

IMPORTANCE OF MOSQUITO CONTROL

Mosquito-borne diseases are spread by the bite of an infected mosquito. Diseases transmitted to people by mosquitoes include

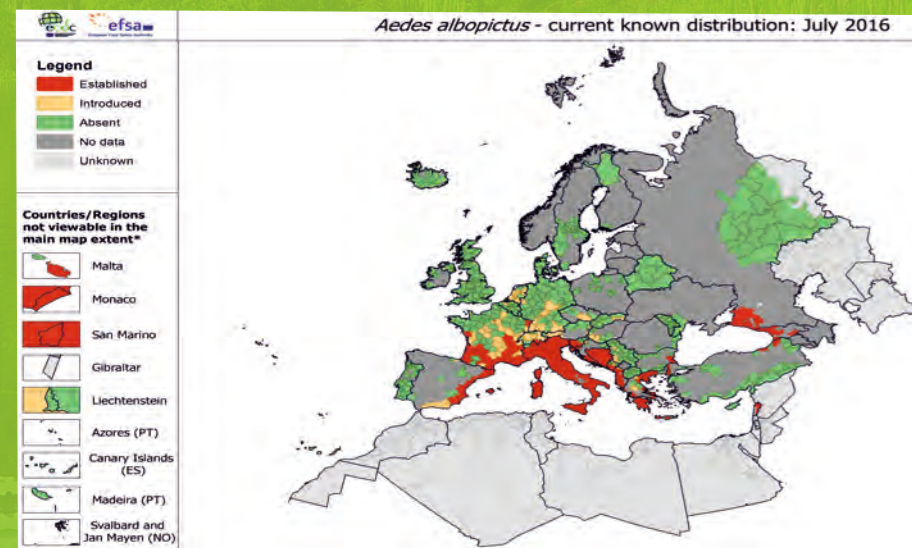
- Zika virus
- West Nile virus
- Chikungunya fever
- Dengue fever
- Malaria

Symptoms of diseases spread by mosquitoes

allergic reactions, flu-like symptoms, joint and muscles pains, fever, brain swelling, meningitis, birth defect.

Different species of mosquitoes are found in different geographic locations

Current known distribution of *Aedes albopictus* in Europe



How to prevent mosquito breeding:

What can homeowners do on their own property:

- Eliminate standing water around the house (destroy old tyres, barrels, etc.)
- Treat drums, rain water butts, flower pot plates, puddles, gutters, barrows etc. with larvicide
- Change water frequently at livestock areas

Professional way of control:

- Organized mosquito management
- Application of larvicides

MOSQUITO SPECIES TO BE CONTROLLED

Culex pipiens



Culex pipiens (the common house mosquito or northern house mosquito) is a species of blood-feeding mosquito of the family Culicidae. It is a vector of some diseases, such as Japanese encephalitis, meningitis. In the US and parts of Europe, it can spread West Nile virus, and in Emilia-Romagna, Italy, it has been demonstrated to be a vector of Usutu virus. Body length varies from three to seven millimeters. Only females feed on blood, their primary blood meal hosts are considered to be birds, but they also feed on humans and other mammals.

Aedes aegypti



The yellow fever mosquito is a mosquito that can spread dengue fever, Zika fever, Chikungunya fever, Mayaro and yellow fever viruses, and other diseases. The mosquito can be recognized by white markings on its legs and a marking in the form of a lyre on the upper surface of its thorax. Originating in Africa, this mosquito is now found in tropical and subtropical regions throughout the world.

Aedes albopictus



This mosquito has become a significant pest in many communities because it closely associates with humans (rather than living in wetlands) and, in addition to dusk and dawn periods, typically flies and feeds in the daytime. The insect is called tiger mosquito for its striped appearance. *Ae. albopictus* is an epidemiologically important vector for the transmission of many viral pathogens, including the yellow fever virus, dengue fever, and Chikungunya fever, as well as several filarial nematodes such as *Dirofilaria immitis*. *Aedes albopictus* is capable of hosting the Zika virus and is considered a potential vector for Zika transmission among humans.

INSECT GROWTH REGULATOR

S-METHOPRENE ACTIVE INGREDIENT

S-methoprene is a highly active well known representative of the group of insect growth regulators (IGR) known as insect juvenile hormone analogues (JHA). *S-methoprene* has a specific effect on embryogenesis and inhibits some processes in insect *metamorphosis*, that makes it an excellent mosquito larvicide. The mature stages lose their capacity to reproduce thus the insect life cycle is broken and infestations decrease.

