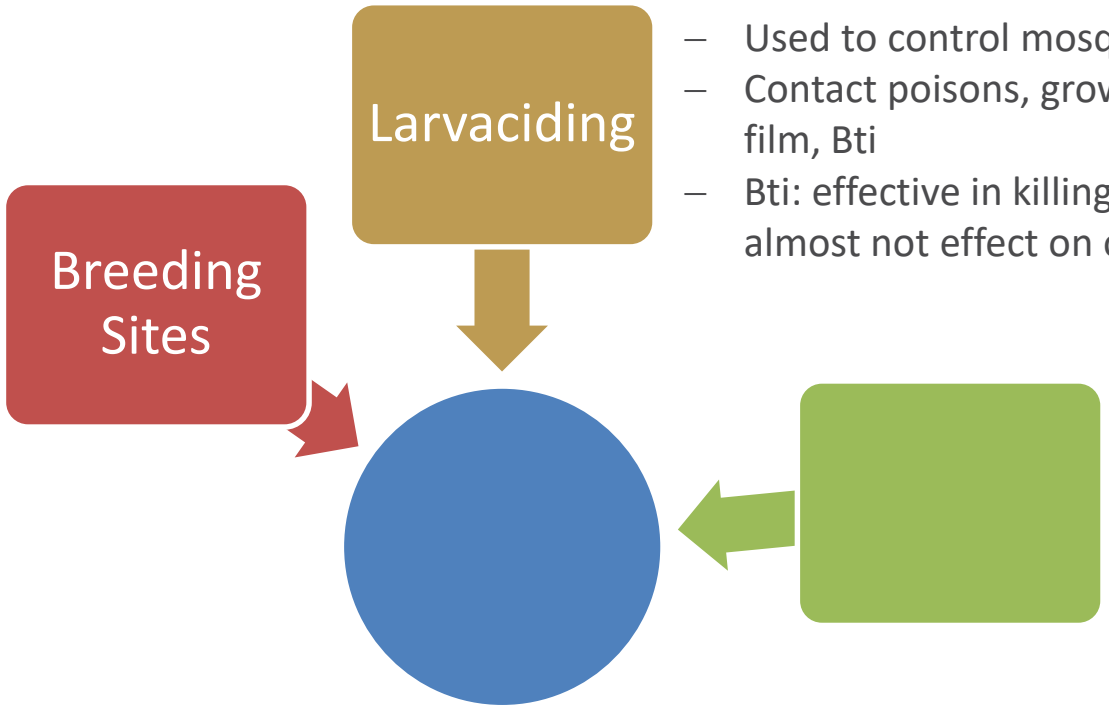


Breeding site!

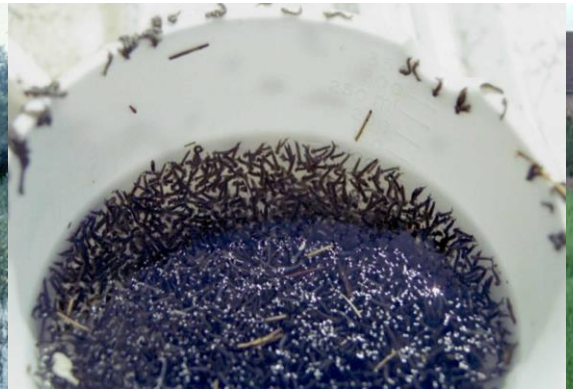
- First Step!
- Remove/Reduce mosquito breeding habitats
- Stagnant water, old tires, flower pots, cans, trash



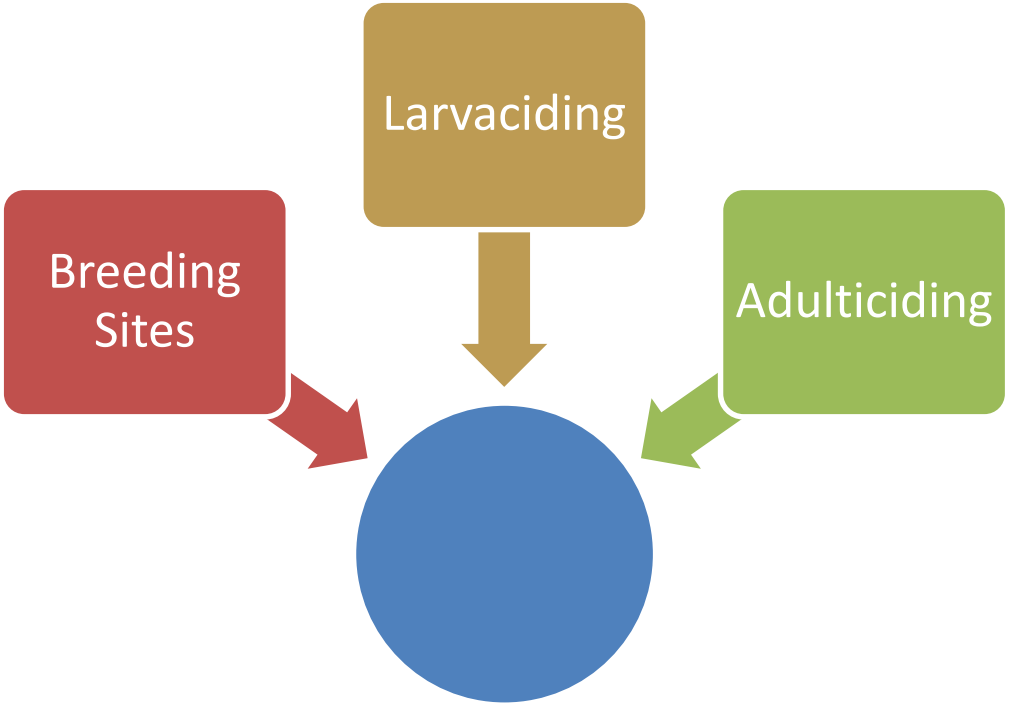

Larvaciding



- Used to control mosquito breeding sites
- Contact poisons, growth regulators, surface film, Bti
- Bti: effective in killing mosquitoes with almost not effect on other organisms

