

**CropLife Australia Insecticide Resistance Management Review Group**  
**Mode of Action Classification for Insecticides – Valid as at 27 June 2019**

Main Mode of Action Group and Primary Site of Action	Chemical Sub-group or Exemplifying Active Constituent	Active Constituents <sup>1</sup>
<b>1*</b> <b>Acetylcholinesterase inhibitors</b> Nerve action  <i>* all members of this class may not be cross resistant</i>	<b>1A</b> Carbamates*	Bendiocarb Carbaryl Carbofuran Carbosulfan Methiocarb Methomyl Oxamyl Pirimicarb Propoxur Thiodicarb
	<b>1B</b> Organophosphates*	Acephate Azamethiphos Azinphos methyl Cadusafos Chlorfenvinphos Chlorpyrifos Chlorpyrifos-methyl Diazinon Dichlorvos Dimethoate Ethion Fenamiphos Fenitrothion Fenthion Maldison (malathion) Methidathion Mevinphos Omethoate Phorate Phosmet Pirimiphos-methyl Profenofos Prothiofos Temephos Terbufos Trichlorfon
<b>2</b> <b>GABA-gated chloride channel blockers</b> Nerve action	<b>2A</b> Cycloidiene organochlorines	No registered actives
	<b>2B</b> Phenylpyrazoles (Fiproles)	Fipronil

<sup>1</sup> Refer APVMA website ([www.apvma.gov.au](http://www.apvma.gov.au)) to obtain complete list of registered products from the PUBCRIS database

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<b>3</b> <b>Sodium channel modulators</b> Nerve action	<b>3A</b> Pyrethroids Pyrethrins	Allethrin Alpha-cypermethrin Beta-cyfluthrin Bifenthrin Bioallethrin Bioresmethrin Cyfluthrin Cypermethrin Cyphenothrin Deltamethrin Esbiothrin Esfenvalerate Fenvalerate Flumethrin Gamma-cyhalothrin Imiprothrin Lambda-cyhalothrin Permethrin Prallethrin Pyrethrins Tau-fluvalinate Tetramethrin Transfluthrin Zeta-cypermethrin
	<b>3B</b> <i>No registered actives in Australia</i>	<i>No registered actives in Australia</i>
<b>4</b> <b>Nicotinic acetylcholine receptor (nAChR) competitive modulators</b> Nerve action	<b>4A</b> Neonicotinoids	Acetamiprid Clothianidin Dinotefuran Imidacloprid Thiacloprid Thiamethoxam
	<b>4B</b> <i>Nicotine</i>	<i>No registered actives in Australia</i>
	<b>4C</b> Sulfoximine	Sulfoxaflor
<b>5</b> <b>Nicotinic Acetylcholine receptor allosteric modulators (nAChR)</b> Nerve action	Spinosyns	Spinosad Spinetoram
<b>6</b> <b>Glutamate-gated Chloride (GluCl) channel allosteric modulators</b> Nerve action	Avermectins Milbemycins	Abamectin, Emamectin benzoate Milbemectin
<b>7</b> <b>Juvenile hormone mimics</b> Growth regulation	<b>7A</b> Juvenile hormone analogues	Methoprene
	<b>7B</b> Fenoxycarb	Fenoxycarb
	<b>7C</b> Pyriproxyfen	Pyriproxyfen

