

# 2021 Pest Control Materials for Managing Insect and Mite Pests of Greenhouse-grown Horticultural Crops

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Greenhouse pest management/plant protection involves using a multitude of strategies in order to minimize the prospect of dealing with insect and mite pest populations. The use of pest control materials (insecticides and miticides) is one component of a pest management/plant protection program, which also includes pest identification and monitoring along with cultural, physical, and biological control. Proper stewardship of pest control materials involves resistance management by rotating products with different modes of action. The Insecticide Resistance Action Committee (IRAC) has developed a grouping, based on mode of action, to facilitate the implementation of appropriate rotation programs. Pest control materials have been assigned a designated number (sometimes number and letter combinations) associated with their mode of action. For more information, consult the IRAC website ([www.irac.online.org](http://www.irac.online.org)). **The information presented in this chart is not a substitute for the label. Always read and understand all information presented on the label before using any pest control material.** Also, be sure to check county and state regulations to determine if there are any local restrictions associated with the use of specific pest control materials listed in this chart.

Insect or Mite Pest	Pest Control Material Common Name	Pest Control Material Trade Name(s)	Restricted Entry Interval (REI)	Mode of Action (IRAC Mode Of Action Group)
APHIDS	Abamectin	Avid	12 hours	<b>6:</b> GABA <sup>1</sup> chloride channel activator
	Acephate	<b>1300 Orthene TR/Precise</b>	24/12 hours	<b>1B:</b> Acetylcholine esterase inhibitor
	Acetamiprid	TriStar	12 hours	<b>4A:</b> Nicotinic acetylcholine receptor modulator
	Afidopyropen	<b>Ventigra</b>	12 hours	<b>9D:</b> Selective feeding blocker/chordotonal organ TRPV channel modulator
	Azadirachtin	Azatin/Ornazin/Molt-X/Azatrol <sup>2</sup>	4/12/4/4 hours	Ecdysone antagonist: inhibits action of molting hormone
	<i>Beauveria bassiana</i> Strain GHA	BotaniGard	4 hours	
	<i>Beauveria bassiana</i> Strain PPRI 5339	<b>Velifer</b>	12 hours	
	Bifenazate + Abamectin	Sirocco	12 hours	<b>20D + 6:</b> Mitochondria electron transport inhibitor + GABA chloride channel activator
	Bifenthrin	<b>Attain TR/Talstar</b>	12 hours	<b>3A:</b> Prolong opening of sodium channels
	Chlorpyrifos	<b>DuraGuard ME</b>	24 hours	<b>1B:</b> Acetylcholine esterase inhibitor
	Clarified hydrophobic extract of neem oil	Triact	4 hours	Suffocation or membrane disruptor
	Cyantraniliprole	Mainspring	4 hours	<b>28:</b> Selective activation of ryanodine receptors
	Cyclanilprole + Flonicamid	Pradia	12 hours	<b>28 + 29:</b> Selective activation of ryanodine receptors + Selective feeding blocker/chordotonal organ modulator
	Cyfluthrin	Decathlon	12 hours	<b>3A:</b> Prolong opening of sodium channels
	Cyfluthrin + Imidacloprid	Discus	12 hours	<b>3A + 4A:</b> Prolong opening of sodium channels + nicotinic acetylcholine receptor modulator
	Dinotefuran	Safari	12 hours	<b>4A:</b> Nicotinic acetylcholine receptor modulator
	Fenoxycarb	Preclude	12 hours	<b>7B:</b> Juvenile hormone mimic
	Fenpropathrin	Tame	24 hours	<b>3A:</b> Prolong opening of sodium channels
	Flonicamid	Aria	12 hours	<b>29:</b> Selective feeding blocker/chordotonal organ modulator
	Flupyradifurone	Altus	4 hours	<b>4D:</b> Nicotinic acetylcholine receptor modulator
Imidacloprid	Marathon/Benefit/Mantra	12 hours	<b>4A:</b> Nicotinic acetylcholine receptor modulator	
<i>Isaria fumosorosea</i> Apopka Strain 97	Ancora	4 hours		
<i>Isaria fumosorosea</i> Strain FE 9901	NoFly	4 hours		