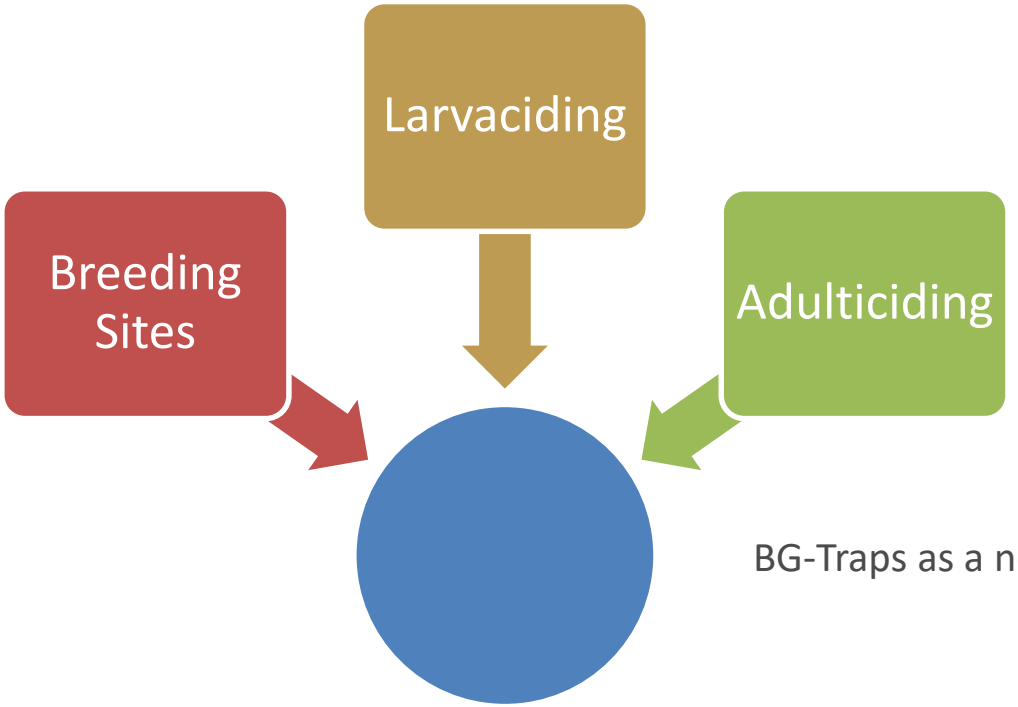


Adulticiding



- Main control measure today for adult mosquitoes
- Ground based applications: residual chemical insecticides, truck mounted thermal fogging or hand fogging machines
- Aerial application: low-volume application of insecticides

Adulticiding



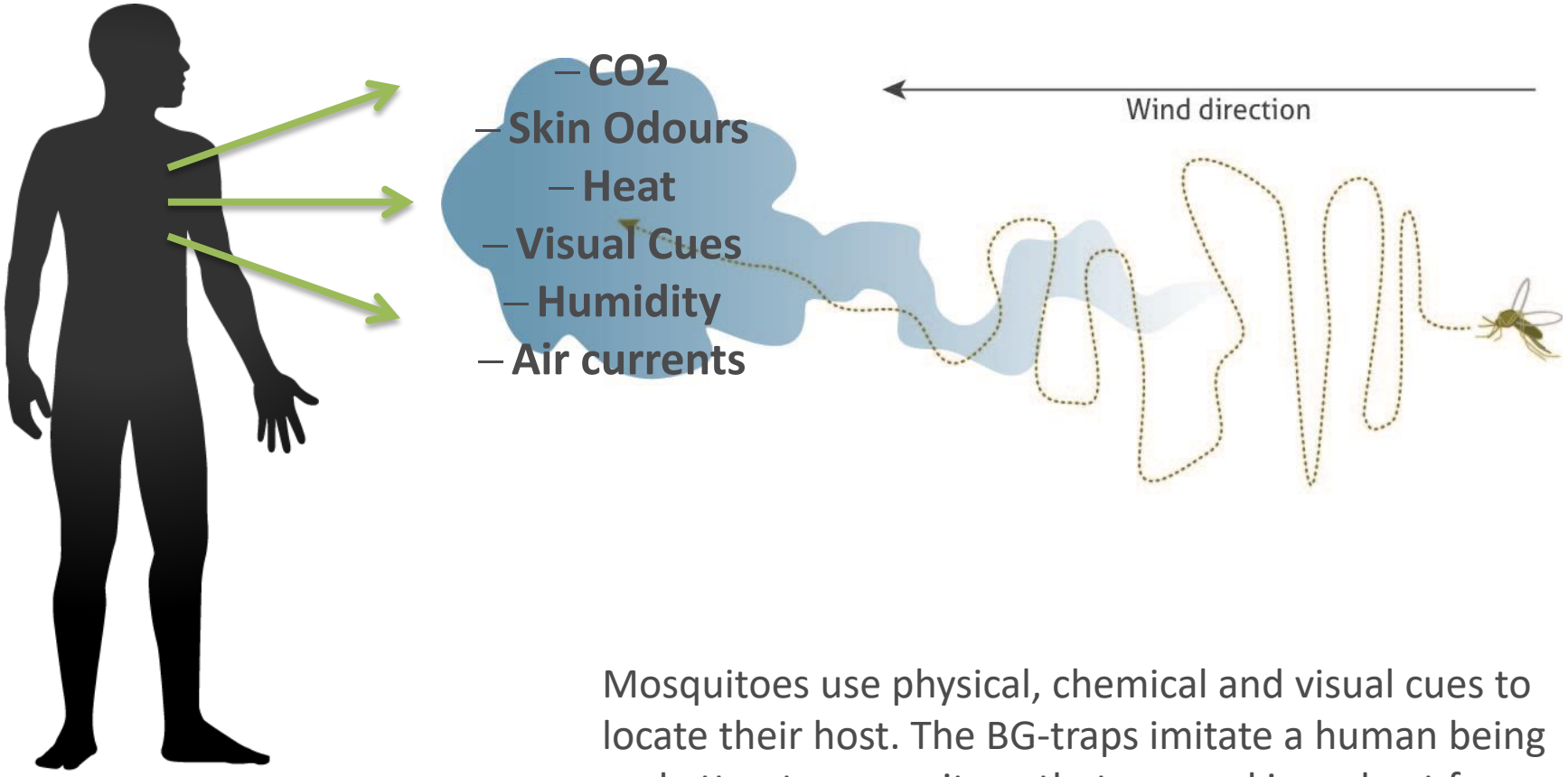
BG-Traps as a new tool





Control Method: Mosquito traps

How does a mosquito find it's host?



Mosquitoes use physical, chemical and visual cues to locate their host. The BG-traps imitate a human being and attracts mosquitoes that are seeking a host for a bloodmeal as well as gravid mosquitoes.

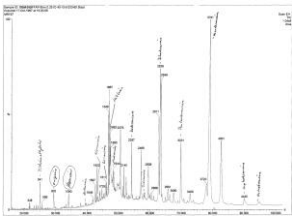
The Biogents suction trap principle

Visual Cues

Mosquitoes are visually attracted to the edge of the *black* suction column centrally placed in the top of the trap. Gravid mosquitoes attracted by the black column imitating a breeding site – it looks like a hole in the tree.

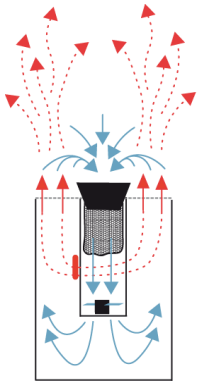
Biogents Attractants

Increase catch rates and it is a combination of non-toxic substances that are specifically found in the human skin.



