Guidelines For Control Of Flies Closely Associated With Humans

Guiding principles

Houseflies and other peridomestic fly species can be important vectors of diseases such as shigellosis, other diarrhoeal diseases, and trachoma. Natural disasters can exacerbate the unsanitary conditions that increase fly populations.
As far as possible, flies should be kept away from young children and food by fly-proofing houses, particularly kitchens, and covering stored food.

Before adopting a control strategy, a thorough understanding of the local fly population's breeding, feeding and resting habits, as well as susceptibility to insecticides is necessary.
The breeding sites of houseflies and related species are animal and human excreta and a wide variety of other organic matter, particularly domestic garbage. *Environmental sanitation is the fundamental measure for fly control*. Proper processing and disposal of refuse, manure, compost and other organic waste is of prime importance in the elimination of fly breeding sites. This approach is called Integrated vector management (IVM). More at: http://whqlibdoc.who.int/hq/2004/WHO_CDS_CPE_PVC_2004_10.pdf

Insecticides should be used only as a supplement to environmental management control methods, not as a substitute. Given that insecticide resistance is widespread, especially to organochlorines and organophosphates, it is strongly recommended that insecticides be used judiciously, and backed up by effective resistance management. The insecticide label recommendations should hence be carefully followed.

Safety precautions

- Insecticide application should be carried by out exclusively by trained personnel to ensure sound management and effective use, supported by monitoring and evaluation.
- Always wear protective gear when handling insecticides as they can be absorbed through the eyes, mouth, nose and skin.
- If skin contact occurs immediately wash the exposed parts with plenty of soap and water. Always wash hands, face and exposed skin after every application of insecticides.
- Proper maintenance and operation of equipment, is essential to the safety of operators and others in the environment.
- Keep insecticide supplies in original containers under lock and key, in dry, well ventilated, places, where flooding is unlikely to occur.
- Disposed off empty insecticide containers by crushing and burying them in a safe place away from water sources and inhabited areas to prevent reuse.

Space treatment

Space treatment is the most effective method of rapidly reducing fly density inside or outside houses. However, there is no residual effect of the insecticide and rapid repopulation of the treated area often occurs.
Portable cold or thermal fog generators are used for indoor treatment. For outdoor treatment, vehicle-mounted foggers are most appropriate. Portable equipment can be used in areas where vehicle access is limited.

Space treatment should be applied every day for 1-2 weeks to kill adults as they emerge from breeding sites in the area. Once under control, the spraying interval can be extended to once or twice a week, depending on the rate of immigration of flies from outside the control area.

Suitable insecticides for space treatment against flies are listed in Tables 1 and 2. For indoor treatment, water based or deodorized kerosene formulations of the less hazardous insecticides are recommended.
Food and water should be protected during indoor space treatment and people and animals should be kept out of the way of outdoor space sprayers. Read and follow the product label and local regulations.

Larviciding

Larviciding as a fly control measure has many drawbacks. Fly breeding substrates tend to accumulate and change continuously and therefore frequent treatments with larvicides are required. The penetration and distribution of the larvicide in the substrate is often problematic, the natural predators of fly larvae may be killed if non-selective treatments are used, and exposure to insufficient concentrations of insecticide in the breeding substrates may favour the development of resistance.

In areas where fly breeding (e.g. refuse, animal or human excrement) is confined to localized sites, carefully targeted larviciding at regular intervals may be indicated. Larvicides are applied at a rate sufficient to wet the upper 10-15 cm of the breeding substrate.

Insect growth regulators (IGRs) are preferred for use as larvicides as they are chemically unrelated to adulticides (Table 3). Although many compounds belonging to the traditional insecticide classes are also active against fly larvae, they should in general be reserved for control of adult flies, to minimize the selection pressure for resistance. The use of pyrethroids in particular should be reserved for space treatment.

Table 1. Suitable insecticides for space treatment for fly control

Insecticide	Chemical Type[a]	Dosage of a.i.[b] (g/ha)	WHO hazard classification of active ingredient (Class)[c]
Chlorpyrifos-methyl	OP	100-150	U
Diazinon	OP	336	II
Dimethoate	OP	224	II
Malathion	OP	672	III
Naled	OP	224	II
Pirimiphos-methyl	OP	250	III
Bioresmethrin	PY	5-10	U
Cypermethrin	PY	2-5	II
Cyphenothrin	PY	5-10	II
d-d-trans-cyphenothrin	PY	2.5-5	NA
Deltamethrin	PY	0.5-1.0	II
Esfenvalerate	PY	2-4	II
Etofenprox	PY	10-20	U
Lambda-cyhalothrin	PY	0.5-1.0	II
Permethrin	PY	5-10	II
d-phenothrin	PY	5-20	U
Resmethrin	PY	2-4	III

[a] OP = organophosphate, PY = pyrethroids.

[b] a.i. = active ingredient.

[c] Class II = moderately hazardous; Class III = slightly hazardous; Class U= unlikely to pose an acute hazard in normal use; NA = not available.

Table 2: Pyrethroid mixtures used in cold and thermal fog formulations for fly control

Pyrethroid mixtures	Concentration (g a.i.[a]/ha)	
	Cold fog	Thermal fog
Permethrin +	5.0-7.5	5.0-15.0
S-bioallethrin +	0.075-0.75	0.2-2.0
Piperonyl butoxide	5.25-5.75	9.0-17.0

Bioresmethrin +	-	5.5
S-bioallethrin +	-	11.0-17.0
Piperonyl butoxide	-	0-56
Phenothrin +	5.0-12.5	4.0-7.0
Tetramethrin +	2.0-2.5	1.5-16.0
Piperonyl butoxide	5.0-10.0	2.0-48.0
Etofenprox +	5-10	5-10
Pyrethrins +	0.18-0.37	0.18-0.37
Piperonyl butoxide	10-20	10-20
Lambda-cyhalothrin +	0.5	0.5
Tetramethrin +	1.0	1.0
Piperonyl butoxide	1.5	1.5
Cypermethrin +	2.8	2.8
S-bioallethrin +	2	2
Piperonyl butoxide	10	10
Tetramethrin +	12-14	12-14
d-phenothrin	6-7	6-7
d-tetramethin +	1.2-2.5	1.2-2.5
Cyphenothrin	3.7-7.5	3.7-7.5
d-tetramethrin +	1.2-2.5	1.2-2.5
d,d-trans-cyphenothrin	2-8	2-8
Deltamethrin +	0.3-0.7	0.3-0.7
S-bioallethrin +	0.5-1.3	0.16-1.3
Piperonyl butoxide	1.5	1.5

[a] **a.i. = active ingredient.**

Table 3. Insecticides used as housefly larvicides

Insecticide	Chemical type[a]	Dosage g a.i./m^2	WHO hazard classification of active ingredient (Class) [b]
Diflubenzuron	IGR	0.5-1.0	U
Cyromazine	IGR	0.5-1.0	U
Pyriproxifen	IGR	0.05-0.1	U
Triflumuron	IGR	0.25 - 0.5	U

[a] **IGR = insect growth regulator.**
[b] **Class U= unlikely to pose an acute hazard in normal use.**