

BIOVECTROL™ - 20EM

(Water Emulsifiable)



(public health)

ENVIRONMENTAL FRIENDLY FORMULATIONS FOR CONTROL OF VECTORS AND PESTS OF PUBLIC HEALTH IMPORTANCE WITH DISINFECTING PROPERTIES

INTRODUCTION

BIOVECTROL™-EM is a new concept; environmental and eco-friendly water emulsifiable insecticidal formulations based on a unique active ingredient **Etofenprox**¹, a high efficacy and extremely safe insecticide and proprietary blends of certain botanical extracts as carrier and synergist.

BIOVECTROL™-EM is specially designed for effective control of vectors and pests of public health importance while providing added benefits like disinfecting properties and yet has remarkably weak toxicity to mammals.

BIOVECTROL™-EM has excellent and broad spectrum efficacies which offers rapid and effective control of vector-borne diseases such as those of Dengue Hemorrhage Fever, Yellow Fever, Malaria, Filariasis, Chagas Disease, Encephalitis, Shigellosis, Trachoma and other Gastro-entero diseases carried by aedes mosquitoes, anopheline mosquitoes, synanthropic flies, triatomine bugs, cockroaches, fleas and ticks; etc.

By virtue of biodegradable and photodegradable properties of **BIOVECTROL™-EM**, long term and repeated applications will not pose any environmental pollution.

FEATURES

- **HIGH EFFICACY/LONG LASTING PROTECTION**

The high efficacy is further enhanced by the synergistic effect of the formulation. It is effective against a broad spectrum of vectors and pests including mosquitoes, flies, cockroaches, triatomine bugs, fleas and ticks; etc. Furthermore it has excellent residual effect on wall surfaces and net fibers thus providing long lasting protection.

- **SAFE FOR MAMMALS AND ANIMALS**

It provides a safe and effective method of protection as it has no harmful influence to human and non-target organisms.

- **LOW IMPACT ON ENVIRONMENT AND TO NON-TARGET ORGANISMS INCLUDING FISH, BIRDS AND BENEFICIAL INVERTEBRATES – ENVIRONMENTAL FRIENDLY**

- **VECTORS UNLIKELY TO DEVELOP RESISTANCE**

Vectors that have developed high resistance to conventional insecticides will have no tendency to show cross-resistance.

- **DISINFECTING EFFECTS**

Its anti-viral, anti-fungal and anti-bacterial properties as added benefits to its effectiveness in the control of vectors and pests of public health importance, providing a safe and hygienic environment.

- **PLEASANT ODOR AND NON STAINING**

Easily accepted by the community.

- **IMPROVEMENT OF LIVING CONDITIONS**

The reduction in larva and adult vector population coupled with long lasting protection (indoor on walls and net fibers) will consequently decrease man-vector contact, thus promoting a healthier, hygienic and safer living environment.

¹ **ETOFENPROX**[®], is a unique "CHO – compound" composed of Carbon, Hydrogen and Oxygen only. **ETOFENPROX**[®] has been highly evaluated through the **World Health Organization Pesticide Evaluation Scheme (WHOPES)** and approved by the Division of Control of Tropical Diseases, WHO in 1997 with approval code number **WHOPES/97.24.1**. **ETOFENPROX**[®] Technical is conditionally registered under the U.S. Environmental Protection Agency (USEPA), under Registration Number **33657-6**.

ENVIRONMENT

• WILDLIFE AND FISH

- a) Mallard Duck LD₅₀ (Oral) ≥ 2,000 mg/kg
- b) Aquatic Animal

SPECIES	TLm value (µg/L, 48 hrs)
Carp	5,000
Goldfish	1,730
Ayu Fish	1,200
Water Flea	> 40,000 (3 hrs)
Short-necked Clam	490,000

• SOIL DECOMPOSITION

- a) Soil decomposition studies showed that the half-life of **BIOVECTROL™-EM** is approximately 1 ~ 3 weeks in aerobic soils.
- b) The leaching test on soils revealed that **BIOVECTROL™-EM** was not leached into the aquatic environment.

BIOVECTROL™-EM is thus proven to be both Environmental and Ecological Friendly.

TOXICOLOGY

• ACUTE TOXICITY

METHOD OF ADMINISTRATION	ANIMALS	LD ₅₀ (mg/kg)
Oral	Rats	> 42,800
	Mice	> 107,200
	Dogs	> 5,000
Dermal	Rats	> 5,000
	Mice	> 5,000
Subcutaneous	Rats	> 32,160
	Mice	> 53,600
Intraperitoneal	Rats	> 42,880
	Mice	> 53,600

• SUBCUTANEOUS TOXICITY

Sub acute dietary studies for 13 weeks on rats and mice did not show any adverse effects.

- **CHRONIC TOXICITY, TERATOGENICITY, MULTIGENERATION STUDY AND MUTAGENICITY**

Long term feeding toxicity studies on rats, mice and dogs did not show any adverse effects. Mutagenicity, teractogenicity and three-generation reproduction studies did not show noticeable abnormalities.

- **IRRITATION AND INHALATION**

No skin and eye irritation on rabbits.
Inhalation toxicity (Rat) LD₅₀ > 5,900 mg/m³

- **SYMPTOMS OF POISONING**

No specific symptoms of poisoning are observed.