Bidirectional Convection Currents

An integral fan blows the attractant upwards in a convection-like current. The downward suction forces the attracted mosquitoes into a catch bag where they remain captured and finally dry out and die.



BG - Traps

- Easy to handle and operate
- Environmentally friendly
- No insecticides or pesticides
- Does not catch beneficial insects
- Safe for people and their pets
- Suited for use in and around the house
- Economic and Effective!





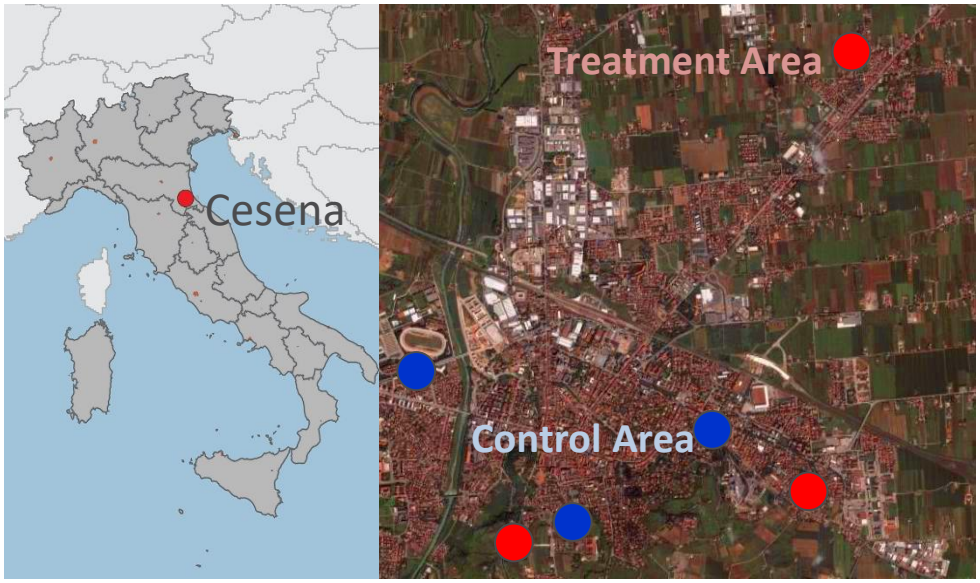
Efficacy Data

More than 350 publications demonstrate the efficacy of Biogents Traps

https://www.zotero.org/groups/bg-sentinel/items
http://www.bg-sentinel.com/

How effective are traps in *controlling* mosquito populations?

Case Study in Italy: Control of Asian Tiger Mosquitoes by the use of mosquito traps



Study with 4 control areas and 4 treatment areas equipped with 8 traps from June to October.

Measured parameters:

- Human landing rates (1 hour)
- Ovitraps were placed in each sector with weekly collections

Engelbrecht et al. (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.

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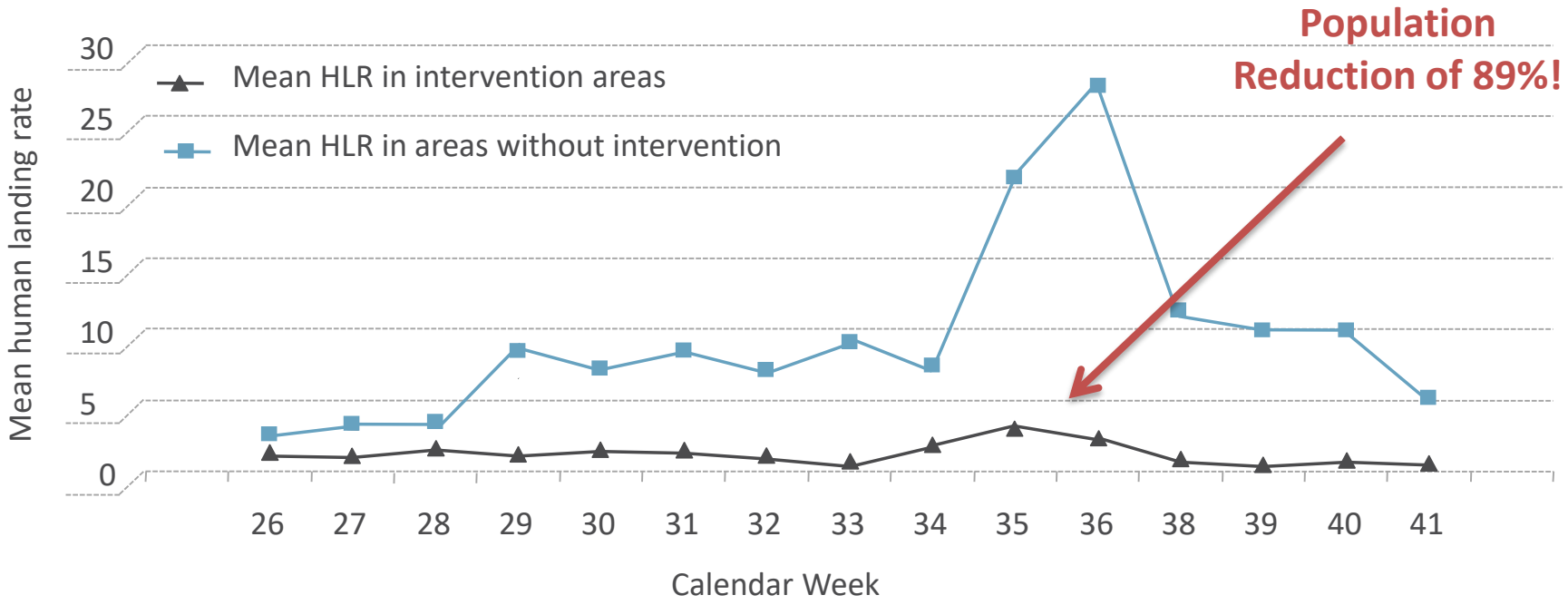

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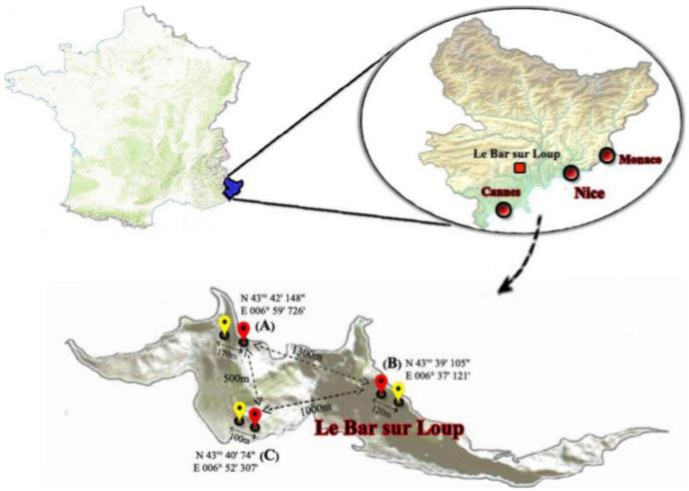
How effective are traps in *controlling* mosquito populations?

