

IRAC Mode of Action (MoA) Classification for active ingredients useful in vector control ¹

Primary Target Site of Action	Group	Subgroup	Chemical subgroup	Examples
Acetylcholinesterase inhibitors	1	A	carbamates ²	bendiocarb, propoxur
		B	organophosphates ²	fenitrothion, pirimiphos-methyl, malathion, temephos
GABA-gated chloride channel antagonists	2	B	(phenylpyrazoles) fiproles	fipronil
Sodium channel modulators	3	A	pyrethroids and pyrethrins	allethrin, bifenthrin, lambda-cyhalothrin, alpha-cypermethrin, deltamethrin, cyfluthrin, permethrin, etofenprox, phenothrin, transfluthrin
		B	DDT	DDT
Nicotinic acetylcholine receptor allosteric activators	5		spinosyns	spinosad
Juvenile hormone mimics	7	A	juvenile hormone analogues	methoprene, hydroprene
		C	pyriproxifen	pyriproxifen
Microbial disrupters of insect midgut membranes	11		<i>Bacillus thuringiensis var. israelensis</i> <i>Bacillus sphaericus</i>	
Inhibitors of chitin biosynthesis	15		benzoylureas	diflubenzuron, triflumuron, novaluron

1. Including larvicidal and adulticidal insecticides. This mode-of-action classification is edited and updated regularly to include new products; please refer to www.irc-online.org for the complete mode of action list.
2. Not all compounds within the OPs are cross-resistant. Different resistance mechanisms that are not linked to target site of action, such as enhanced metabolism are common for the OPs (Figure 1). Some of these metabolic resistance mechanisms are sometimes specific to a particular subgroup or particular compounds within the OPs. As a result, there are proven examples of the successful management of resistance to a particular compound or subgroup of compounds within the OPs using OP compounds from a different subgroup.