BÁBOLNA BIO is one of the few companies in the world synthesizing *S-methoprene* active ingredient under Good Manufacturing Practice (GMP) conditions certified by a state authority. The development and production of *S-methoprene* based formulations makes BÁBOLNA BIO an established leader of the Pest Control industry.

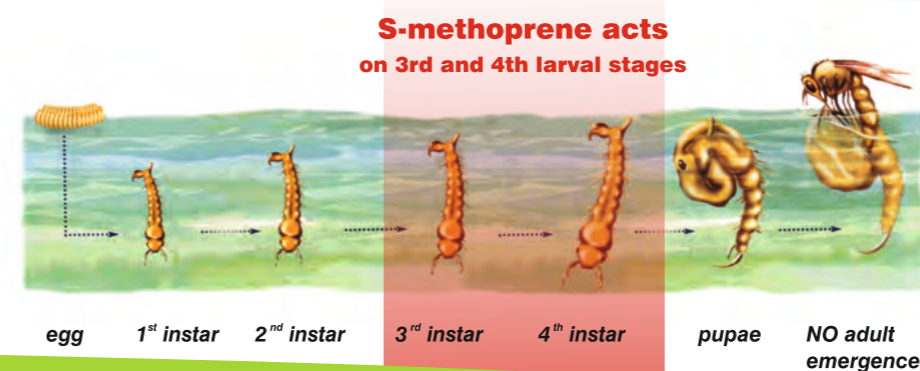
Moreover, BÁBOLNA BIO is the only company who, in line with the EU Biocidal Products Regulation, has prepared and submitted its Active Substance Dossier for *S-methoprene* under Pt. 18 of Insecticides. Following Annex I inclusion, BÁBOLNA BIO is preparing a number of Product Dossiers for a variety of indoor and outdoor uses.

SAFETY

The *S-methoprene*-based BIOPREN® Mosquito Larvicides are environmentally friendly formulations and do not pose unreasonable risks to wildlife or the environment. BIOPREN® products have low toxicity to fish and birds and are non-toxic to bees. *S-methoprene* has extremely low mammalian toxicity reflected in the fact that the World Health Organisation has approved *S-methoprene* for use as a mosquito larvicide in stored drinking water.

SPECTRUM OF ACTIVITY

S-methoprene based Mosquito Larvicides disrupt the development of mosquito larvae in ponds, puddles, swamps and other natural or artificial bodies of water. The environment friendly biorational active ingredient *S-methoprene* breaks the mosquito's life cycle preventing the emergence of biting, breeding adults. The formulations are active against a range of species including *Anopheles*, *Culex*, *Culiseta* and *Coquillettidia spp*, as well as those of the floodwater complex, *Aedes* and *Psorophora spp*. Larvae treated with *S-methoprene* can continue to develop to the pupal stage but die prior to emergence.



Bábolna Bio



BIOPREN® Mosquito Growth Regulator Larvicides



LARVAE CONTROL with S-methoprene Insect Growth Regulator (IGR)

RESIDUAL EFFICACY

BIOPREN® Liquid Mosquito Larvicide and Granule formulations are timed release products to control mosquitoes in permanent and semi-permanent aquatic environments. These formulations are non-toxic and biodegradable. The combination of the biorational insecticide and the carrier provides efficacy, with no adverse environmental impact and no deleterious effects on non-target organisms if used according to label instructions.

ADVANTAGES

- Immediate and prolonged efficacy
- Not toxic to vertebrates and environmentally friendly
- Acts during 3rd and 4th larval instars of the mosquitoes' development
- Can be applied to environmentally sensitive aquatic habitats and potable water
- Suitable for both aerial and ground applications

BIOPREN® 50 LML LIQUID MOSQUITO LARVICIDE

EU BPR status: Biocidal dossier under evaluation



Warning

Active ingredient:
w/w 5.0% (52 g/L) S-methoprene



This S-methoprene based formulation has been developed for professional mosquito control operators. In order to achieve both immediate and residual effect, the formulation contains free and microencapsulated S-methoprene. The formulation is recommended for control of *Aedes* and *Culex* spp. Depending on the water depth and taking into consideration the breeding site type, the dosages vary between 220 to 400 ml concentrate per hectare diluted with water. 5 to 50 lit of the above working solution are to be distributed per hectare by hand-held, backpack or truck mounted sprayers. Aerial treatment is also possible where approved.

