



VECTOTHOR

IN2CARE[®] MOSQUITO STATION

Exploiting mosquito
behaviour to eliminate
mosquitoes safely



- ✓ Kills all mosquito larvae in the Station
- ✓ Kills all mosquito larvae in surrounding breeding sites
- ✓ Kills exposed adult mosquitoes
- ✓ Stops virus development!



Dengue Mosquito



Asian tiger mosquito

Exploiting mosquito behaviour to eliminate mosquitoes safely

The scientific way to combat *Aedes* mosquitoes that transmit dengue, chikungunya, yellow fever and Zika virus.

Dengue, chikungunya, yellow fever and Zika virus are rapidly spreading mosquito-borne viral diseases. They are difficult to diagnose and treat, and mosquito control is the only option to stop transmission. These mosquito-borne diseases are the most significant public health risks globally, with dengue fever one of the most important arboviral diseases in humans.

Aedes aegypti Linnaeus (dengue mosquito) and *Aedes albopictus* Skuse (Asian tiger mosquito) are the most important mosquito vectors of dengue fever. They are the most efficient vectors for arboviruses because they highly favour people, thrive in close proximity to where we live, and frequently bite! *Aedes* mosquitoes prefer to rest in shaded areas and feed on humans during daylight hours. Peak biting periods are early morning and just before dark in the evening.

Only female mosquitoes bite people. This is to secure a blood feed, which is required for egg-laying, after which they can transmit the deadly viruses. (Male mosquitoes do not bite).

Aedes mosquitoes are difficult to control as they lay their eggs in water in very small and hard-to-find cryptic breeding sites (e.g. spathes of plants and artificial containers such as pots, earthen jars, drums, concrete tanks, coconut shells, vases, old tyres, rubbish and more).

The VECTOTHOR IN2CARE MOSQUITO STATION attracts and kills the blood-sucking *Aedes* females using two bioactive agents, to target both the mosquito larvae and adults. It is a multi-impact, auto-dissemination Station that provides effective kill of mosquito larvae in breeding sites in a wide area surrounding the Station. The Station will also target other 'pot' breeding species such as *Culex pipiens* Linnaeus (common house mosquito).

SCIENTIFICALLY EXPLOITING MOSQUITO BEHAVIOUR

Aedes mosquitoes are attracted to small container-like breeding sites and have a unique egg-laying behaviour. They lay their eggs over several breeding sites, to spread them around and increase the success of their offspring surviving.

The VECTOTHOR IN2CARE MOSQUITO STATION exploits this natural behaviour by using the female mosquito to spread a low toxic killing agent applied in the Station, to multiple breeding sites in the area. This concept is referred to as 'auto-dissemination' and it enables us to kill virtually all the mosquito larvae in the area around the Station, before they become biting adults capable of spreading disease.

HOW WE EXPLOIT THE FEMALE MOSQUITO!

The VECTOTHOR IN2CARE MOSQUITO STATION is made of durable plastic that contains water to which we add a distinctive odour lure, targeted to attract egg-laying *Aedes* mosquitoes to the Station. When the female mosquitoes enter the station, they rest on a treated gauze mesh near the water surface. This mesh is laced with a light powder containing an insect growth regulator and a naturally occurring, insect-killing fungus.

We then exploit the fact that *Aedes* mosquitoes lay their eggs over multiple sites.

After picking up the two actives, the female mosquito flies out of the Station to lay more eggs elsewhere. She has however been infected with the fungus; and she is also carrying the insect growth regulator on her legs.

As she visits different water containers to lay her eggs, she spreads the insect growth regulator, contaminating many other breeding sites around the Station. This Auto-dissemination process ensures she kills the larvae from many other mosquitoes in small and hard to find breeding sites.

ACTIVE NATURE

The two actives in the VECTOTHOR IN2CARE MOSQUITO STATION are designed to exploit the natural behaviour and biology of *Aedes* mosquitoes, and kill both adult mosquitoes and mosquito larvae.

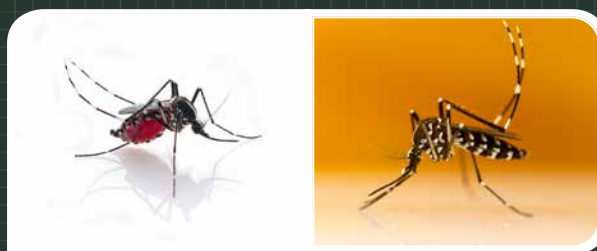
An Insect Growth Regulator Kills the Larvae

Pyriproxyfen is an Insect Growth Regulator that mimics the naturally produced Juvenile Hormone of the mosquito larvae. The effects of this are seen during the larval-pupal transformation stage, with death occurring at the pupal stage, so adult mosquitoes fail to emerge. This active is effective at extremely low concentrations and is approved by regulatory authorities around the world, including the WHO and US EPA, for direct application to human drinking water.

The female mosquito picks this active up from the Station when she lays her eggs, and then spreads it to the various breeding sites she visits. This means that the eggs she lays at each site will be killed before they emerge as adult mosquitoes. It also means that the eggs from every other mosquito will also be killed.