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<b>8</b> <b>Miscellaneous non-specific (multi-site) inhibitors-</b>	<b>8A</b> Alkyl halides	Methyl bromide
	<b>8B</b> Chloropicrin	Chloropicrin
	<b>8C</b> Fluorides	Sulfuryl fluoride
<b>9</b> <b>Chordotonal organ TRPV channel modulators</b> Nerve Action	<b>9B</b> Pyridine azomethine derivatives	Pymetrozine
	<b>9D</b> <b>Pyropenes</b>	Afidopyropen
<b>10</b> <b>Mite growth inhibitors</b> Growth regulation	<b>10A</b> Clofentezine Hexythiazox	Clofentezine Hexythiazox
	<b>10B</b> Etoxazole	Etoxazole
<b>11</b> <b>Microbial disrupters of insect midgut membranes</b> (includes transgenic crops expressing <i>Bacillus thuringiensis</i> toxins)	<b>11A</b> <i>Bacillus thuringiensis</i> and the insecticidal proteins they produce.	<i>Bacillus thuringiensis</i> subsp. <i>israelensis</i> <i>B. thuringiensis</i> subsp. <i>aizawai</i> <i>B. thuringiensis</i> subsp. <i>kurstaki</i> <i>B. thuringiensis</i> subsp. <i>tenebrionis</i> B.t. crop proteins: Cry1Ac Cry2Ab Cry1F Vip3A
	<b>11B</b> <i>B. sphaericus</i> and the insecticidal proteins they produce	<i>Bacillus sphaericus</i>
<b>12</b> <b>Inhibitors of mitochondrial ATP synthase</b> Energy metabolism	<b>12A</b> Diafenthuron	Diafenthuron
	<b>12B</b> Organotin miticides	Fenbutatin oxide
	<b>12C</b> Propargite	Propargite
	<b>12D</b> Tetradifon	Tetradifon
<b>13</b> <b>Uncoupler of oxidative phosphorylation via disruption of the proton gradient</b> Energy metabolism	Chlorfenapyr	Chlorfenapyr
<b>14</b> <b>Nicotinic acetylcholine receptor channel blockers</b> Nerve action	Nereistoxin analogues	<i>No registered actives in Australia</i>

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<b>15</b> <b>Inhibitors of chitin biosynthesis, type 0,</b>  Growth regulation	Benzoylureas	Bistrifluron Chlorfluazuron Diflubenzuron Flufenoxuron Hexaflumuron Lufenuron Novaluron Triflumuron
<b>16</b> <b>Inhibitors of chitin biosynthesis, type 1</b>  Growth regulation	Buprofezin	Buprofezin
<b>17</b> <b>Moulting disruptor, Dipteran</b> Growth regulation	Cyromazine	Cyromazine
<b>18</b> <b>Ecdysone receptor agonists</b> Growth regulation	Diacylhydrazines	Methoxyfenozide Tebufenozide
<b>19</b> <b>Octopamine receptor agonists</b> Nerve action	Amitraz	Amitraz
<b>20</b> <b>Mitochondrial complex III electron transport inhibitors</b> Energy metabolism	<b>20A</b> Hydramethylnon	Hydramethylnon
	<b>20B</b> <i>No registered actives in Australia</i>	<i>No registered actives in Australia</i>
	<b>20C</b> <i>No registered actives in Australia</i>	<i>No registered actives in Australia</i>
	<b>20D</b> Bifenazate	Bifenazate
<b>21</b> <b>Mitochondrial complex I electron transport inhibitors</b> Energy metabolism	<b>21A</b> METI acaricides and insecticides	Fenpyroximate Pyridaben Tebufenpyrad
	<b>21B</b> Rotenone	Rotenone (Derris)
<b>22</b> <b>Voltage-dependent sodium channel blockers</b> Nerve action	<b>22A</b> Oxadiazines	Indoxacarb
	<b>22B</b> Semicarbazones	metaflumizone
<b>23</b> <b>Inhibitors of acetyl CoA carboxylase</b> Lipid synthesis, growth regulation	Tetronic and Tetramic acid derivatives	Spirotetramat

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<b>24</b> <b>Mitochondrial complex IV electron transport inhibitors</b> Energy metabolism	<b>24A</b> Phosphides	Phosphine Aluminium phosphide Magnesium phosphide
	<b>24B</b> <i>Cyanides</i>	<i>No registered actives in Australia</i>
<b>25</b> <b>Mitochondrial complex II electron transport inhibitors</b> Energy metabolism	<b>25A</b> Beta-ketonitrile derivatives	<i>No registered actives in Australia</i>
	<b>25B</b> Carboxanilides	<i>No registered actives in Australia</i>
<b>28</b> <b>Ryanodine receptor modulators</b> Nerve and muscle action	Diamides	Chlorantraniliprole Cyantraniliprole Cyclaniliprole Flubendiamide
<b>29</b> <b>Chordotonal organ modulators – undefined target site</b> Nerve action	Flonicamid	Flonicamid
<b>UN</b>	Azadirachtin	Azadirachtin
	<i>Beauveria bassiana</i>	<i>Beauveria bassiana</i>
Compounds of unknown or uncertain mode of action <sup>2</sup>	<i>Clitoria ternatea</i> extract	<i>Clitoria ternatea</i> extract
	Dicofol	Dicofol
	Lime sulphur	Lime sulphur
	Sulphur	Sulphur

<sup>2</sup> A compound with an unknown or controversial mode of action or an unknown mode of toxicity will be held in group 'un' until evidence becomes available to enable that compound to be assigned to a more appropriate mode of action group.

