Dimilin®

Insect Growth Regulator for control of mosquitoes and flies

- larvicidal activity
- effective control of mosquitoes and flies
- long residual action
- suitable for IPM programmes
- safe to the user and the environment
- various formulations to meet each specific need
PROTECTING YOUR ENVIRONMENT

DIMILIN® belongs to a modern class of insecticides, the benzoyl ureas, commonly known as Insect Growth Regulators (IGRs). They have a mode of action which is completely different from conventional neurotoxic insecticides. DIMILIN® is manufactured by Chemtura Corporation, one of the world's leading specialist crop protection companies. The active ingredient in all DIMILIN® formulations is diflubenzuron.

In addition to the wide use in agriculture and forestry, DIMILIN® has also proved to be an efficient tool in the control of several public health and hygiene pests, including mosquitoes and flies, thus contributing to a more healthy and pleasant human environment.

Diflubenzuron inhibits chitin synthesis in the larval cuticle of susceptible insects. This results in an inability of larvae to moult. Treated larvae are either unable to escape from the old larval skin, or the new, weak cuticle of the new instar is lethally injured. This results in larval mortality at moulting or shortly afterwards.

When final larval instars ingest diflubenzuron, distortions in the pupal or adult cuticle may also occur. The deviation from the normal moulting process ultimately leads to the death of the insects.

No immediate effect is visible after the application of diflubenzuron. However, once the larvae have ingested sufficient quantity of the product, they will die during their next moult. Depending on species, instar and temperature, this may take a few days to a week. Adult insects are not susceptible to diflubenzuron.

SAFE TO THE USER AND THE ENVIRONMENT

The toxicity of diflubenzuron to mammals is very low. The actual oral LD₅₀ of diflubenzuron for mouse and rat is > 4640 mg a.i. per kg bodyweight. Diflubenzuron is non-irritant to skin and eye. Long term studies have shown that diflubenzuron is not carcinogenic and does not effect reproduction. It is neither mutagenic nor teratogenic.

At recommended rates, diflubenzuron is not toxic to fish, wildlife and domestic animals. Most non-target invertebrates, both in aquatic and terrestrial environments, are only slightly or not affected. The most susceptible group of organisms appeared to be the micro-crustaceans. However, lasting adverse effects on populations of these organisms have never been demonstrated after use of diflubenzuron at recommended rates under practical conditions.

Diflubenzuron is easily degraded in soil and water. Half-life values are within the range of 2-6 days.

CONTROL OF MOSQUITOES, MIDGES AND GNATS

DIMILIN® has a larvicial activity on mosquitoes, and both nuisance and biting midges and gnats. It is effective in controlling most species of economic and public health importance, including mosquitoes belonging to the genera Aedes, Anopheles and Culic.

All larval instars are susceptible. Even pupae and adults may be indirectly affected. This is due to the delayed activity of DIMILIN® on the larval to pupal, and pupal to adult moults following ingestion of DIMILIN® by the preceding last larval instar.

Under practical conditions a DIMILIN® treatment in surface water will suppress adult emergence for a period of 2 to 4 weeks, depending on environmental conditions. In closed systems, such as sewage pits, septic tanks and wells, a residual effect of more than one month is not unusual.

Diflubenzuron has passed through all stages of the WHO Pesticide Evaluation Scheme, including large scale field trials, and is referred to by this organization as an insecticide suitable to be used as a larvicide in mosquito control.
FORMULATIONS
All formulations contain the same particle size of the active ingredient and have the same effect on mosquitoes. Various formulations have been developed to better perform specific larviciding functions.
- **DIMILIN® WP-25**, a wettable powder containing 250 g a.i. per kg. It is the most commonly used formulation, and can be used in mosquito breeding sites where open water prevails.
- **DIMILIN® SC-48**, a suspension concentrate containing 480 g a.i. per l. This formulation can also be used in breeding sites where open water prevails.
- **DIMILIN® SC-15**, a suspension concentrate containing 150 g a.i. per l. This formulation can also be used in breeding sites where open water prevails.
- **DIMILIN® GR-2**, a new, easy to apply granular formulation containing 2% g a.i. Thanks to its efervesence, the active ingredient quickly and evenly spreads in treated water. It can be applied directly to the mosquito or fly breeding site by suitable granule spreading equipment, by hand or after dilution with water.
- **DIMILIN® G-4**, a granular formulation containing 40 g a.i. per kg. This formulation was developed primarily to aid in the control of mosquitoes that breed in dense vegetation or in canopy covered areas. **DIMILIN® G-4** can be applied directly to the mosquito breeding site by suitable granule spreading equipment or by hand.
- **DIMILIN® TB-2 (DT-2)**, a new, easy to apply tablet formulation containing 2% g a.i. Its efervesence formulation helps the active ingredient to quickly reach a homogeneous dilution in water bodies. Easy to carry, it is suitable for professional users as well as consumers.

