



Department of
Agriculture and Food



GRDC Grains Research &
Development Corporation
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Transform™ Insecticide for control of aphids in canola

Dr. Rob Annetts & Melissa Welsh

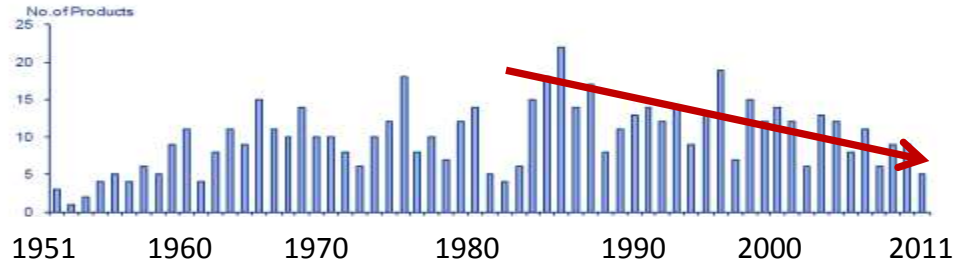
26 February 2013



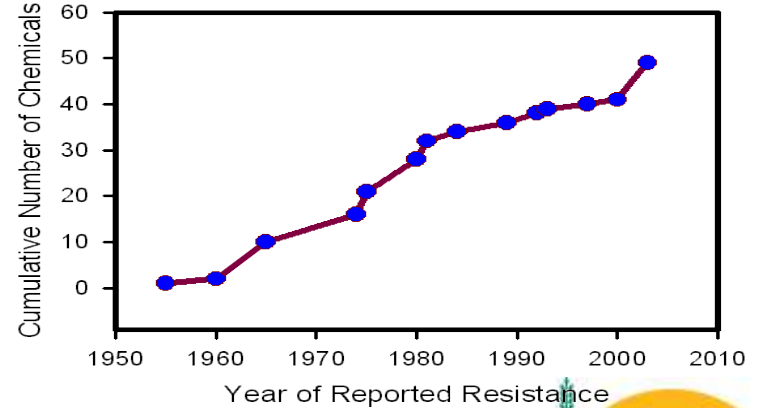


Fewer molecules

New Active Ingredients Introduced Each Year since 1950



Resistance increasing



Key pests

- Green peach aphid (*Myzus persicae*)
- Grey cabbage aphid (*Brevicoryne brassicae*)
- Turnip aphid (*Lipaphis erysimi*)

- Oat aphid (*Rhopalosiphum padi*), Corn aphid (*R. maidis*), Rose grain aphid (*Metopolophium dirhodum*), Grain aphid (*Sitobion miscanthi*)



Damage

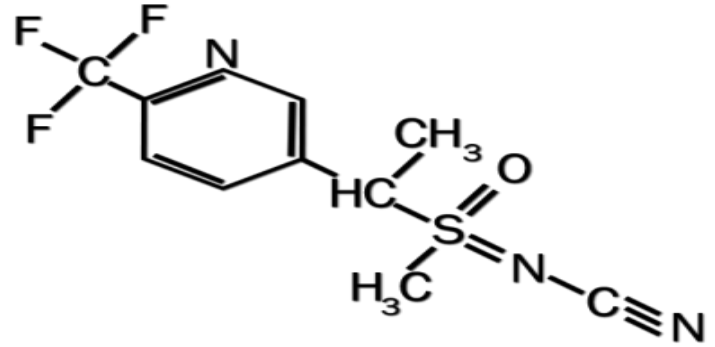
- Aphids damage canola crops by:
 - direct feeding on sap,
 - transmission of plant virus
 - injecting toxins
 - inducing secondary fungal growth (sooty mould) on honey dew

Control

- Current control measures:
 - seed dressing
 - foliar insecticides

Transform™ Insecticide

- Sulfoxaflor 240 g ai/L SC
- New chemistry: *Sulfoximines*



Overview of key attributes

- Unique mode of action (Group 4C mode of action)
- Excellent contact, systemic and translaminar activity
- Fast-acting, with extended residual control
- Active on a broad range of sap-feeding insects
- Excellent fit in IPM programs
- Will be registered on a wide range of crops