Field trap barrier system in France for controlling *Aedes albopictus*



Study with 3 control and 3 experimental houses equipped with 9, 13 and 18 traps with CO_2 from July to September.

BioBelt: network of traps positioned at an average of 5 m distance around the area to be protected

Measured parameters:
Human landing rates (30 min)

Akhoundi et al. (2018): Effectiveness of a field trap barrier system for controlling *Aedes albopictus*: a „removal trapping“ strategy. *Parasites & Vectors* 11:101

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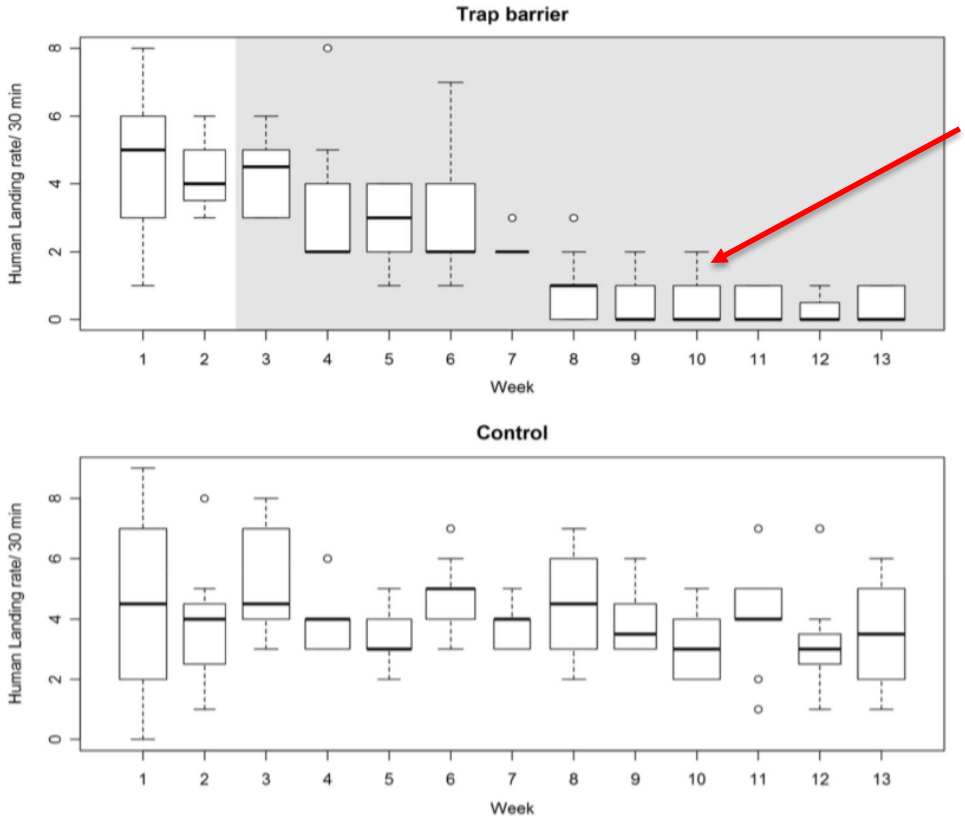


Ae. albopictus biting rate was reduced to almost zero!

Akhoundi et al. (2018): Effectiveness of a field trap barrier system for controlling *Aedes albopictus*: a „removal trapping“ strategy. *Parasites & Vectors* 11:101

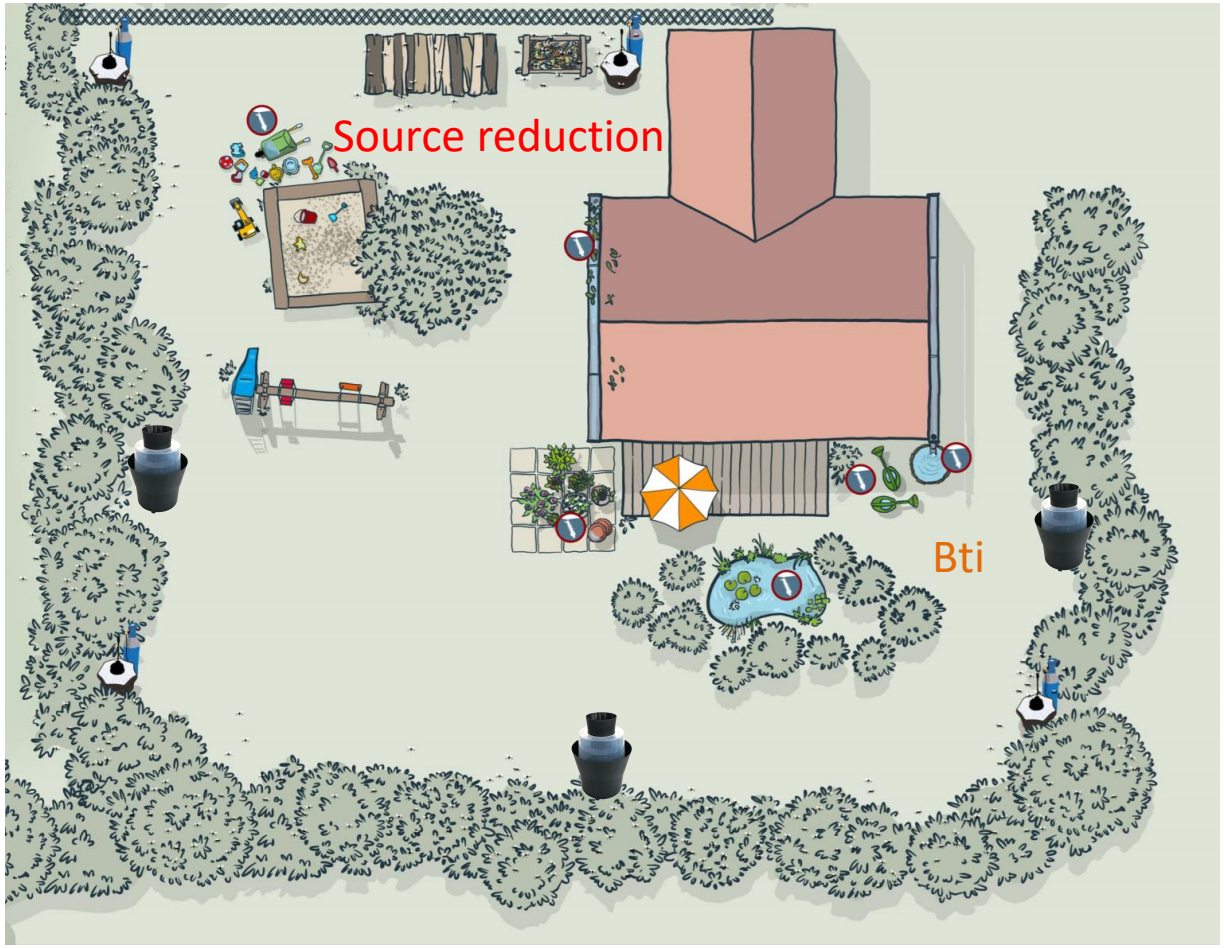
Invasive species: The Tiger mosquito *Aedes albopictus*

