



# BIOVECTROL® 20EM

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



**BIOVECTROL® 20EM** is a new concept; environmental and eco-friendly water emulsifiable insecticidal formulations based on a unique active ingredient **Etofenprox®<sup>1</sup>**, a high efficacy and extremely safe insecticide and proprietary blends of certain botanical extracts as carrier and synergist.

**BIOVECTROL® 20EM** 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.

<sup>1</sup> **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 successfully approved by the Division of Tropical Diseases, WHO in 1997 with code number **WHOPES/97.24.1**.



**BIOVECTROL® 20EM**, 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, Filaria, 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® 20EM**, 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 and more hygienic living environment.

**ENVIRONMENT**

➤ **WILDLIFE AND FISH**

- a) Mallard Duck LD<sub>50</sub> (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® 20EM** is approximately 1- 3 weeks in aerobic soils.
- b) The leaching test on soils revealed that **BIOVECTROL® 20EM** was not leached into the aquatic environment.

**BIOVECTROL® 20EM** is thus proven to be both Environmental and Ecological Friendly.

**TOXICOLOGY**

➤ **ACUTE TOXICITY**

METHOD OF ADMINISTRATION	ANIMALS	LD <sub>50</sub> (mg/kg)
<b>Oral</b>	Rats	> 42,800
	Mice	> 107,200
	Dogs	> 5,000
<b>Dermal</b>	Rats	> 5,000
	Mice	> 5,000
<b>Subcutaneous</b>	Rats	> 32,160
	Mice	> 53,600
<b>Intraperitoneal</b>	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, teratogenicity and three-generation reproduction studies did not show noticeable abnormalities.

➤ **IRRITATION AND INHALATION**

No skin and eye irritation on rabbits.

Inhalation toxicity (Rat) LD<sub>50</sub> > 5,900 mg/m<sup>3</sup>

➤ **SYMPTOMS OF POISONING**

No specific symptoms of poisoning are observed.

➤ **SAFETY COMARISON AMONG VARIOUS INSECTICIDES**

INSECTICIDE	LD <sub>50</sub> mg/kg (Rat)	ODOR	Ch-Esterase Inhibition	IRRITATION
<b>ETOFENPROX</b>	> 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
<b>COMPARISON WITH COMPOUNDS FOR DAILY CONSUMPTION</b>				
Common Salt	3,000	X	X	X
Sugar	29,700	X	X	X



➤ **WHO HAZARD CLASSIFICATION**

INSECTICIDE	WHO HAZARD CLASSIFICATION
<b>ETOFENPROX</b>	Table 5
Malathion	Table 4
Cyfluthrin	Table 3
Permethrin	Table 3
Lamda-cyhalothrin	Table 3
Pirimphos-methyl	Table 4
Deltamethrin	Table 3
Cypermethrin	Table 3

➤ **FUNDAMENTAL ACTIVITY AGAINST HYGENIC PESTS**

VECTORS / PESTS	STAGE	MEHTOD	LD <sub>50</sub> or LC <sub>50</sub>
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® 20EM**, 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 45min	After contact time of 60min
Staphylococcus Aureus	99.97%	99.99%
Pseudomonas Aureus	99.96%	99.97%
Salmonella Typhimurium	> 99.99%	> 99.99%
Escherichia Coli	> 99.99%	> 99.99%



## **APPLICATION EQUIPEMNT**

- Hand sprayers, compressed air sprayers
- Mist-blowers (power operated)
- Aerosol generators (power operated)
- Thermal foggers (power operated)

## **APPLICATION METHODS**

Dilute **BIOVECTROL® 20EM** 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 outsides, 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.

## **APPLICATION INSTRUCTIONS**

To homogenized (so that the concentrate solution is evenly distributed in the water) the solution, follow the following steps:

- a. Shake the Biovectrol 20EM bottle;
- b. Measure the Biovectrol 20EM with a measuring cup;
- c. Pour content into any clean used bottle with cap, for example used mineral bottle;
- d. Rinse the measuring cup with water and add the rinsed water into the bottle;



- e. Top up water into the bottle (does not matter how much water is added at this stage);
- f. Close cap & shake vigorously;
- g. Pour content into any spraying machine container;
- h. Add water until it reach the dilution level;
- i. Stir the diluted solution before used.

The diluted solution should be used immediately and in no circumstances, be kept for more than 2 days given that chlorine & bacteria in the piped water will break down the effectiveness of the solution.

## RECOMMENDED DILUTION

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 Min 8L/ha	Spray directly onto 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 40ml/m <sup>2</sup>	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 preventive clothing is sufficient.

## PACKING

**BIOVECTROL® 20EM** is available in 1 liter, 5 liters and 20 liters pails.

Other packing sizes are also available upon request.