Insect or Mite Pest	Pest Control Material Common Name	Pest Control Material Trade Name(s)	Restricted Entry Interval (REI)	Mode of Action (IRAC Mode Of Action Group)
APHIDS <i>continued</i>	Kinoprene	Enstar	4 hours	<b>7A:</b> Juvenile hormone mimic
	Methiocarb	Mesuroil	24 hours	<b>1A:</b> Acetylcholine esterase inhibitor
	Mineral oil	<b>Ultra-Pure Oil/SuffOil-X</b>	4 hours	Suffocation or membrane disruptor
	Potassium salts of fatty acids	M-Pede	12 hours	Desiccation or membrane disruptor
	Pymetrozine	Endeavor	12 hours	<b>9B:</b> Selective feeding blocker/chordotonal organ TRPV channel modulator
	Pyrethrins	Pyreth-It/ <b>Pyrethrum</b>	12 hours	<b>3A:</b> Prolong opening of sodium channels
	Pyrethrins + Oil	Pycana	12 hours	<b>3 + suffocation (oil on board):</b> Sodium channel modulators
	Pyrifluquinazon	Rycar	12 hours	<b>9B:</b> Selective feeding blocker/chordotonal organ TRPV channel modulator
	Spinetoram + Sulfoxaflor	XXpire	12 hours	<b>5 + 4C:</b> Nicotinic acetylcholine receptor disruptor/agonist and GABA chloride channel activator + nicotinic acetylcholine receptor modulator
	Spirotetramat	Kontos	24 hours	<b>23:</b> Lipid biosynthesis inhibitor
	Tau-fluvalinate	Mavrik	12 hours	<b>3A:</b> Prolong opening of sodium channels
	Thiamethoxam	Flagship	12 hours	<b>4A:</b> Nicotinic acetylcholine receptor modulator
Tolfenpyrad	Hachi-Hachi	12 hours	<b>21A:</b> Mitochondria electron transport inhibitor	
BROAD MITE	Abamectin	Avid	12 hours	<b>6:</b> GABA chloride channel activator
	Bifenazate + Abamectin	Sirocco	12 hours	<b>20D + 6:</b> Mitochondria electron transport inhibitor + GABA chloride channel activator
	Chlorfenapyr	<b>Pylon</b>	12 hours	<b>13:</b> Oxidative phosphorylation uncoupler
	Fenpyroximate	Akari	12 hours	<b>21A:</b> Mitochondria electron transport inhibitor
	Pyrethrins + Oil	Pycana	12 hours	<b>3 + suffocation (oil on board):</b> Sodium channel modulators
	Pyridaben	Sanmite	12 hours	<b>21A:</b> Mitochondria electron transport inhibitor
	Spiromesifen	Savate	12 hours	<b>23:</b> Lipid biosynthesis inhibitor
	Spirotetramat	Kontos	24 hours	<b>23:</b> Lipid biosynthesis inhibitor
CATERPILLARS	Acetamiprid	TriStar	12 hours	<b>4A:</b> Nicotinic acetylcholine receptor modulator
	Azadirachtin	Azatin/Ornazin/Molt-X/Azatrol <sup>2</sup>	4/12/4/4 hours	Ecdysone antagonist: inhibits action of molting hormone
	<i>Bacillus thuringiensis</i> subsp. <i>kurstaki</i>	Dipel	4 hours	<b>11:</b> Midgut membrane disruptor
	Bifenthrin	<b>Attain TR/Talstar</b>	12 hours	<b>3A:</b> Prolong opening of sodium channels
	Chlorfenapyr	<b>Pylon</b>	12 hours	<b>13:</b> Oxidative phosphorylation uncoupler
	Chlorpyrifos	<b>DuraGuard ME</b>	24 hours	<b>1B:</b> Acetylcholine esterase inhibitor
	Cyantraniliprole	Mainspring	4 hours	<b>28:</b> Selective activation of ryanodine receptors
	Cyclaniloprole	Sarisa	4 hours	<b>28:</b> Selective activation of ryanodine receptors
	Cyclaniloprole + Flonicamid	Pradia	12 hours	<b>28 + 29:</b> Selective activation of ryanodine receptors + Selective feeding blocker/chordotonal organ modulator
	Cyfluthrin	Decathlon	12 hours	<b>3A:</b> Prolong opening of sodium channels
	Fenoxycarb	Preclude	12 hours	<b>7B:</b> Juvenile hormone mimic
	Fenpropathrin	Tame	24 hours	<b>3A:</b> Prolong opening of sodium channels