**CropLife Australia Insecticide Resistance Management Review Group**  
**Mode of Action Group Classification for Insecticides Active Constituent List – Valid as at 27 June 2019**

Active Constituent	Current Group	Active Constituent	Current Group
Abamectin	6	Etoxazole	10B
Acephate	1B	Fipronil	2B
Acetamiprid	4A	Flonicamid	29
Afidopyropen	9D	Flubendiamide	28
Allethrin	3A	Flufenoxuron	15
Alpha-cypermethrin	3A	Flumethrin	3A
Aluminium phosphide	24A	Gamma-cyhalothrin	3A
Amitraz	19	Hexaflumuron	15
Azadirachtin	UN	Hexythiazox	10A
Azamethiphos	1B	Hydramethylnon	20A
Azinphos methyl	1B	Imidacloprid	4A
<i>Bacillus thuringiensis aizawai</i>	11	Imiprothrin	3A
<i>Bacillus thuringiensis israelensis</i>	11	Indoxacarb	22A
<i>Bacillus thuringiensis kurstaki</i>	11	Lambda-cyhalothrin	3A
<i>Bacillus sphaericus</i>	11	Lufenuron	15
<i>Bacillus thuringiensis tenebrionis</i>	11	Magnesium phosphide	24A
<i>Beauveria bassiana</i>	UN	Maldison (malathion)	1B
Bendiocarb	1A	Metaflumizone	22B
Beta-cyfluthrin	3A	Methidathion	1B
Bifenazate	20	Methiocarb	1A
Bifenthrin	3A	Methomyl	1A
Bioallethrin	3A	Methoprene	7A
Bioresmethrin	3A	Methoxyfenozide	18
Bistrifluron	15	Methyl bromide	8A
Buprofezin	16	Mevinphos	1B
Cadusafos	1B	Milbemectin	6
Carbaryl	1A	Oxamyl	1A
Carbofuran	1A	Omethoate	1B
Carbosulfan	1A	Permethrin	3A
Chlorantraniliprole	28	Phorate	1B
Chlorfenvinphos	1B	Phosmet	1B
Chlorfluazuron	15	Phosphine	24A
Chlorfenapyr	13	Pirimicarb	1A
Chloropicrin	8B	Pirimiphos-methyl	1B
Chlorpyrifos	1B	Prallethrin	3A
Chlorpyrifos-methyl	1B	Profenofos	1B
<i>Clitoria ternatea</i> extract	UN	Propargite	12C
Clofentezine	10A	Propoxur	1A
Clothianidin	4A	Prothiofos	1B
Cyantraniliprole	28	Pymetrozine	9B
Cyfluthrin	3A	Pyrethrins	3A
Cypermethrin	3A	Pyridaben	21A
Cyromazine	17	Pyriproxyfen	7C
Deltamethrin	3A	Spinosad	5
Diafenthiuron	12A	Spinetoram	5
Diazinon	1B	Spirotetramat	23
Dichlorvos	1B	Sulfoxaflor	4C
Dicofol	UN	Tau-fluvalinate	3A
Diflubenzuron	15	Tebufenozide	18
Dimethoate	1B	Tebufenpyrad	21A
Dinotefuran	4A	Temephos	1B
Emamectin benzoate	6	Terbufos	1B
Esbiothrin	3A	Tetradifon	12D
Ethion	1B	Tetramethrin	3A

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Esfenvalerate	3A	Thiacloprid	4A
Fenamiphos	1B	Thiamethoxam	4A
Fenbutatin oxide	12B	Thiodicarb	1A
Fenitrothion	1B	Transfluthrin	3A
Fenoxycarb	7B	Trichlorfon	1B
Fenpyroximate	21A	Triflumuron	15
Fenthion	1B		
Fenvalerate	3A	Zeta-cypermethrin	3A

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