Sulfoxaflor MoA

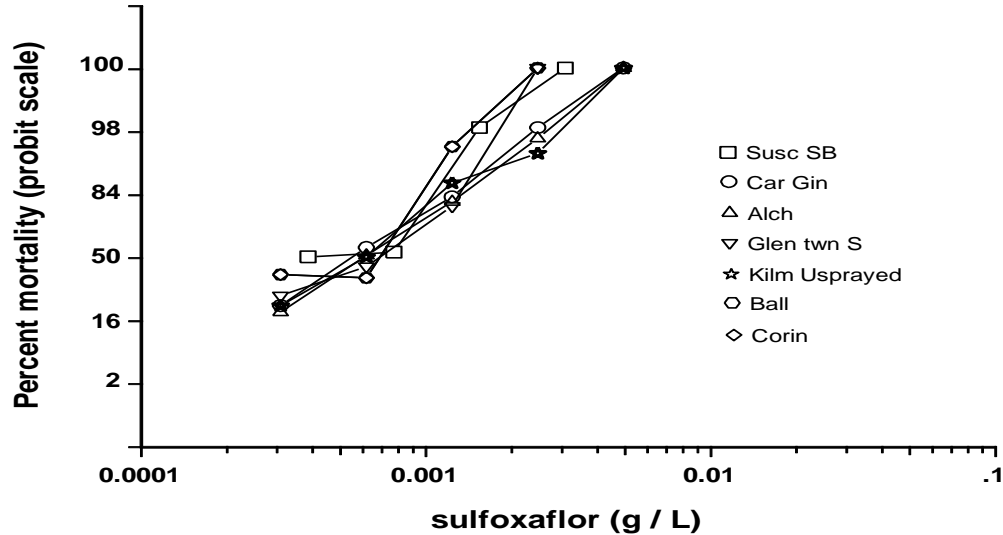
- New subgroup 4C
 - Group 4 nicotinic acetylcholine receptor [nAChR] agonists

The reasons for this new subgroup are:

1. New chemical class
2. No cross resistance between sulfoxaflor and existing insecticides
3. The lack of cross-resistance is due to the lack of metabolic breakdown
4. Sulfoxaflor interacts with the insecticidal target site differently from existing products such as the neonicotinoids



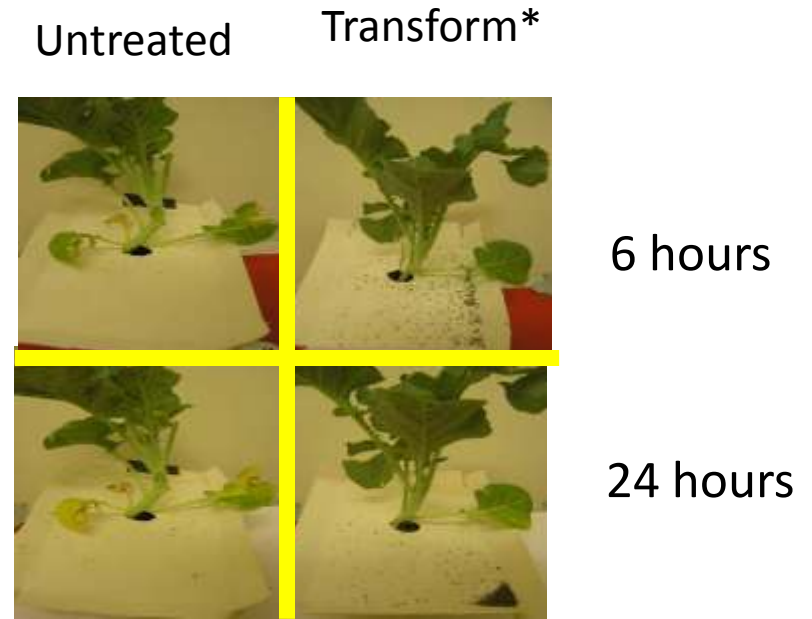
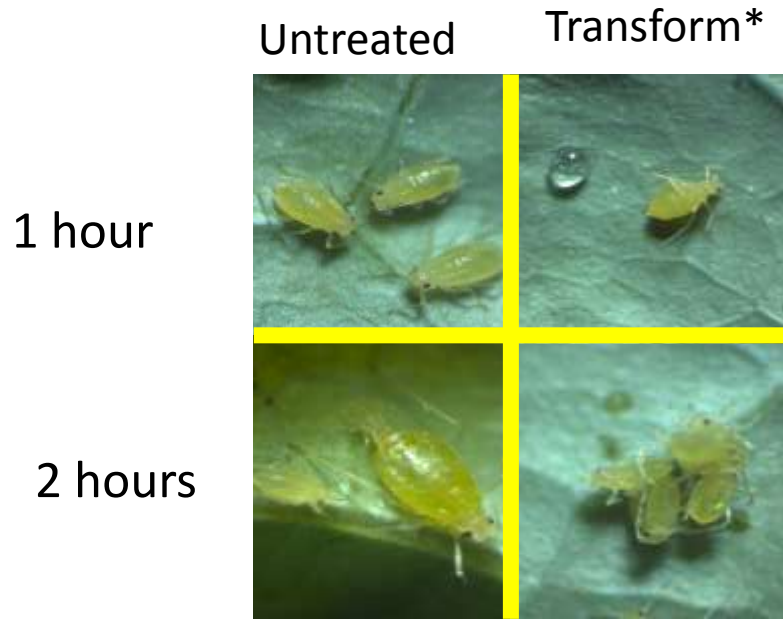
Resistance testing summary for the 2010-2011 cotton season: cotton aphid *Aphis gossypii*