Insect or Mite Pest	Pest Control Material Common Name	Pest Control Material Trade Name(s)	Restricted Entry Interval (REI)	Mode of Action (IRAC Mode Of Action Group)
CATERPILLARS <i>continued</i>	Potassium salts of fatty acids	M-Pede	12 hours	Desiccation or membrane disruptor
	Pyrethrins	Pyreth-It/ <b>Pyrethrum</b>	12 hours	<b>3A:</b> Prolong opening of sodium channels
	Pyrethrins + Oil	Pycana	12 hours	<b>3 + suffocation (oil on board):</b> Sodium channel modulators
	Pyridalyl	Overture	12 hours	Unknown mode of action
	Methoxyfenozide	Intrepid	4 hours	<b>18:</b> Ecdysone agonist: mimics action of molting hormone
	Novaluron	Pedestal	12 hours	<b>15:</b> Chitin synthesis inhibitor
	Spinetoram + Sulfoxaflor	XXpire	12 hours	<b>5 + 4C:</b> Nicotinic acetylcholine receptor disruptor/agonist and GABA chloride channel activator + nicotinic acetylcholine receptor modulator
	Spinosad	Conserve	4 hours	<b>5:</b> Nicotinic acetylcholine receptor disruptor/agonist and GABA chloride channel activator
	Tau-fluvalinate	Mavrik	12 hours	<b>3A:</b> Prolong opening of sodium channels
	Tolfenpyrad	Hachi-Hachi	12 hours	<b>21A:</b> Mitochondria electron transport inhibitor
	CYCLAMEN MITE	Abamectin	Avid	12 hours
Bifenazate + Abamectin		Sirocco	12 hours	<b>20D + 6:</b> Mitochondria electron transport inhibitor + GABA chloride channel activator
Chlorfenapyr		<b>Pylon</b>	12 hours	<b>13:</b> Oxidative phosphorylation uncoupler
Fenpyroximate		Akari	12 hours	<b>21A:</b> Mitochondria electron transport inhibitor
Spiromesifen		Savate	12 hours	<b>23:</b> Lipid biosynthesis inhibitor
Spirotetramat		Kontos	24 hours	<b>23:</b> Lipid biosynthesis inhibitor
FUNGUS GNAT LARVAE	Acetamiprid	TriStar	12 hours	<b>4A:</b> Nicotinic acetylcholine receptor modulator
	Azadirachtin	Azatin/Ornazin/Molt-X/Azatrol <sup>2</sup>	4/12/4/4 hours	Ecdysone antagonist: inhibits action of molting hormone
	<i>Bacillus thuringiensis</i> subsp. <i>israelensis</i>	Gnatrol	4 hours	<b>11:</b> Midgut membrane disruptor
	Chlorfenapyr	<b>Pylon</b>	12 hours	<b>13:</b> Oxidative phosphorylation uncoupler
	Chlorpyrifos	<b>DuraGuard ME</b>	24 hours	<b>1B:</b> Acetylcholine esterase inhibitor
	Cyfluthrin + Imidacloprid	Discus	12 hours	<b>3A + 4A:</b> Prolong opening of sodium channels + nicotinic acetylcholine receptor modulator
	Cyromazine	Citation	12 hours	<b>17:</b> Chitin synthesis inhibitor
	Diflubenzuron	Adept	12 hours	<b>15:</b> Chitin synthesis inhibitor
	Dinotefuran	Safari	12 hours	<b>4A:</b> Nicotinic acetylcholine receptor modulator
	Imidacloprid	Marathon/Benefit/Mantra	12 hours	<b>4A:</b> Nicotinic acetylcholine receptor modulator
	Kinoprene	Enstar	4 hours	<b>7A:</b> Juvenile hormone mimic
	Pyriproxyfen	Distance/Fulcrum	12 hours	<b>7C:</b> Juvenile hormone mimic
	<i>Steinernema feltiae</i>	<b>Nemasys</b> , NemaShield, Scanmask, and Entonem		
	Thiamethoxam	Flagship	12 hours	<b>4A:</b> Nicotinic acetylcholine receptor modulator

Insect or Mite Pest	Pest Control Material Common Name	Pest Control Material Trade Name(s)	Restricted Entry Interval (REI)	Mode of Action (IRAC Mode Of Action Group)
FUNGUS GNAT ADULTS	Bifenthrin	<b>Attain TR</b> /Talstar	12 hours	<b>3A:</b> Prolong opening of sodium channels
	Cyfluthrin	Decathlon	12 hours	<b>3A:</b> Prolong opening of sodium channels
	Cyfluthrin + Imidacloprid	Discus	12 hours	<b>3A + 4A:</b> Prolong opening of sodium channels + nicotinic acetylcholine receptor modulator
	Fenpropathrin	Tame	24 hours	<b>3A:</b> Prolong opening of sodium channels
	Potassium salts of fatty acids	M-Pede	12 hours	Desiccation or membrane disruptor
	Tau-fluvalinate	Mavrik	12 hours	<b>3A:</b> Prolong opening of sodium channels
LEAFHOPPERS	Acetamiprid	TriStar	12 hours	<b>4A:</b> Nicotinic acetylcholine receptor modulator
	Azadirachtin	Azatin/Ornazin/Molt-X/Azatrol <sup>2</sup>	4/12/4/4 hours	Ecdysone antagonist: inhibits action of molting hormone
	<i>Beauveria bassiana</i> Strain GHA	BotaniGard	4 hours	
	Bifenthrin	<b>Attain TR</b> /Talstar	12 hours	<b>3A:</b> Prolong opening of sodium channels
	Buprofezin	Talus	12 hours	<b>16:</b> Chitin synthesis inhibitor
	Chlorpyrifos	<b>DuraGuard ME</b>	24 hours	<b>1B:</b> Acetylcholine esterase inhibitor
	Clarified hydrophobic extract of neem oil	Triact	4 hours	Suffocation or membrane disruptor
	Cyfluthrin	Decathlon	12 hours	<b>3A:</b> Prolong opening of sodium channels
	Cyfluthrin + Imidacloprid	Discus	12 hours	<b>3A + 4A:</b> Prolong opening of sodium channels + nicotinic acetylcholine receptor modulator
	Dinotefuran	Safari	12 hours	<b>4A:</b> Nicotinic acetylcholine receptor modulator
	Fenpropathrin	Tame	24 hours	<b>3A:</b> Prolong opening of sodium channels
	Flonicamid	Aria	12 hours	<b>29:</b> Selective feeding blocker/chordotonal organ modulator
	Flupyradifurone	Altus	12 hours	<b>4D:</b> Nicotinic acetylcholine receptor modulator
	Imidacloprid	Marathon/Benefit/Mantra	12 hours	<b>4A:</b> Nicotinic acetylcholine receptor modulator
	<i>Isaria fumosoroseus</i> Strain FE 9901	NoFly	4 hours	
	Potassium salts of fatty acids	M-Pede	12 hours	Desiccation or membrane disruptor
	Pyrethrins	Pyreth-It/ <b>Pyrethrum</b>	12 hours	<b>3A:</b> Prolong opening of sodium channels
	Spirotetramat	Kontos	24 hours	<b>23:</b> Lipid biosynthesis inhibitor
	Tau-fluvalinate	Mavrik	12 hours	<b>3A:</b> Prolong opening of sodium channels
	Thiamethoxam	Flagship	12 hours	<b>4A:</b> Nicotinic acetylcholine receptor modulator
Tolfenpyrad	Hachi-Hachi	12 hours	<b>21A:</b> Mitochondria electron transport inhibitor	
LEAFMINERS	Abamectin	Avid	12 hours	<b>6:</b> GABA chloride channel activator
	Acephate	<b>1300 Orthene TR</b> /Precise	24/12 hours	<b>1B:</b> Acetylcholine esterase inhibitor
	Acetamiprid	TriStar	12 hours	<b>4A:</b> Nicotinic acetylcholine receptor modulator
	Azadirachtin	Azatin/Ornazin/Molt-X/Azatrol <sup>2</sup>	4/12/4/4 hours	Ecdysone antagonist: inhibits action of molting hormone
	Bifenazate + Abamectin	Sirocco	12 hours	<b>20D + 6:</b> Mitochondria electron transport inhibitor + GABA chloride channel activator
	Bifenthrin	<b>Attain TR</b> /Talstar	12 hours	<b>3A:</b> Prolong opening of sodium channels