Asian Tiger mosquito *(Aedes albopictus)*

- Found in the Americas, Europe, and Asia
- Vector-Borne Diseases transmitted by tiger mosquitoes
- Urban species, container breeders, aggressive, day biting
- Short flight range
- Hibernate over winter as eggs

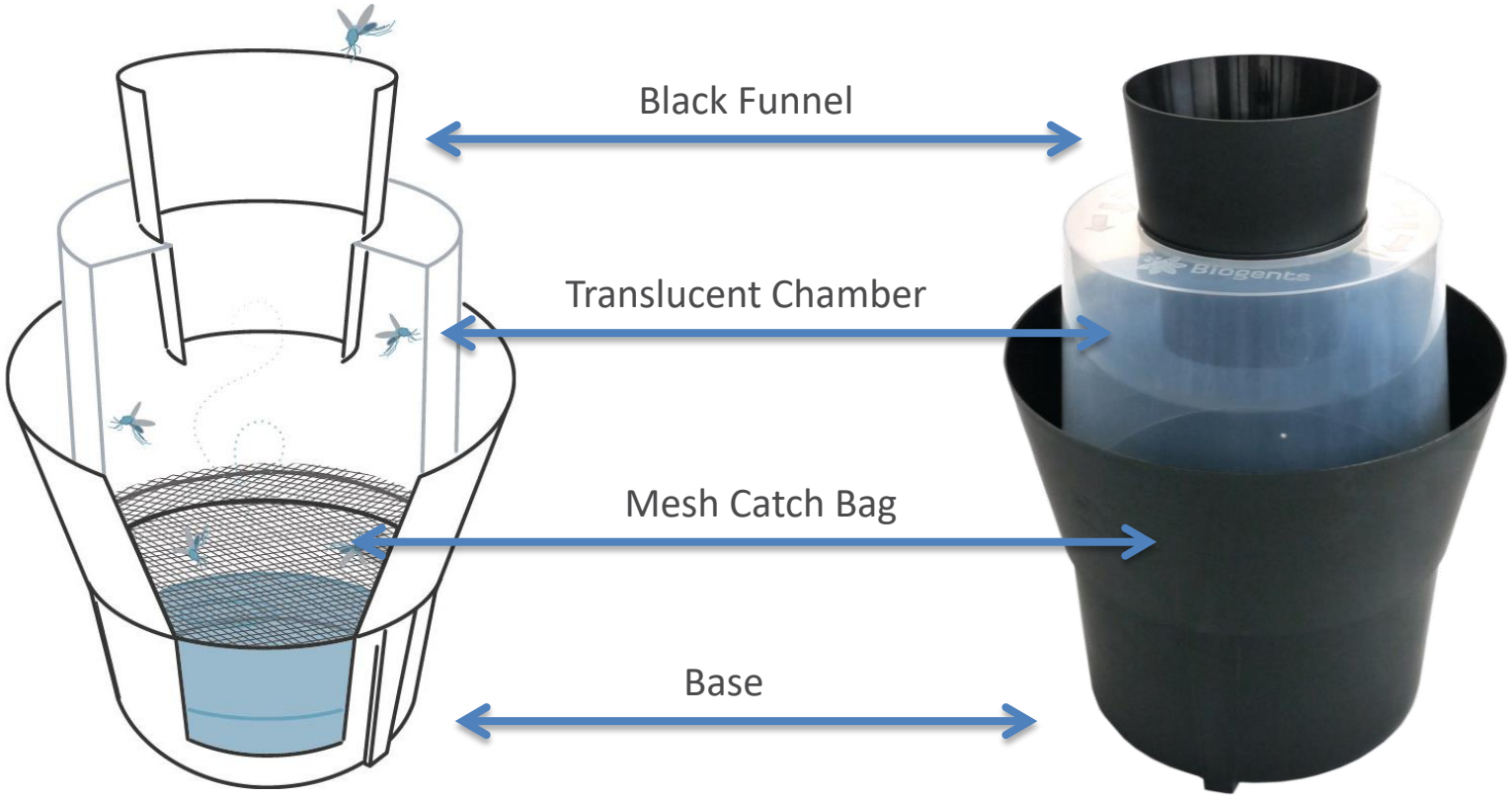
Tiger mosquitoes

Trapping



Due to the fact that the tiger mosquitoes remain within hundred meters of where they completed their immature development, beside source reduction and larvaciding the bg-mosquitaire is a good tool in the backyard. Through continuous use of the suction traps, a tiger mosquito population can be diminished by up to 80%. In addition the suction traps could be combined with the gravid traps BG-GAT.

BG-GAT (*Gravid Aedes Trap*)



Female mosquitoes are attracted by water and oviposition cues and enter the transparent chamber where they are contaminated by killing agents.

Eiras, A.E., Buhagiar, T.S., and Richie, 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.

Use of GATs for Control?

VECTOR CONTROL, PEST MANAGEMENT, RESISTANCE, REPELLENTS

Use of the CDC Autocidal Gravid Ovitrap to Control and Prevent Outbreaks of *Aedes aegypti* (Diptera: Culicidae)

Morbidity and Mortality Weekly Report

Reduced Incidence of Chikungunya Virus Infection in Communities with Ongoing *Aedes Aegypti* Mosquito Trap Intervention Studies — Salinas and Guayama, Puerto Rico, November 2015–February 2016

insects

MDPI

Review

The State of the Art of Lethal Oviposition Trap-Based Mass Interventions for Arboviral Control

Brian J. Johnson [1,2,*], Scott A. Ritchie [1,2] and Dina M. Fonseca [3]

The CDC AGO trap is similar to the BG-GAT trap. Barrera demonstrated that the AGO traps can be used to not only control *Aedes aegypti* populations in Puerto Rico but he also showed that the incidence of Chikungunya Infections was also reduced in trap intervention areas.

