

## INSECTICIDES MODE OF ACTION TABLE

IRAC GROUP	MODE OF ACTION	CHEMICAL FAMILY (GROUP)	ACTIVE INGREDIENTS
1A	Acetylcholine esterase inhibitors	Carbamates	Aldicarb, Alanycarb, Bendiocarb, Benfuracarb, Butocarboxim, Butoxycarboxim, Carbaryl, Carbofuran, Carbosulfan, Ethiofencarb, Fenobucarb, Formetanate, Furathiocarb, Isoprocarb, Methiocarb, Methomyl, Metolcarb, Oxamyl, Pirimicarb, Propoxur, Thiodicarb, Thiofanox, Trimethacarb, XMC, Xylcarb
1A		Triazemate	Triazemate
1B		Organophosphates	Acephate, Azamethiphos, Azinphos-ethyl, Azinphos-methyl, Cadusafos, Chlorethoxyfos, Chlorfenvinphos, Chlormephos, Chlorpyrifos, Chlorpyrifos-methyl, Coumaphos, Cyanophos, Demeton-S-methyl, Diazinon, Dichlorvos/ DDVP, Dicrotophos, Dimethoate, Dimethylvinphos, Disulfoton, EPN, Ethion, Ethoprophos, Famphur, Fenamiphos, Fenitrothion, Fenthion, Fosthiazate, Heptenophos, Isofenphos, Isopropyl O-methoxyaminothio=phosphoryl salicylate, Isoxathion, Malathion, Mecarbam, Methamidophos, Methidathion, Mevinphos, Monocrotophos, Naled, Omethoate, Oxydemeton-methyl, Parathion, Parathion-methyl, Phenthoate, Phorate, Phosalone, Phosmet, Phosphamidon, Phoxim, Pirimiphos-, ethyl, Profenofos, Propetamphos, Prothiofos, Pyraclofos, Pyridaphenthion, Quinalphos, Sulfotep, Tebupirimfos, Temephos, Terbufos, Tetrachlorvinphos, Thiometon, Triazophos, Trichlorfon, Vamidothion

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2A	GABA-gated chloride channel antagonists	Cyclodiene organochlorines	Chlordane, Endosulfan, gamma-HCH (Lindane)
2B		Phenylpyrazoles (Fiproles)	Ethiprole, Fipronil
3	Sodium channel modulators	DDT	DDT
3		Methoxychlor	Methoxychlor
3		Pyrethroids	Acrinathrin, Allethrin, d-cis-trans Allethrin, d-trans Allethrin, Bifenthrin, Bioallethrin, Bioallethrin S-cyclopentenyl , Bioresmethrin, Cycloprothrin, Cyfluthrin, beta-Cyfluthrin, Cyhalothrin, lambda-Cyhalothrin, gamma-Cyhalothrin, Cypermethrin, alpha-Cypermethrin, beta-Cypermethrin, theta-cypermethrin, zeta-Cypermethrin, Cyphenothrin , (1R)-trans- isomers], Deltamethrin, Empenthrin , (EZ)- (1R)- isomers], Esfenvalerate, Etofenprox, Fenpropathrin, Fenvalerate, Flucythrinate, Flumethrin, tau-Fluvalinate, Halfenprox, Imiprothrin, Permethrin, Phenothrin [(1R)-trans-isomer], Prallethrin, Resmethrin, RU 15525, Silafluofen, Tefluthrin, Tetramethrin, Tetramethrin [(1R)-isomers], Tralomethrin, Transfluthrin, ZXI 8901
3		Pyrethrins	Pyrethrins (pyrethrum)
4A	Nicotinic Acetylcholine receptor agonists / antagonists	Neonicotinoids	Acetamiprid, Clothianidin, Dinotefuran, Imidacloprid, Nitenpyram, Thiacloprid, Thiamethoxam
4B		Nicotine	Nicotine
4C		Bensultap	Bensultap
4C		Cartap hydrochloride	Cartap hydrochloride
4C		Nereistoxin analogues	Thiocyclam, Thiosultap-sodium
5	Nicotinic Acetylcholine receptor agonists (allosteric) (not group 4)	Spinosyns	Spinosad
6	Chloride channel activators	Avermectins, Milbemycins	Abamectin, Emamectin benzoate, Milbemectin
7A	Juvenile hormone mimics	Juvenile hormone analogues	Hydroprene, Kinoprene, Methoprene
7B		Fenoxycarb	Fenoxycarb
7C		Pyriproxyfen	Pyriproxyfen