Insect or Mite Pest	Pest Control Material Common Name	Pest Control Material Trade Name(s)	Restricted Entry Interval (REI)	Mode of Action (IRAC Mode Of Action Group)
LEAFMINERS <i>continued</i>	Chlorpyrifos	<b>DuraGuard ME</b>	24 hours	<b>1B:</b> Acetylcholine esterase inhibitor
	Cyantraniliprole	Mainspring	4 hours	<b>28:</b> Selective activation of ryanodine receptors
	Cyclaniloprole	Sarisa	4 hours	<b>28:</b> Selective activation of ryanodine receptors
	Cyclaniloprole + Flonicamid	Pradia	12 hours	<b>28 + 29:</b> Selective activation of ryanodine receptors + Selective feeding blocker/chordotonal organ modulator
	Cyfluthrin + Imidacloprid	Discus	4 hours	<b>3A + 4A:</b> Prolong opening of sodium channels + nicotinic acetylcholine receptor modulator
	Cyromazine	Citation	12 hours	<b>17:</b> Chitin synthesis inhibitor
	Diflubenzuron	Adept	12 hours	<b>15:</b> Chitin synthesis inhibitor
	Dinotefuran	Safari	12 hours	<b>4A:</b> Nicotinic acetylcholine receptor modulator
	Fenoxycarb	Preclude	12 hours	<b>7B:</b> Juvenile hormone mimic
	Imidacloprid	Marathon/Benefit/Mantra	12 hours	<b>4A:</b> Nicotinic acetylcholine receptor modulator
	<i>Isaria fumosorosea</i> Apopka Strain 97	Ancora	4 hours	
	Kinoprene	Enstar	4 hours	<b>7A:</b> Juvenile hormone mimic
	Mineral oil	<b>Ultra-Pure Oil/SuffOil-X</b>	4 hours	Suffocation or membrane disruptor
	Novaluron	Pedestal	12 hours	<b>15:</b> Chitin synthesis inhibitor
	Pyrethrins + Oil	Pycana	12 hours	<b>3 + suffocation (oil on board):</b> Sodium channel modulators
	Spinosad	Conserve	4 hours	<b>5:</b> Nicotinic acetylcholine receptor disruptor/agonist and GABA chloride channel activator
	Thiamethoxam	Flagship	12 hours	<b>4A:</b> Nicotinic acetylcholine receptor modulator
MEALYBUGS	Acephate	<b>1300 Orthene TR/Precise</b>	24/12 hours	<b>1B:</b> Acetylcholine esterase inhibitor
	Acetamiprid	TriStar	12 hours	<b>4A:</b> Nicotinic acetylcholine receptor modulator
	Afidopyropen	<b>Ventiga</b>	12 hours	<b>9D:</b> Selective feeding blocker/chordotonal organ TRPV channel modulator
	Azadirachtin	Azatin/Ornazin/Molt-X/Azatrol <sup>2</sup>	4/12/4/4 hours	Ecdysone antagonist: inhibits action of molting hormone
	<i>Beauveria bassiana</i> Strain GHA	BotaniGard	4 hours	
	<i>Beauveria bassiana</i> Strain PPRI 5339	<b>Velifer</b>	12 hours	
	Bifenthrin	<b>Attain TR/Talstar</b>	12 hours	<b>3A:</b> Prolong opening of sodium channels
	Buprofezin	Talus	12 hours	<b>16:</b> Chitin synthesis inhibitor
	Chlorpyrifos	<b>DuraGuard ME</b>	24 hours	<b>1B:</b> Acetylcholine esterase inhibitor
	Clarified hydrophobic extract of neem oil	Triact	4 hours	Suffocation or membrane disruptor
	Cyclaniloprole + Flonicamid	Pradia	12 hours	<b>28 + 29:</b> Selective activation of ryanodine receptors + Selective feeding blocker/chordotonal organ modulator
	Cyfluthrin	Decathlon	12 hours	<b>3A:</b> Prolong opening of sodium channels
	Cyfluthrin + Imidacloprid	Discus	12 hours	<b>3A + 4A:</b> Prolong opening of sodium channels + nicotinic acetylcholine receptor modulator
	Dinotefuran	Safari	12 hours	<b>4A:</b> Nicotinic acetylcholine receptor modulator
	Fenoxycarb	Preclude	12 hours	<b>7B:</b> Juvenile hormone mimic