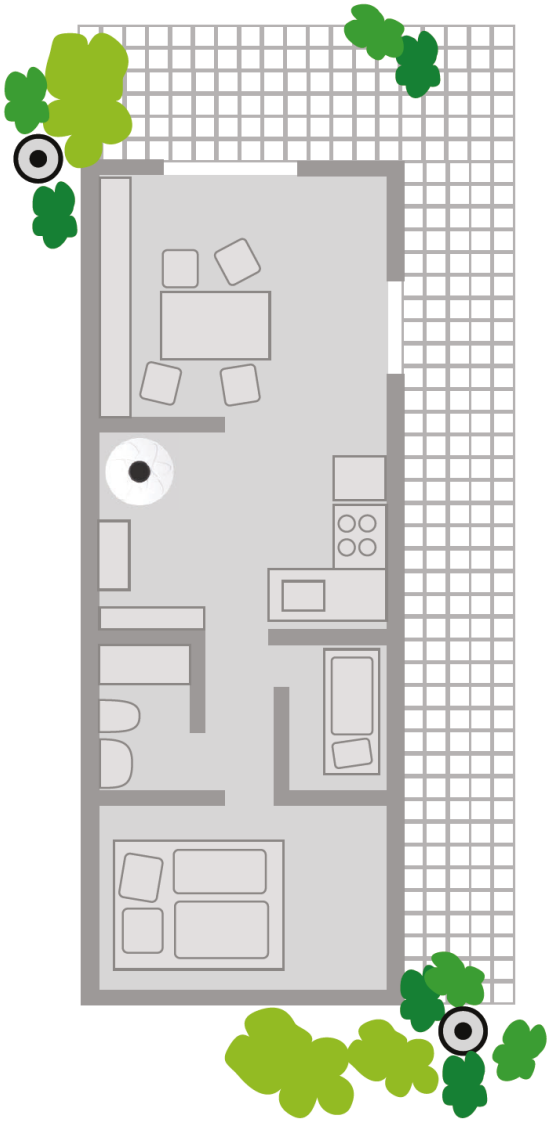
Integrated mosquito management

Use multiple control methods to help control *Aedes*

The efficacy of mosquito traps has been show to significantly reduce *Aedes* population sizes.

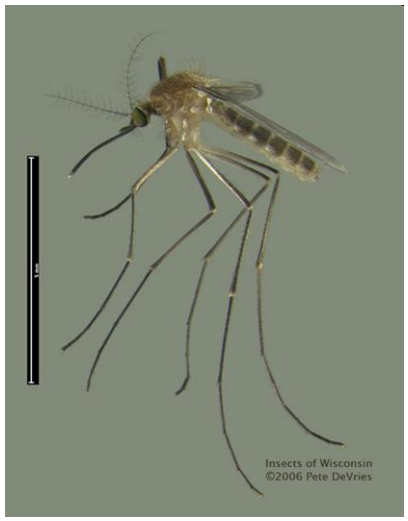
Equip households with a combination of both mosquito traps and if necessary perform larviciding to potential breeding sites.

This should widen the scope of targeted physiological mosquito stages, raising the probability of success in control.



House mosquito

Genus *Culex and Culiseta*:
small house mosquitoes (*Culex pipiens*)
large house mosquito (*Culiseta annulata*)



- Exist in close environments to humans
- Hibernate over winter in cool environments (e.g. Basements)
- Larval develop in small containments of water (e.g. Gardens, sewage systems, ect.)
- Generally do not travel far for their blood meal
- Travel distance around its host (500m)
- General blood hosts: birds and humans

Inundation mosquitoes

Examples*: Ochlerotatus sticticus, Aedes vexans*

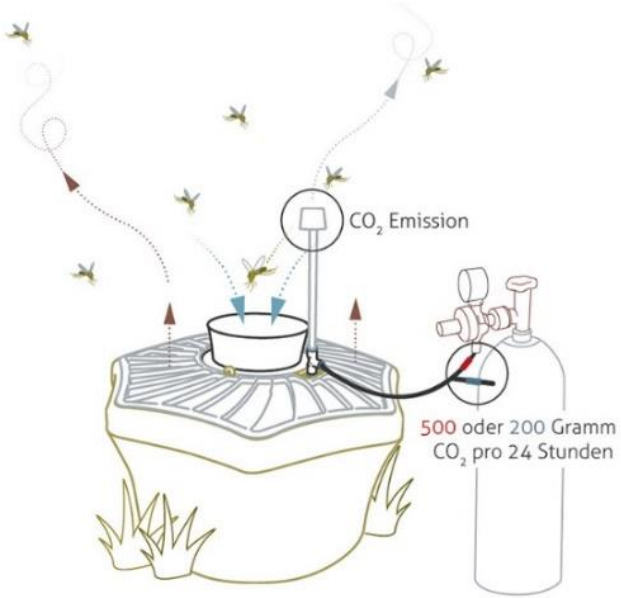
- Eggs are laid in lower wet flood plains of rivers
- Survive for years without water
- When flooding occurs it creates a mass hatching of mosquitoes in very short amount of time
- Hibernate over winter as eggs
- Travel far in search for host (>10km)

Mosquitaire CO_2

Additional Attractants – CO_2

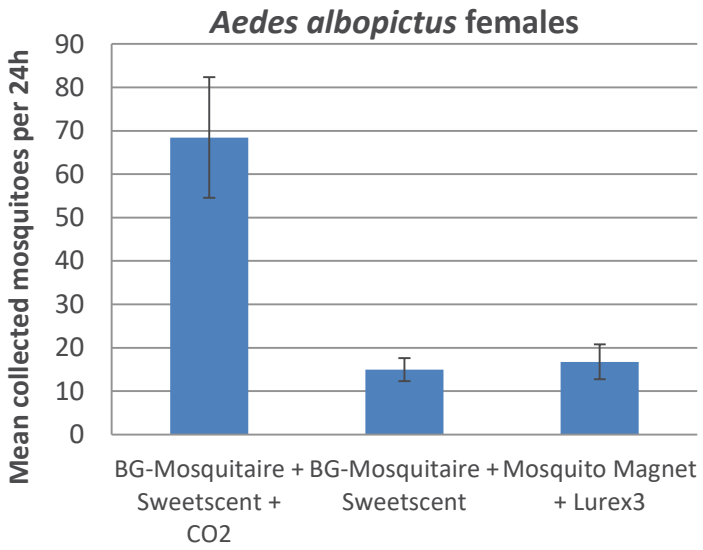
When humans exhale they release carbon dioxide (CO_2) into their surroundings.

