



The Role of Insecticides in an Integrated Program





How many insecticide MOA's
(groups) are registered in Australia?



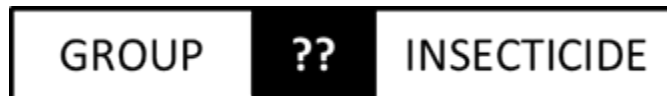
How many different insecticide
MOA's (groups) would your typical
grower be using on their farm?



Insecticide Mode of Action

- 25 different MOA's, 36 sub-groups
 - In broadacre we heavily rely on just 3 MOA's !
 - GROUP 1 - AChE inhibitors (OP's & carbamates)
 - GROUP 3 - pyrethroids,
 - GROUP 4A - neonicotinoids

Broadspectrum; fast knockdown; relatively toxic; under regulatory review; increasing resistance





Resistance can be found in...

	Group 1		Group 3	Group 4	Group 5	Group 7
	Carbamate	OP's	SP's	Neonics	Spinosyn	IGR's
<i>Helicoverpa armigera</i>	✓	✓	✓		✓	
Diamondback moth	?	✓	✓			
Green peach aphid	✓	✓	✓			
Cotton aphid	✓	✓	✓	✓		
Two spotted mite		✓	✓			
RLEM			✓			
Silverleaf whitefly			✓			✓



Regulatory Challenges

- Residues
- Bee toxicity
- ECRP
- EU MRL withdrawal
- Toxicity
- Spray drift / buffer zones
- Manufacturer withdrawal



Regulatory status as at Dec 2012

Carbamates in brown (Group 1A)

Organophosphates in black (Group 1B)

Review completed	Cancelled / Withdrawn / Phase out underway	Currently under ECRP review	On priority list for review	Not on list for review
Carbaryl	<p>Aldicarb</p> <p>Azinphos-ethyl</p> <p>Chlorfenvinphos</p> <p>Demeton-S-methyl</p> <p>Methamidophos</p> <p>Mevinphos</p> <p>Monocrotophos</p> <p>Parathion-ethyl</p> <p>Parathion-methyl</p> <p>Profenofos</p>	<p>Azinphos-methyl</p> <p>Chlorpyrifos</p> <p>Diazinon</p> <p>Dimethoate</p> <p>Fenamiphos</p> <p>Fenithrothin</p> <p>Fenthion</p> <p>Malathion</p> <p>Methidathion</p> <p>Methiocarb</p> <p>Omethoate</p>	<p>Acephate</p> <p>Carbofuran</p> <p>Disulfoton</p> <p>Methomyl</p> <p>Phorate</p> <p>Phosmet</p> <p>Terbufos</p> <p>Trichlorfon</p>	<p>Chlorpyrifos-methyl</p> <p>Thiodicarb</p> <p>Pirimicarb</p>
	Endosulfan (2A)	Fipronil (2C)		



What options do we have?



Seed Treatment Options

- winter crops



New for 2013

	Imidacloprid (4A) e.g. Emerge [®] , Gaucho [®] , Hombre [®] , Zorro [®]	Fipronil (2C) e.g. Cosmos [®]	Thiamethoxam + Lambda-cyhalothrin (4A + 3A) e.g. Cruiser [®] Opti
Canola	Aphids, RLEM, BOM	RLEM	Aphids, RLEM [^] , Lucerne Flea [^]
Cereals	Aphid feeding damage		Aphid feeding damage, RLEM [^] , Lucerne Flea [^]
Pasture / Fodder Brassicas	RLEM, BOM		
Lupins	RLEM, BOM		
Faba beans, field peas, lentils	Aphids (Gaucho only)		

[^] Suppression



Foliar Options - aphids

Registration
pending for 2013

Pirimicarb (1A) e.g. Pirimor®	Dimethoate / Omethoate (1B)	Pyrethroids (3A)	Sulfoxaflor (4C) e.g. Transform®	Petroleum spray oil e.g. Canopy®
Cereals, canola, lupins	Cereals	Cereals	Cereals & canola	Pulses & oilseeds
Aphid specific	Also controls sucking bugs	Broadspectrum. Acts as aphid repellent	Primarily aphids (active on mirids and whitefly)	Primarily aphids
Resistance in some crops	Resistance in some crops	Resistance in some crops	New group. No cross-resistance, including 4A	Works by smothering insects
Potential cross-resistance				
Very soft on beneficials	Moderate to hard impact	Very hard on beneficials	Low to moderate impact	Very low impact
Can flare other pests				

Helicoverpa



New for 2013

Pyrethroids (3A)	Spinetoram (5) e.g. Success® Neo	Bt (11) e.g. Dipel®	Indoxacarb (22A) e.g. Steward®	NPV e.g. Vivus® Max
Canola & pulses	Canola & fodder brassicas	Pulses & oilseeds	Pulses	Cereals, oilseeds & pulses
Broadspectrum. Resistance in some DBM & <i>H. armigera</i>	<i>Helicoverpa</i> & DBM	<i>Helicoverpa</i> & DBM	<i>Helicoverpa</i> & mirids.	Specific to <i>Helicoverpa</i>
Controls mixed sizes of susceptible populations		Neonates to first instar	Neonates to second instar	Neonates to second instar
Very hard on beneficials	Selectivity varies by group	Very low impact	Low impact	No impact



Diamondback moth



New for 2013

Pyrethroids (3A)	Spinetoram (5) e.g. Success® Neo	Emamectin (6) e.g. Affirm®	Bt (11) e.g. Dipel® +/- PSO
Canola & pulses	Canola & fodder brassicas	Canola	Pulses & oilseeds
Broadspectrum. Resistance in some DBM & <i>H. amigera</i>	DBM	DBM	<i>Helicoverpa</i> & DBM
Controls mixed sizes of susceptible populations	Controls mixed sizes Best on up to medium instars	Controls mixed sizes	Neonates to first instar
Very hard on beneficials	Selectivity varies across beneficial group		Very low impact

Beneficial Insect Selectivity - foliar applications

Product	Overall ranking	Predatory beetles - Total	Predatory bugs - Total	Apple Dimpling bug	Lacewing adults	Spiders	Total (wasps)	Ants	Thrips
Bt	Very low	VL	VL	VL	VL	VL	VL	VL	VL
NPV (Vivus Max)	Very low	VL	VL	VL	VL	VL	VL	VL	VL
Pirimicarb (Pirimor)	Very low	VL	L	VL	VL	VL	VL	VL	L
Petroleum spray oil	Very low	VL	VL	VL	VL	L	VL	H	VL
Indoxacarb (Steward)	Low	L	VL	H	M	VL	VL	H	VL
Emamectin (Affirm)	Mod	L	H	H	L	M	M	VL	M
Dimethoate (200mL/ha)	Mod	M	M	M	M	L	M	H	M
Dimethoate (500mL/ha)	High	M	M	H	VH	M	H	VH	M
OP's	High	H	H	VH	L	M	H	VH	H
Pyrethroids	Very high	VH	VH	VH	VH	VH	VH	VH	VH

Source: Cotton Pest Management Guide 2012-13 for more detailed information

Take Home Messages

- Insecticides remain fundamental to insect management systems
- Current insecticides under pressure
- Need to develop new management systems
 - Increased non-chemical solutions
 - More insecticide diversity / rotation
 - More selective options
 - Better timing
 - New solutions becoming available