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8A	Compounds of unknown or non-specific mode of action (fumigants)	Alkyl halides	Methyl bromide and other alkyl halides
8B		Chloropicrin	Chloropicrin
8C		Sulfuryl fluoride	Sulfuryl fluoride
9A	Compounds of unknown or non-specific mode of action (selective feeding blockers)	Cryolite	Cryolite
9B		Pymetrozine	Pymetrozine
9C		Flonicamid	Flonicamid
10A	Compounds of unknown or non-specific mode of action (mite growth inhibitors)	Clofentezine	Clofentezine
10A		Hexythiazox	Hexythiazox
10B		Etoxazole	Etoxazole
11A1	Microbial disruptors of insect midgut membranes (includes transgenic crops expressing <i>Bacillus thuringiensis</i> toxins)	<i>B.t.</i> subsp. <i>israelensis</i>	<i>Bacillus thuringiensis</i> subsp. <i>israelensis</i>
11A2		<i>B. sphaericus</i>	<i>Bacillus sphaericus</i>
11B1		<i>B.t.</i> subsp. <i>Aizawai</i>	<i>Bacillus thuringiensis</i> subsp. <i>Aizawai</i>
11B2		<i>B.t.</i> subsp. <i>kurstaki</i>	<i>Bacillus thuringiensis</i> subsp. <i>Kurstaki</i>
11C		<i>B.t.</i> subsp. <i>tenebrionis</i>	<i>Bacillus thuringiensis</i> subsp. <i>Tenebrionis</i>
12A	Inhibitors of oxidative phosphorylation, disruptors of ATP formation (inhibitors of ATP synthase)	Diafenthiuron	Diafenthiuron
12B		Organotin miticides	Azocyclotin, Cyhexatin, Fenbutatin oxide
12C		Propargite	Propargite
12C		Tetradifon	Tetradifon
13	Uncouplers of oxidative phosphorylation via disruption of proton gradient	Chlorfenapyr	Chlorfenapyr
13		DNOC	DNOC
15	Inhibitors of chitin biosynthesis, type 0, Lepidopteran	Benzoylureas	Bistrifluron, Chlofluzuron, Diflubenzuron, Flucycloxuron, Flufenoxuron, Hexaflumuron, Lufenuron, Novaluron, Noviflumuron, Teflubenzuron, Triflumuron
16	Inhibitors of chitin biosynthesis, type 1, Homopteran	Buprofezin	Buprofezin
17	Moulting disruptor, Dipteran	Cyromazine	Cyromazine

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18A	Ecdysone agonists / moulting disruptors	Diacylhydrazines	Chromafenozide, Halofenozide, Methoxyfenozide, Tebufenozide
18B		Azadirachtin	Azadirachtin
19	Octopaminergic agonists	Amitraz	Amitraz
20A	Mitochondrial complex III electron transport inhibitors (Coupling site II)	Hydramethylnon	Hydramethylnon
20B		Acequinocyl	Acequinocyl
20C		Fluacrypyrim	Fluacrypyrim
21	Mitochondrial complex I electron transport inhibitors	METI acaricides	Fenazaquin, Fenpyroximate, Pyrimidifen, Pyridaben, Tebufenpyrad, Tolfenpyrad
21		Rotenone	Rotenone
22	Voltage-dependent sodium channel blockers	Indoxacarb	Indoxacarb
23	Inhibitors of lipid synthesis	Tetronic acid derivatives	Spirodiclofen, Spiromesifen
24A	Mitochondrial complex IV electron transport inhibitors	Aluminium phosphide	Aluminium phosphide
24B		Cyanide	Cyanide
24C		Phosphine	Phosphine
25	Neuronal inhibitors (unknown mode of action)	Bifenazate	Bifenazate
26	Aconitase inhibitors	Fluoroacetate	Fluoroacetate
27A	Synergists	P450-dependent monooxygenase inhibitors	Piperonyl butoxide
27B		Esterase inhibitors	Tribufos (DEF)
28	Ryanodine receptor modulators	Flubendiamide	Flubendiamide
UNA	Compounds with unknown mode of action <sup>2</sup>	Benzoximate	Benzoximate
UNB		Chinomethionat	Chinomethionat
UNC		Dicofol	Dicofol
UND		Pyridalyl	Pyridalyl
NSA	Miscellaneous non-specific (multi-site) inhibitors <sup>3</sup>	Borax	Borax
NSB		Tartar emetic	Tartar emetic