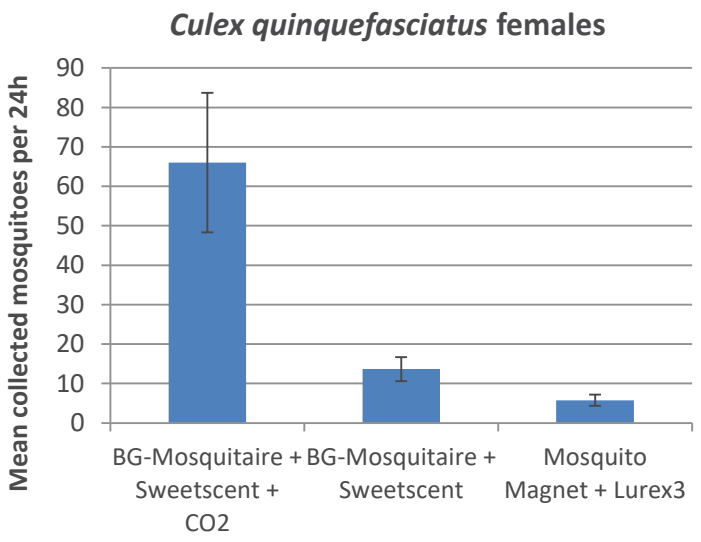
The addition of CO_2 to Biogents' traps enables you to catch a broad range of mosquitoes and other blood-sucking insects.



How effective is the Mosquitaire CO_2?

The following graphs displays the results from a field comparison of mosquito traps (with and without CO_2)



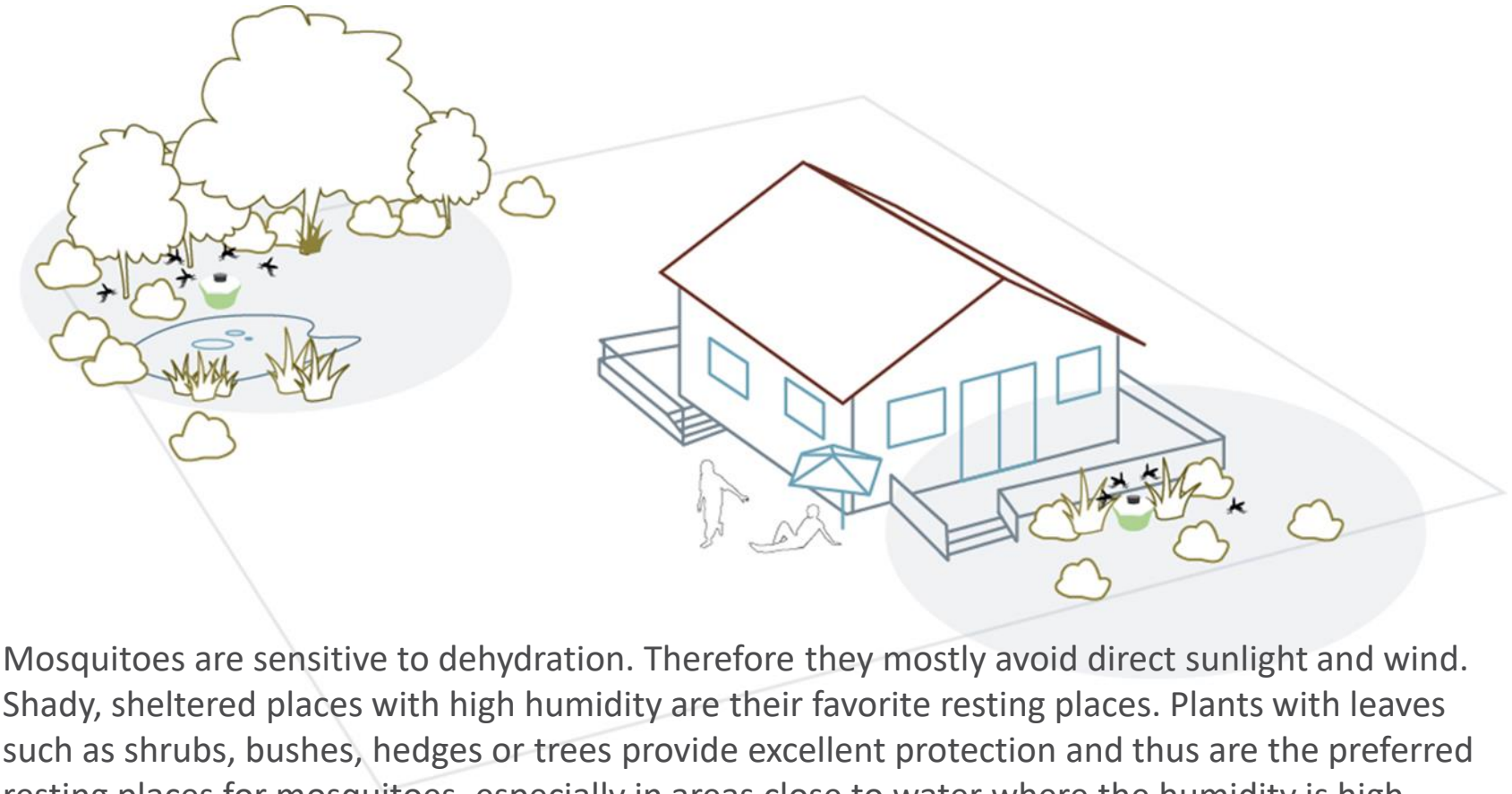


Willis, S. et al. (2015): Mosquito Trap Comparisons Using Biogents Lures. Louisiana Mosquito Control Association

Placement is important!

Positioning of the traps:

The correct positioning of mosquito traps has a direct influence on the success of the catch rate.



Mosquitoes are sensitive to dehydration. Therefore they mostly avoid direct sunlight and wind. Shady, sheltered places with high humidity are their favorite resting places. Plants with leaves such as shrubs, bushes, hedges or trees provide excellent protection and thus are the preferred resting places for mosquitoes, especially in areas close to water where the humidity is high.