TRADE NAMES
**DIMILIN®** is the general trade name of all diflubenzuron containing products manufactured by Chemtura Corporation. These formulations are available in different trade names in various countries such as: **DU-DIM®** or **DEVICE®**.

RATES
Rates for mosquito control in g or ml per 100 m² of surface area (or tablets / 1000 l):

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<tr>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Clear Surface water</td>
<td>0.25</td>
<td>0.5</td>
<td>1</td>
<td>1-2</td>
<td>17-34</td>
<td>12.5-25</td>
<td>6.25-12.5</td>
</tr>
<tr>
<td>Polluted surface water</td>
<td>0.5</td>
<td>5</td>
<td>1-2</td>
<td>2-4</td>
<td>34-67</td>
<td>25-50</td>
<td>12.5-25</td>
</tr>
<tr>
<td>Closed systems with standing water (Tablets/1000 l)</td>
<td>1</td>
<td>4</td>
<td>2</td>
<td>7</td>
<td>50</td>
<td>25</td>
<td>25</td>
</tr>
</tbody>
</table>

Control of midges and gnats usually requires a higher rate of **DIMILIN®** than that used for mosquitoes. At 1-2 g a.i. per 100 m² of surface area, a good and long lasting control has been reported for several species.

INSTRUCTIONS FOR USE
When using high or low volume spray equipment, dilute the required quantity of **DIMILIN®** for an area to be sprayed in a sufficient quantity of water to ensure good coverage with spray liquid. Both hand-operated compression sprayers and motorized knapsack sprayers can be used.

In order to prevent build-up of an adult population it is recommended to start **DIMILIN®** applications at an early stage of population development when the majority of the larvae is in the 1st or 2nd instar.

Applications should be repeated when inspection indicates an increase in the number of 2nd and 3rd instar larvae.

Chitin synthesis is quickly resumed when larvae no longer ingest **DIMILIN®**. An even coverage of breeding places is necessary to prevent irregular, premature recovery of mosquito larvae.
FLY CONTROL
Flies breed in decaying, fermenting or rotting organic matter. In rural areas breeding places are easily found around farms and houses in manure heaps and other places where organic matter has been dumped. In urban areas rubbish heaps, wastes from food processing, sewage drains etc. are also important sources of fly breeding.
Flies are not only a nuisance pest; their ability to carry diseases also makes them a public health pest.
DIMILIN® is active against the larval stages of most important fly species, including the house fly (Musca domestica), face fly (Musca autumnalis), stable fly (Stomoxys calcitrans) and horn fly (Haematobia irritans). It kills these insects before they reach the adult stage and start flying, and is an efficient and economic tool for fly control. When applied at the recommended rate, DIMILIN® effectively prevents larval development for 2-3 weeks.

HOW AND WHEN TO APPLY
Control of fly larvae is achieved by topical treatment of the upper layer of the breeding medium. DIMILIN® WP-25, WP-48 and SC-15 can be applied with a sprayer giving coarse spray, or with a watering can. The quantity of water should be sufficient to wet the upper 10-15 cm of the breeding medium thoroughly. On sufficiently wet surfaces, such as in sewage drains, granules (G-4 and GR-2) can be used.
Best results are obtained when DIMILIN® is used in a regular treatment programme, starting before a large adult population is present. Repeat after 2-3 weeks, but in any case after further deposition of untreated material.

FORMULATIONS
- DIMILIN® WP-25, a wettable powder containing 250 g a.i. per kg. This formulation can be used on both dry and wet surfaces in 2 – 5 litre water per 10 m³ of surface area.
- DIMILIN® SC-48, suspension concentrate formulation containing 480 g a.i. per l. This formulation can also be used in breeding sites.
- DIMILIN® SC-15, suspension concentrate formulation containing 150 g a.i. per l. This formulation can also be used in breeding sites.
- DIMILIN® G-4 and GR-2, can be applied directly to the breeding sites by suitable granule spreading equipment or by hand. It is recommended only for use in wet fly-breeding sites. When the substrate is too dry to achieve disintegration of the granules, the substrate should be moistened.

RATES
Rates for fly control in g or ml per 10 m³ of surface area:

<table>
<thead>
<tr>
<th></th>
<th>a.i.</th>
<th>WP-25</th>
<th>SC-48</th>
<th>SC-15</th>
<th>G-4</th>
<th>GR-2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dry and wet surfaces</td>
<td>5 – 10</td>
<td>20 – 40</td>
<td>10 – 20</td>
<td>35 – 70</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Wet surfaces only</td>
<td>5 – 10</td>
<td>20 – 40</td>
<td>10 – 20</td>
<td>35 – 70</td>
<td>125-250</td>
<td>250-500</td>
</tr>
</tbody>
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Use the higher rate for the first application or after deposition of untreated material, especially when irregular deposited heaps such as food processing wastes and rubbish heaps are treated. In a regular spray programme with 2 weeks interval the lower rate can be used.