Insect or Mite Pest	Pest Control Material Common Name	Pest Control Material Trade Name(s)	Restricted Entry Interval (REI)	Mode of Action (IRAC Mode Of Action Group)
MEALYBUGS <i>continued</i>	Fenpropathrin	Tame	24 hours	<b>3A:</b> Prolong opening of sodium channels
	Fonicamid	Aria	12 hours	<b>29:</b> Selective feeding blocker/chordotonal organ modulator
	Flupyradifurone	Altus	4 hours	<b>4D:</b> Nicotinic acetylcholine receptor modulator
	Imidacloprid	Marathon/Benefit/Mantra	12 hours	Nicotinic acetylcholine receptor modulator (4A)
	<i>Isaria fumosorosea</i> Apopka Strain 97	Ancora	4 hours	
	<i>Isaria fumosoroseus</i> Strain FE 9901	NoFly	4 hours	
	Kinoprene	Enstar	4 hours	<b>7A:</b> Juvenile hormone mimic
	Mineral oil	<b>Ultra-Pure Oil/SuffOil-X</b>	4 hours	Suffocation or membrane disruptor
	Potassium salts of fatty acids	M-Pede	12 hours	Desiccation or membrane disruptor
	Pyrethrins + Oil	Pycana	12 hours	<b>3 + suffocation (oil on board):</b> Sodium channel modulators
	Pyrifluquinazon	Rycar	12 hours	<b>9B:</b> Selective feeding blocker/chordotonal organ TRPV channel modulator
	Spineotram + Sulfoxaflor	XXpire	12 hours	<b>5 + 4C:</b> Nicotinic acetylcholine receptor disruptor/agonist and GABA chloride channel activator + nicotinic acetylcholine receptor modulator
	Spirotetramat	Kontos	24 hours	<b>23:</b> Lipid biosynthesis inhibitor
	Thiamethoxam	Flagship	12 hours	<b>4A:</b> Nicotinic acetylcholine receptor modulator
	Tolfenpyrad	Hachi-Hachi	12 hours	<b>21A:</b> Mitochondria electron transport inhibitor
PLANT BUGS	Acetamiprid	TriStar	12 hours	<b>4A:</b> Nicotinic acetylcholine receptor modulator
	Cyclaniloprole + Fonicamid	Pradia	12 hours	<b>28 + 29:</b> Selective activation of ryanodine receptors + Selective feeding blocker/chordotonal organ modulator
	Fonicamid	Aria	12 hours	<b>29:</b> Selective feeding blocker/chordotonal organ modulator
	Bifenthrin	<b>Attain TR/Talstar</b>	12 hours	<b>3A:</b> Prolong opening of sodium channels
	Flupyradifurone	Altus	4 hours	<b>4D:</b> Nicotinic acetylcholine receptor modulator
	<i>Isaria fumosorosea</i> Apopka Strain 97	Ancora	4 hours	
	<i>Isaria fumosoroseus</i> Strain FE 9901	NoFly	4 hours	
	Pyrethrins + Oil	Pycana	12 hours	<b>3 + suffocation (oil on board):</b> Sodium channel modulators
	Tau-fluvalinate	Mavrik	12 hours	<b>3A:</b> Prolong opening of sodium channels
SCALES (HARD AND SOFT) <sup>a</sup>	Acephate	<b>1300 Orthene TR/Precise</b>	24/12 hours	<b>1B:</b> Acetylcholine esterase inhibitor
	Acetamiprid	TriStar	12 hours	<b>4A:</b> Nicotinic acetylcholine receptor modulator
	Azadirachtin	Azatin/Ornazin/Molt-X/Azatrol <sup>2</sup>	4/12/4/4 hours	Ecdysone antagonist: inhibits action of molting hormone
	Bifenthrin	<b>Attain TR/Talstar</b>	12 hours	<b>4A:</b> Prolong opening of sodium channels
	Buprofezin	Talus	12 hours	<b>16:</b> Chitin synthesis inhibitor