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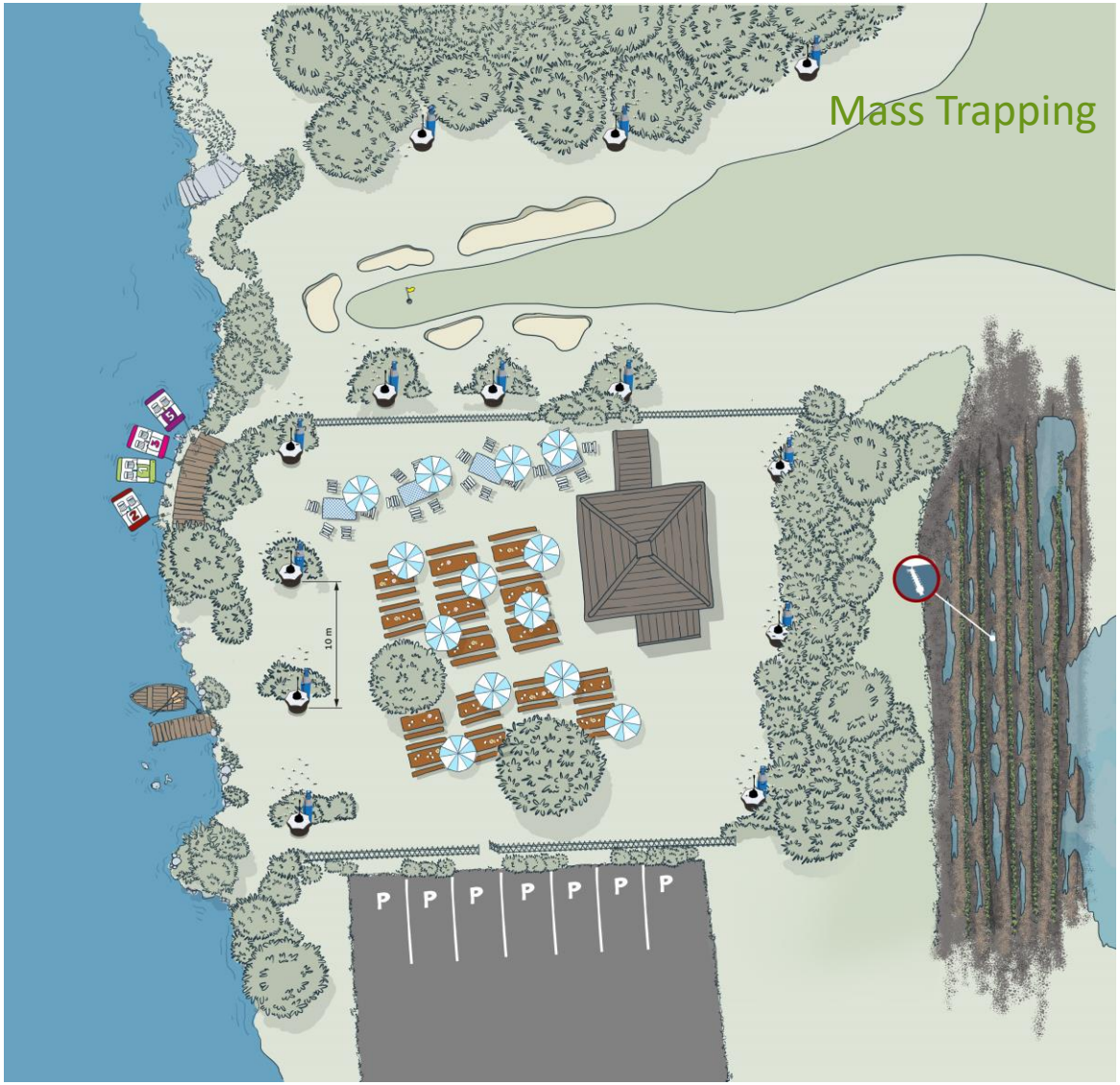
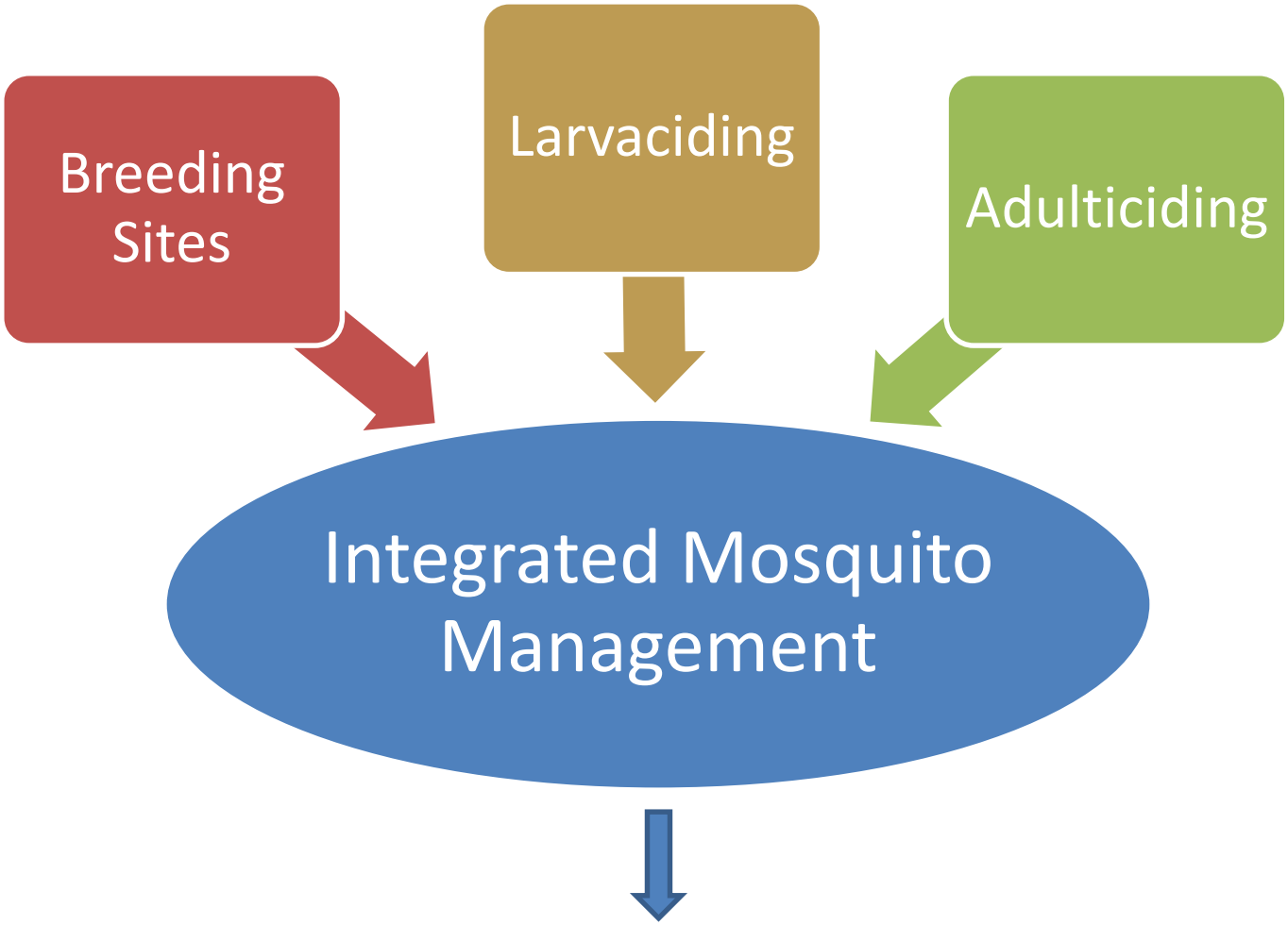
House mosquitoes

Trapping

Inundation mosquitoes



80.000 Mosquitoes catched in 1 week close to the Starnberger See in Bavaria



- Reduce mosquito populations
- Protect the European citizens against disease vectors and nuisance mosquitoes

THANK YOU FOR YOUR ATTENTION