- **SAFETY COMPARISION AMONG VARIOUS INSECTICIDES**

INSECTICIDE	LD50 mg/kg (Rat)	ODOR	Ch-Esterase Inhibition	IRRITATION
ETOFENPROX®	> 40,000	X	X	X
Malathion	1,375	✓	✓	X
Cyfluthrin	250	✓	✓	✓
Temephos	1,266	✓	✓	X
Bendiocarb	40 ~ 156	✓	✓	X
Permethrin	430 ~ 470	X	X	Slight
Lamda-cyhalothrin	79	X	X	✓
Pirimphos-methyl	2018	✓	✓	✓
Deltamethrin	129	X	X	✓
Cypermethrin	250	✓	✓	Slight
COMPARSIONS WITH COMPOUNDS FOR DAILY CONSUMPTION				
Common Salt	3,000	X	X	X
Sugar	29,700	X	X	X

- **WHO HAZARD CLASSIFICATION & EFFECTS ON AQUATIC ORGANISMS**

INSECTICIDE	WHO HAZARD CLASSIFICATION	EFFECTS ON AQUATIC ORGANISMS
ETOFENPROX®	Table 5	Extremely Low Toxic
Malathion	Table 4	Highly Toxic
Cyfluthrin	Table 3	Highly Toxic
Permethrin	Table 3	Highly Toxic
Lamda-cyhalothrin	Table 3	Highly Toxic
Pirimphos-methyl	Table 4	Highly Toxic
Deltamethrin	Table 3	Highly Toxic
Cypermethrin	Table 3	Highly Toxic

FUNDAMENTAL ACTIVITY AGAINST HYGIENIC PESTS

VECTORS / PESTS	STAGE	METHOD	LD ₅₀ or LC ₅₀
Culex Pipiens	Larva	Immersion	0.0054 ppm
Culex Quinquefasciatus	Adult	WHO test kit	0.0036 %
Anopheles Albimanus	Adult	WHO test kit	0.009 %
Anopheles Gambiae	Larva	Immersion	0.009 %
Anopheles Quadrimaculatus	Larva	Immersion	0.00085 ppm
Anopheles Stephensi	Larva	Immersion	0.0073 ppm
Aedes Taeniorhynchus	Adult	Aerosol	0.0013 ppm
Musca Domestica	Adult	Topical	0.064 µg / ♀
Stomoxys Calcitrans	Adult	Topical	0.0093 µg / ♀
Blattella Germanica	Adult	Topical	0.209 µg / ♀

BASIC BACTERICIDAL ACTIVITY

The basic bactericidal activity of **BIOVECTROL™-EM**, as a disinfectant (20EM at 1:79 or 80x dilution with water) is as follows:

TEST ORGANISM	REDUCTION IN VIABILITY % KILLED	
	After contact time of 45 min	After contact time of 60 min
<i>Staphylococcus Aureus</i>	99.97 %	99.99 %
<i>Pseudomonas Aureus</i>	99.96 %	99.97 %
<i>Salmonella Typhimurium</i>	> 99.99 %	> 99.99 %
<i>Escherichia Coli</i>	> 99.99 %	> 99.99 %

APPLICATION METHODS

Dilute **BIOVECTROL™-EM** with water and mix homogeneously. The dilution factor and the interval of re-treatment vary depending on the field of application.

Vectors that are mainly exophilic, but tend to feed or rest indoors briefly can be effectively controlled by indoor residual spraying. Examples of indoor residual treatment will be residual spraying to walls, ceilings, undersides of furniture, outside eaves and porch.

For vectors that are strongly exophilic and/or exophagic, those that rest and bite outdoors; exterior spraying should be employed. Exterior space-treatments with cold aerosols are carried out using hand or vehicle mounted ULV equipment.

Other control methods, such as insecticide treated mosquito nets can also be employed. Treating mosquito nets and curtains has also proven to be an effective and long lasting strategy for repelling and killing biting insects. Impregnated bednet also has the controlling effect on malaria parasite development.

When space treatment is applied from outdoors, residents should be encouraged to leave windows and doors open during application to aid penetration of the insecticide.

There is no side effect on spray-men and the people living in the sprayed areas.

BIOVECTROL™ FORMULATIONS : 20EM (Water Emulsifiable)

TARGET PEST	APPLICATION METHOD	DOSAGE or DILUTION RATE
Anopheles mosquito adults and nuisance insects	Bednet impregnation	Soak for 10 minutes and hang to dry in the shade. 25 ml in 2,000 ml of water (1:80 dilution)
Fly adults, Mosquito adults, Cockroaches, bedbugs, fleas and others	Space Spray	Spray directly upon flies and mosquitoes. 10 ~ 20 ml in 2,000 ml of water (1:100 ~ 200 dilution)
Fly adults, Mosquito adults, Cockroaches, bedbugs, fleas and others	Residual Spray	Spray upon the ceiling and wall where flies and mosquitoes perch frequently. 10 ~ 50 ml in 2,000 ml of water (1:40 ~ 200 dilution)
Fly Larvae	Spray upon the habitat and garbage	5 ml in 2,000 ml of water (1:400 dilution)
Mosquitoes-Larvae	Pour into the habitat	50 ~ 100 ml in 2,000 ml of water (1:20 ~ 40 dilution)

STORAGE AND HANDLING PRECAUTIONS

- Keep container closed when not in use.
- Store away from foodstuffs and feeds.
- Avoid direct sunlight and high temperature storage.
- General ventilation and industrial protective clothing is sufficient.

FORMULATIONS AVAILABLE

Various concentrations of **BIOVECTROL™-EM** are available.

PACKING

BIOVECTROL™-EM is available in 1 Litre, 5 Litres, and 20 Litres pails. Other packing is also available upon request.



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