Insect or Mite Pest	Pest Control Material Common Name	Pest Control Material Trade Name(s)	Restricted Entry Interval (REI)	Mode of Action (IRAC Mode Of Action Group)
SCALES (HARD AND SOFT) <sup>a</sup> <i>continued</i>	Clarified hydrophobic extract of neem oil	Triact	4 hours	Suffocation or membrane disruptor
	Cyantranilprole	Mainspring	4 hours	<b>28:</b> Selective activation of ryanodine receptors
	Cyclanilprole	Sarisa	4 hours	<b>28:</b> Selective activation of ryanodine receptors
	Cyclanilprole + Flonicamid	Pradia	12 hours	<b>28 + 29:</b> Selective activation of ryanodine receptors + Selective feeding blocker/chordotonal organ modulator
	Cyfluthrin	Decathlon	12 hours	<b>3A:</b> Prolong opening of sodium channels
	Dinotefuran	Safari	12 hours	<b>4A:</b> Nicotinic acetylcholine receptor modulator
	Fenoxycarb	Preclude	12 hours	<b>7B:</b> Juvenile hormone mimic
	Flonicamid	Aria	12 hours	<b>29:</b> Selective feeding blocker/chordotonal organ modulator
	Imidacloprid	Marathon/Benefit/Mantra	12 hours	<b>4A:</b> Nicotinic acetylcholine receptor modulator
	Kinoprene	Enstar	4 hours	<b>7A:</b> Juvenile hormone mimic
	Mineral oil	<b>Ultra-Pure Oil/SuffOil-X</b>	4 hours	Suffocation or membrane disruptor
	Potassium salts of fatty acids	M-Pede	12 hours	Desiccation or membrane disruptor
	Pyrethrins + Oil	Pycana	12 hours	<b>3 + suffocation (oil on board):</b> Sodium channel modulators
	Pyriproxyfen	Distance/Fulcrum	12 hours	<b>7C:</b> Juvenile hormone mimic
	Spirotetramat	Kontos	24 hours	<b>23:</b> Lipid biosynthesis inhibitor
	Thiamethoxam	Flagship	12 hours	<b>4A:</b> Nicotinic acetylcholine receptor modulator
	Tolfenpyrad	Hachi-Hachi	12 hours	<b>21A:</b> Mitochondria electron transport inhibitor
SHORE FLY LARVAE	Azadirachtin	Azatin/Ornazin/Molt-X/Azatrol <sup>2</sup>	4/12/4/4 hours	Ecdysone antagonist: inhibits action of molting hormone
	Chlorpyrifos	<b>DuraGuard ME</b>	24 hours	<b>1B:</b> Acetylcholine esterase inhibitor
	Cyromazine	Citation	12 hours	<b>17:</b> Chitin synthesis inhibitor
	Diflubenzuron	Adept	12 hours	<b>15:</b> Chitin synthesis inhibitor
	Pyriproxyfen	Distance/Fulcrum	12 hours	<b>7C:</b> Juvenile hormone mimic
	Spinosad	Conserve	4 hours	<b>5:</b> Nicotinic acetylcholine receptor disruptor/agonist and GABA chloride channel activator
	<i>Steinernema carpocapsae</i>	<b>Millenium</b>	0 hours	
SLUG AND SNAIL	Iron phosphate	Sluggo	0 hours	Inhibits calcium metabolism
	Metaldehyde	Deadline	Refer to Label	Central nervous system toxin
	Methiocarb	MesuroI	24 hours	<b>1A:</b> Acetylcholine esterase inhibitor
SPIDER MITE (TWO SPOTTED)	Abamectin	Avid	12 hours	<b>6:</b> GABA chloride channel activator
	Acequinocyl	Shuttle	12 hours	<b>20B:</b> Mitochondria electron transport inhibitor
	<i>Beauveria bassiana</i> Strain PPRI 5339	<b>Velifer</b>	12 hours	
	Bifenazate	Floramite	4 hours	<b>20D:</b> Mitochondria electron transport inhibitor
	Bifenazate + Abamectin	Sirocco	12 hours	<b>20D + 6:</b> Mitochondria electron transport inhibitor + GABA chloride channel activator
	Bifenthrin	<b>Attain TR/Talstar</b>	12 hours	<b>3A:</b> Prolong opening of sodium channels