A Natural Fungus

Beauveria bassiana is a naturally occurring, entomopathogenic soil fungus that causes white muscardine disease in adult mosquitoes. When the microscopic spores of the fungus come into contact with the body of the female mosquito, they germinate, penetrate the cuticle, and slowly grow inside her, killing her within a few days. This allows her to spread the Insect Growth Regulator to many other breeding sites, whilst ensuring she does not survive. Most importantly, the fungus affects her health and greatly reduces her ability to find and bite people once she has been infected. It also blocks dengue virus replication so the disease cannot be spread.



Aedes aegypti Linnaeus
(Dengue mosquito)

Aedes albopictus Skuse
(Asian tiger mosquito)



The gravid female is lured to the Station, where she is contaminated with two bioactive agents.

She will unknowingly spread insect growth regulator to surrounding breeding sites, killing her larvae AND the larvae of other mosquitoes in the area.



Here, the mosquito is contaminated with two bioactive agents;
1. An insect growth regulator which halts larval development,
2. A natural fungus that slowly kills the infected mosquito.

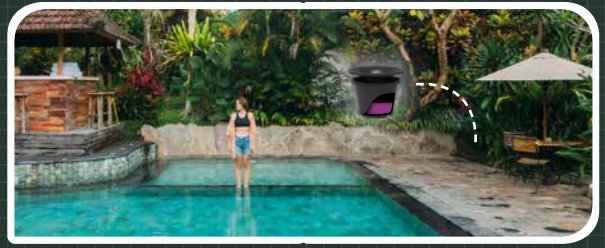


AN ENVIRONMENTALLY FRIENDLY SOLUTION

Insecticide resistance has become a major problem. Large scale insecticide fogging programs show limited efficacy and major impacts on non-target organisms. This necessitates a switch to more sustainable, environmentally friendly vector control. The VECTOTHOR IN2CARE MOSQUITO STATION uses a natural, US-EPA approved, fungus to kill adult

mosquitoes; and the Insect Growth Regulator is a WHO-recommended ingredient that can even be used in drinking water. Both bioactives have short half-lives in the environment and are classified as low risk for non-target organisms.

The VECTOTHOR IN2CARE MOSQUITO STATION deploys tiny amounts of this bioactive mixture in an enclosed point-source environment, that is specifically targeted to mosquitoes. Minute amounts of the Insect Growth Regulator will get deposited exclusively in other breeding sites (mostly small man-made containers), which is enough to kill mosquito larvae. Less than 10 ppb of the active is required to prevent adult mosquito emergence. This means it poses no risk for non-target organisms like fish, birds or mammals.





VECTOTHOR
IN2CARE® MOSQUITO STATION



Infected mosquitoes usually STOP biting and virus replication is also reduced, preventing the spread of harmful diseases like dengue (pictured).

The mosquito dies within a few days, without transmitting disease.



Dengue virus

HOW TO USE THE VECTOTHOR IN2CARE MOSQUITO STATION

Stations should be placed where mosquitoes are likely to breed. This means in shaded, vegetated places, close to human habitation.

In high risk areas we recommend 1 Station per 400 m² (25 Stations per hectare). Monthly Station maintenance (replenishment of the bioactives and topping up with water) is required, depending on climate and monitoring demands.

Mosquitoes are not trapped but are simply contaminated with the actives. Because of its slow-killing action, you will see live larvae in the Station water. This is quite normal and actually serves to attract female mosquitoes, thus improving the performance. The larvae,

often called 'wrigglers' will die before they can emerge as adults. When positioned correctly, in a large enough area, VECTOTHOR IN2CARE MOSQUITO STATIONS will effectively reduce the numbers of *Aedes* mosquitoes and reduce the risk of infection from dengue, Zika, yellow fever or chikungunya viruses. Optimal control is achieved when you also remove as many other breeding sources as possible. Allow two weeks to notice the full benefits.

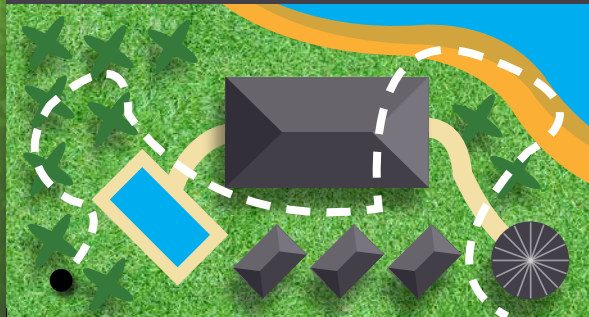
For non-isolated sites we recommend also installing a BITHOR Mosquito Control Zone™ around the property. This is because adult *Aedes* mosquitoes can travel up to 150 m from near-by properties

How to use the VECTOTHOR IN2CARE MOSQUITO STATION

1 CONFIRM TARGET SPECIES
Dengue + Asian tiger mosquito



2 MAP THE TARGET AREA
One Station per 400 m²



3 PLACE AND SECURE STATIONS
Shaded, vegetated places



4 MONTHLY MAINTENANCE
Top up with water + sachet



5 MONITOR AND RECORD RESULTS



6 SIT BACK AND RELAX...



ENSYSTEX AUSTRALASIA PTY LTD
Warehouse D, Building 6, The Switchyard
161 Manchester Road, Auburn NSW 2144
Call 13 35 36
www.Ensystex.com.au

ENSYSTEX NEW ZEALAND LTD
7C Corinthian Drive, ALBANY Auckland 0752
0800 ENSYSTEX (0800 367 978)
www.Ensystex.co.nz

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