WHY USE SPACE SPRAYS

Space-spraying (fogging or ULV Misting) can be a highly effective means of killing large numbers of insects (mainly flying adults) in a short space of time. It is a method that can be employed with great effect against insects such as mosquitoes and flies and in enclosed situations is a very useful method to ‘clean up’ stored-product moths and American cockroaches. Suitable and appropriately calibrated equipment can deliver small amounts of active ingredient over a large area with excellent results. It is a technique that is used as a method of choice for rapidly bringing adult mosquito numbers down in vector-borne disease epidemics (eg. dengue).

CONCEPT

Space spraying involves the generation of an aerosol of very fine insecticide droplets using equipment that is specifically designed for the purpose. The droplets form a discrete swathe of insecticide fog or mist from the point of output. Droplets can also be carried on air currents for a short period of time, which increases the range of effect from the immediate output source.

CONSIDERATIONS

Target Insects: Space sprays are primarily targeted against flying insects such as flies and mosquitoes but can also be used with great effect against insects resting on exposed surfaces - particularly in confined areas eg American cockroaches in sewers.

In fly or mosquito control programmes regular spraying at 2 - 3 day intervals over 14 days will rapidly reduce the adult populations; reducing breeding and population increase and in the long term therefore depleting larval and pupal reservoirs. Thereafter once or twice weekly maintenance treatments can control immigration of new adults and prevent population build up. This is particularly effective against urban mosquitoes and around fly breeding sites.

Droplet size: This is very important. If they are too big they will fall to the ground close to point of issue and pick-up by the target-insects will be reduced. Too small and they will remain suspended in the air more easily and may actually ‘miss’ the target insects due to aerodynamic effects around individual insects; the potential for drift away from the target area is also increased with droplets which are too small.

World Health Organisation research has shown that the optimum droplet size for maximum pick-up by flying insects is around 10 to 20 µm.

Timing of application - insect activity: Because a space-spray is designed to target insects mainly when they are flying (or occasionally resting on open exposed surfaces) it is important that application is timed to coincide with peak activity times for the target insect in order to maximise results. This will vary with the insects in question but generally housefly flight activity peaks in the early morning or the late afternoon and for mosquitoes it is commonly late afternoon and early evening.

Timing of application - atmospheric conditions: Climatic conditions should also be considered when spraying - temperature inversions which commonly occur early mornings and evenings are conditions conducive to spray remaining at ground level and not disappearing into upper air currents where insects would not be contacted. Spraying should be avoided during the heat of the day as convection currents and winds will limit efficacy.

Product: The ideal product for use in space sprays should contain an active ingredient that is rapidly acting at low dose rates; have low mammalian toxicity (to reduce risks to the operator, the public and animals) and be suitable for application through a range of equipment. Lack of residual life of the active ingredient is also desirable so that impact against non-target species and the environment is minimised when droplets settle on surfaces.

One product that is registered in Australia and stands out above others with these desired qualities is:

RESLIN THERMAL FOGGING AND ULV INSECTICIDE CONCENTRATE
**Reslin** is an insecticide concentrate containing 50 g/L bioresmethrin and 400 g/L piperonyl butoxide that is registered for use against indoor and outdoor flying insect pests (e.g., flies, biting midges, stored product moths and mosquitoes) as well as American Cockroaches. Bioresmethrin is a synthetic pyrethroid, providing rapid knock-down and kill of insects, with limited residual life and low mammalian toxicity (rat oral LD50 7070 - 8000 mg/kg and dermal LD50 >10,000 mg/kg). Bioresmethrin is an active ingredient commonly found in household aerosol products. Piperonyl butoxide (PBO) is a synergist which inhibits the breakdown of bioresmethrin in the insect and enables high levels of insecticidal activity at low levels of application. PBO also has low mammalian toxicity (rat oral LD50 5630 mg/kg and dermal LD50 >2000 mg/kg).

<table>
<thead>
<tr>
<th>SITUATION</th>
<th>PEST</th>
<th>RATE</th>
<th>CRITICAL COMMENTS</th>
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<tbody>
<tr>
<td>Warehouses, flour mills, factories, kitchens, industrial buildings, domestic residences</td>
<td>Biting midges, moths, flies, mosquitoes, American cockroaches</td>
<td>20 mL/1000 m³</td>
<td>Dilute with suitable volume of water, oil or kerosene. In food processing areas dilute with water only.</td>
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<tr>
<td>Outdoors, including council tips, picnic areas, sports grounds, recreation areas and in mosquito eradication campaigns</td>
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<td>a) 100 mL/ha using water as diluent OR b) 200 mL/ha using oil or kerosene as diluent</td>
<td>Using thermal fogging or cold aerosol generating ULV equipment, hand-held or knapsack sprayer, spray into air or onto infested area. Repeat when necessary, as determined by management practices and environment conditions.</td>
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<tr>
<td>Direct spraying of refuse</td>
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<td>20 mL/1000 m²</td>
<td>Dilution with water is preferred where there is a risk of flammability, e.g. council tips</td>
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**ADVENTAGES OF USING RESLIN**

- Economical to use (especially when compared to products which have to be applied undiluted). Eg. 100 mL of Reslin (in diluent) is enough to apply over 1 hectare or 1 mL of Reslin (in diluent) for every 100 m².
- Can be used both indoors and outdoors
- Suitable for dilution with both water and oil
- Rapid knock-down and kill of flying insect pests - ideal for control of mosquitoes, flies and biting midges as well as stored-product moths in warehouses
- Suitable for application through a range of equipment

- Low mammalian toxicity
- Space sprays such as Reslin have less chance of contributing towards insecticide resistance development because they are generally not persistent and so insects are not exposed to sub-lethal levels of active ingredient that can increase the rate of resistance development.

**ENVIRONMENT AND SAFETY CONSIDERATIONS**

Bioresmethrin is rapidly degraded in sunlight and the residual life on outdoor surfaces is therefore very short, long term environmental effects should not be expected from the use of Reslin according to the label. As with all insecticides care should be taken however when applying the product in areas that contain non-target species. Reslin is potentially dangerous to bees - spraying should be avoided around any plants in flower whilst bees are foraging. Similar to many other synthetic pyrethroids bioresmethrin active ingredient is toxic to fish and other aquatic organisms and spraying directly over water bodies should be avoided.