Insect or Mite Pest	Pest Control Material Common Name	Pest Control Material Trade Name(s)	Restricted Entry Interval (REI)	Mode of Action (IRAC Mode Of Action Group)
SPIDER MITE (TWOSPOTTED) <i>continued</i>	Chlorfenapyr	<b>Pylon</b>	12 hours	<b>13:</b> Oxidative phosphorylation uncoupler
	Clarified hydrophobic extract of neem oil	Triact	4 hours	Suffocation or membrane disruptor
	Clofentezine	Novato	12 hours	<b>10A:</b> Growth and embryogenesis inhibitor
	Cyflumetofen	<b>Sultan</b>	12 hours	<b>25:</b> Mitochondria electron transport inhibitor
	Etoxazole	TetraSan/Beethoven	12/24 hours	<b>10B:</b> Chitin synthesis inhibitor
	Fenazaquin	Magus	12 hours	<b>21A:</b> Mitochondria electron transport inhibitor
	Fenpyroximate	Akari	12 hours	<b>21A:</b> Mitochondria electron transport inhibitor
	Hexythiazox	Hexygon	12 hours	<b>10A:</b> Growth and embryogenesis inhibitor
	<i>Isaria fumosorosea</i> Apopka Strain 97	Ancora	4 hours	
	<i>Metarhizium brunneum</i> Strain F52	Met52	4 hours	
	Mineral oil	<b>Ultra-Pure Oil/SuffOil-X</b>	4 hours	Suffocation or membrane disruptor
	Potassium salts of fatty acids	M-Pede	12 hours	Desiccation or membrane disruptor
	Pyridaben	Sanmite	12 hours	<b>21A:</b> Mitochondria electron transport inhibitor
	Spiromesifen	Savate	12 hours	<b>23:</b> Lipid biosynthesis inhibitor
	Spirotetramat	Kontos	24 hours	<b>23:</b> Lipid biosynthesis inhibitor
	THRIPS	Abamectin	Avid	12 hours
Acephate		<b>1300 Orthene TR/Precise</b>	24/12 hours	<b>1B:</b> Acetylcholine esterase inhibitor
Acetamiprid		TriStar	12 hours	<b>4A:</b> Nicotinic acetylcholine receptor modulator
Azadirachtin		Azatin/Ornazin/Molt-X/Azatrol <sup>2</sup>	4/12/4/4 hours	Ecdysone antagonist: inhibits action of molting hormone
<i>Beauveria bassiana</i> Strain GHA		BotaniGard	4 hours	
<i>Beauveria bassiana</i> Strain PPRI 5339		<b>Velifer</b>	12 hours	
Bifenazate + Abamectin		Sirocco	12 hours	<b>20D + 6:</b> Mitochondria electron transport inhibitor + GABA chloride channel activator
Bifenthrin		<b>Attain TR/Talstar</b>	12 hours	<b>3A:</b> Prolong opening of sodium channels
Chlorfenapyr		<b>Pylon</b>	12 hours	<b>13:</b> Oxidative phosphorylation uncoupler
Chlorpyrifos		<b>DuraGuard ME</b>	24 hours	<b>1B:</b> Acetylcholine esterase inhibitor
Cyantraniliprole		Mainspring	4 hours	<b>28:</b> Selective activation of ryanodine receptors
Cyclaniloprole		Sarisa	4 hours	<b>28:</b> Selective activation of ryanodine receptors
Cyclaniloprole + Fonicamid		Pradia	12 hours	<b>28 + 29:</b> Selective activation of ryanodine receptors + Selective feeding blocker/chordotonal organ modulator
Cyfluthrin		Decathlon	12 hours	<b>3A:</b> Prolong opening of sodium channels
Cyfluthrin + Imidacloprid		Discus	12 hours	<b>3A + 4A:</b> Prolong opening of sodium channels + nicotinic acetylcholine receptor modulator
Fenoxycarb		Preclude	12 hours	<b>7B:</b> Juvenile hormone mimic
Fonicamid	Aria	12 hours	<b>29:</b> Selective feeding blocker/chordotonal organ modulator	
<i>Isaria fumosoroseus</i> Strain FE 9901	NoFly	4 hours		



Insect or Mite Pest	Pest Control Material Common Name	Pest Control Material Trade Name(s)	Restricted Entry Interval (REI)	Mode of Action (IRAC Mode Of Action Group)
THRIPS <i>continued</i>	Kinoprene	Enstar	4 hours	<b>7A:</b> Juvenile hormone mimic
	<i>Metarhizium brunneum</i> Strain F52	Met52	4 hours	
	Methiocarb	Mesuroil	24 hours	<b>1A:</b> Acetylcholine esterase inhibitor
	Mineral oil	<b>Ultra-Pure Oil</b> /SuffOil-X	4 hours	Suffocation or membrane disruptor
	Novaluron	Pedestal	12 hours	<b>15:</b> Chitin synthesis inhibitor
	Potassium salts of fatty acids	M-Pede	12 hours	Desiccation or membrane disruptor
	Pyrethrins	Pyreth-It/ <b>Pyrethrum</b>	12 hours	<b>3A:</b> Prolong opening of sodium channels
	Pyrethrins + Oil	Pycana	12 hours	<b>3 + suffocation (oil on board):</b> Sodium channel modulators
	Pyridalyl	Overture	12 hours	Unknown mode of action
	Spinetoram + Sulfoxaflor	XXpire	12 hours	<b>5 + 4C:</b> Nicotinic acetylcholine receptor disruptor/agonist and GABA chloride channel activator + nicotinic acetylcholine receptor modulator
	Spinosad	Conserve	4 hours	<b>5:</b> Nicotinic acetylcholine receptor disruptor/agonist and GABA chloride channel activator
	Spirotetramat	Kontos	24 hours	<b>23:</b> Lipid biosynthesis inhibitor
	<i>Steinernema feltiae</i>	<b>Nemasys</b>		
	Tau-fluvalinate	Mavrik	12 hours	<b>3A:</b> Prolong opening of sodium channels
	Thiamethoxam	Flagship	12 hours	<b>4A:</b> Nicotinic acetylcholine receptor modulator
	Tolfenpyrad	Hachi-Hachi	12 hours	<b>21A:</b> Mitochondria electron transport inhibitor
WHITEFLIES	Abamectin	Avid	12 hours	<b>6:</b> GABA chloride channel activator
	Acephate	<b>1300 Orthene TR</b> /Precise	24/12 hours	<b>1B:</b> Acetylcholine esterase inhibitor
	Acetamiprid	TriStar	12 hours	<b>4A:</b> Nicotinic acetylcholine receptor modulator
	Afidopyropen	<b>Ventigra</b>	12 hours	<b>9D:</b> Selective feeding blocker/chordotonal organ TRPV modulator
	Azadirachtin	Azatin/Ornazin/Molt-X/Azatrol <sup>2</sup>	4/12/4/4 hours	Ecdysone antagonist: inhibits action of molting hormone
	<i>Beauveria bassiana</i> Strain GHA	BotaniGard	4 hours	
	<i>Beauveria bassiana</i> Strain PPRI 5339	<b>Velifer</b>	12 hours	
	Bifenthrin	<b>Attain TR</b> /Talstar	12 hours	<b>3A:</b> Prolong opening of sodium channels
	Bifenazate + Abamectin	Sirocco	12 hours	<b>20D + 6:</b> Mitochondria electron transport inhibitor + GABA chloride channel activator
	Buprofezin	Talus	12 hours	<b>16:</b> Chitin synthesis inhibitor
	Clarified hydrophobic extract of neem oil	Triact	4 hours	Suffocation or membrane disruptor
	Cyantranilprole	Mainspring	4 hours	<b>28:</b> Selective activation of ryanodine receptors
	Cyclanilprole	Sarisa	4 hours	<b>28:</b> Selective activation of ryanodine receptors
	Cyclanilprole + Flonicamid	Pradia	12 hours	<b>28 + 29:</b> Selective activation of ryanodine receptors + Selective feeding blocker/chordotonal organ modulator
	Cyfluthrin	Decathlon	12 hours	<b>3A:</b> Prolong opening of sodium channels
	Cyfluthrin + Imidacloprid	Discus	12 hours	<b>3A + 4A:</b> Prolong opening of sodium channels + nicotinic acetylcholine receptor modulator