BIOPREN® 50 LML dosage (mL/hectare)

Breeding site type	Breeding site / water depth	
	< 30 cm	> 30 cm
Clean	220	290
Slightly contaminated (marshy, swampy area, riceland)	290	360
Highly contaminated (sewer treatment plant, infiltration pool)	360	400

code number	packing unit	unit/carton	unit/pallet
KS-22236	1 litre/bottle	12	384
KS-22235	5 litres/can	2	66
KS-86264	25 litres	-	6



BIOPREN® 4 GR MOSQUITO LARVICIDE GRANULE

EU BPR status: Biocidal dossier under evaluation

Active ingredient:
w/w 0.40% (4.0 g/kg) S-methoprene



S-methoprene based formulation for control of *Aedes* and *Culex* spp. larvae. The carrier of the formulation is a special sand granule covered with free and microencapsulated S-methoprene. Generally similar areas can be treated as with BIOPREN® 50 LML, however in case of aerial treatment (where approved) the formulation has an excellent canopy penetration. The usual dose is 2 to 5 kg / hectare. Following treatment the remaining natural sand carrier makes no environmental problem. It has a delayed residual effect. The formulation is very stable.

BIOPREN® 4 GR dosage (kg/hectare)

Breeding site type	Breeding site / water depth	
	< 30 cm	> 30 cm
Clean (flooded area, prevention)	2	3
Slightly contaminated (marshy, swampy area)	3	4
Highly contaminated (sewer treatment plant pool)	4	5

code number	packing unit	unit/carton	unit/pallet
KS-22237	5 kg/bucket	-	80
KS-22238	20 kg/bucket	-	33



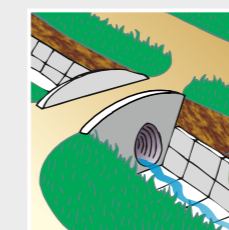
BIOPREN® MOSQUITO LARVICIDE TABLET

EU BPR status: Biocidal dossier under evaluation

Active ingredient:
w/w 0.50% (5.0 g/kg) S-methoprene



BIOPREN® Tablets are typically for use against *Aedes aegypti*, *Aedes albopictus* and *Culex pipiens*. The 0.5 and 2.0-gram effervescent tablets are meant to be used both by professional pest control operators and the general public. The typical professional pest control treatment areas include rain-water drainage systems and gullies in cities and towns, rain water ditches and flooded areas etc. The 2.0 gram tablet is suitable for the treatment of 1000 – 2000 litres of water. Treatments by the general public may cover garden ponds, fountains, unused pools, rain water collecting drums. One 0.5 gram tablet is enough to treat 200 – 500 litres of water. The use of tablets is highly recommended especially where *Aedes albopictus* is present in smaller water holding systems.



BIOPREN® MOSQUITO LARVICIDE TABLET dosage

Quality of water:	Dose:
clear water	1x 2 g or 4x 0.5g tablets/ 1000-2000 l of water
water polluted with organic matters	1x 2 g or 4x 0.5g tablets/ 500-1000 l of water
high load of organic matters for example, in case of shafts	1x 2 g or 4x 0.5g tablets/ 40 l of water

code number	packing unit	unit/carton	unit/pallet
KS-21894	1 kg/bottle (2 g)	12	180
KS-21895	5 kg/bucket (2 g)	-	64
KS-21899	1 kg/bottle (0.5 g)	12	180



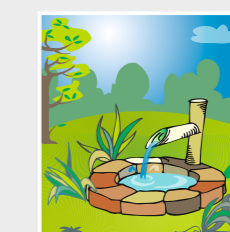
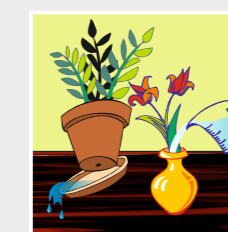
BIOPREN® FLEA- AND MOSQUITO LARVICIDE PUMP SPRAY

EU BPR status: Biocidal dossier under evaluation

Active ingredient:
w/w 0.03% (0.297 g/L) S-methoprene



This formulation is a hand-held pump spray. Specifically developed against *Aedes albopictus* – but also used against *Aedes aegypti*, and *Culex pipiens* – which breeds in smaller water holding containers, like rain water holding drums, rain water butts, flower pot plates, puddles, gutters, barrows, tyres, buckets etc. and small natural or artificial depressions which may serve, temporarily or permanently, as breeding sites for mosquito larvae. Typical dose is one trigger shot per 10 litres of waters per week. The product is meant to be used by the general public end-users, especially in gardens, balconies, etc. in residential and rural areas. The composition is suitable for suppressing the development of both mosquito larvae and fleas.



BIOPREN® FLEA- AND MOSQUITO LARVICIDE PUMP SPRAY dosage

Type of breeding site	Dose:
rain-water butt	2-4 trigger shots / 100-200 litres of water
any other smaller breeding site suitable to catch and hold rain-water	1 trigger shot / 10 litres of water

code number	packing unit	unit/carton	unit/pallet
KS-21650	0.5 litre / trigger sprayer	12	384