Insect or Mite Pest	Pest Control Material Common Name	Pest Control Material Trade Name(s)	Restricted Entry Interval (REI)	Mode of Action (IRAC Mode Of Action Group)
WHITEFLIES <i>continued</i>	Diflubenzuron	Adept	12 hours	<b>15:</b> Chitin synthesis inhibitor
	Dinotefuran	Safari	12 hours	<b>4A:</b> Nicotinic acetylcholine receptor modulator
	Fenazaquin	Magus	12 hours	<b>21A:</b> Mitochondria electron transport inhibitor
	Fenoxycarb	Preclude	12 hours	<b>7B:</b> Juvenile hormone mimic
	Fenpropathrin	Tame	24 hours	<b>3A:</b> Prolong opening of sodium channels
	Flonicamid	Aria	12 hours	<b>29:</b> Selective feeding blocker/chordotonal organ modulator
	Flupyradifurone	Altus	4 hours	<b>4D:</b> Nicotinic acetylcholine receptor modulator
	Imidacloprid	Marathon/Benefit/Mantra	12 hours	<b>4A:</b> Nicotinic acetylcholine receptor modulator
	<i>Isaria fumosorosea</i> Apopka Strain 97	Ancora	4 hours	
	<i>Isaria fumosoroseus</i> Strain FE 9901	NoFly	4 hours	
	<i>Metarhizium brunneum</i> Strain F52	Met52	4 hours	
	Kinoprene	Enstar	4 hours	<b>7A:</b> Juvenile hormone mimic
	Mineral oil	<b>Ultra-Pure Oil</b> /SuffOil-X	4 hours	Suffocation or membrane disruptor
	Novaluron	Pedestal	12 hours	<b>15:</b> Chitin synthesis inhibitor
	Potassium salts of fatty acids	M-Pede	12 hours	Desiccation or membrane disruptor
	Pymetrozine	Endeavor	12 hours	<b>9B:</b> Selective feeding blocker/chordotonal organ TRPV channel modulator
	Pyrethrins	Pyreth-I/Pyrethrum	12 hours	<b>3A:</b> Prolong opening of sodium channels
	Pyrethrins + Oil	Pycana	12 hours	<b>3 + suffocation (oil on board):</b> Sodium channel modulators
	Pyridaben	Sanmite	12 hours	<b>21A:</b> Mitochondria electron transport inhibitor
	Pyriproxyfen	Rycar	12 hours	<b>9B:</b> Selective feeding blocker/chordotonal organ TRPV channel modulator
	Pyriproxyfen	Distance/Fulcrum	12 hours	<b>7C:</b> Juvenile hormone mimic
	Spinetoram + Sulfoxaflor	XXpire	12 hours	<b>5 + 4C:</b> Nicotinic acetylcholine receptor disruptor/agonist and GABA chloride channel activator + nicotinic acetylcholine receptor modulator
	Spiromesifen	Savate	12 hours	<b>23:</b> Lipid biosynthesis inhibitor
	Spirotetramat	Kontos	24 hours	<b>23:</b> Lipid biosynthesis inhibitor
	Tau-fluvalinate	Mavrik	12 hours	<b>3A:</b> Prolong opening of sodium channels
	Thiamethoxam	Flagship	12 hours	<b>4A:</b> Nicotinic acetylcholine receptor modulator
Tolfenpyrad	Hachi-Hachi	12 hours	<b>21A:</b> Mitochondria electron transport inhibitor	

<sup>a</sup> Refer to label for specific scale species.

<sup>1</sup> GABA=Gamma-aminobutyric acid.

<sup>2</sup> Additional azadirachtin products include the following: AzaGuard, Aza-Direct, and AzaSol.

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