Dose response for six 2010-2011 field collected cotton aphid (*Aphis gossypii*) strains and a single reference susceptible strain (Susc SB) against sulfoxaflor. The field strains all contained neonicotinoid resistant cotton aphid (Dr Grant A. Herron, NSW DPI, unpublished data).

Symptoms

Knockdown



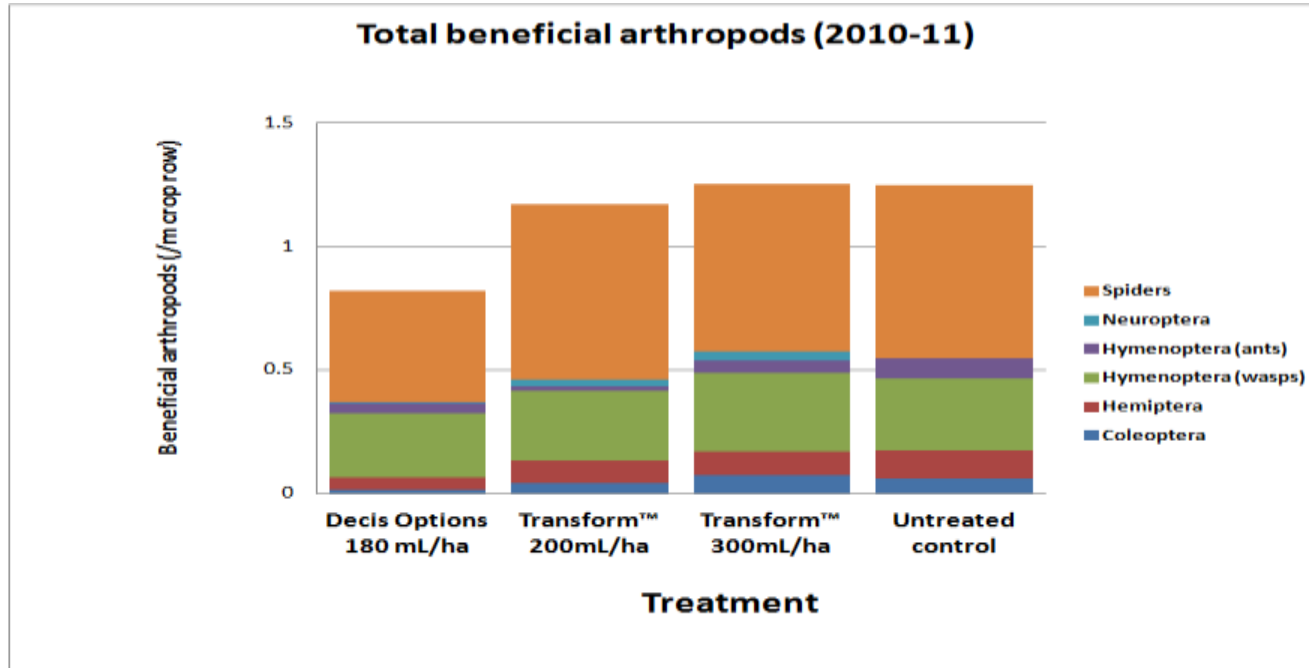
*Transform applied at 24 g/100L

Transform label

Row crops

Crop	Key pest controlled	Rate Range (mL/ha)
Cereals	Aphids	50-100
Canola	Aphids	100-200
Cotton	Aphids	200-300
	Green mirids	
	Greenhouse whitefly	400
Vegetables	Aphids	200-300
	Greenhouse whitefly	400

Impact on beneficial insects



Honey bees

- “This product is toxic to bees exposed to direct treatment. Do not apply this product while bees are actively visiting the area to be treated”.
- Toxic on direct contact and up to 3 hours after application.



Transform™ registration



DATA



Green peach aphid

Table 1. The number of aphids per leaf or terminal (*winged and wingless*) in Western Australian canola 2008-12

<i>Treatment</i>	<i>Rate</i> <i>mL/ha</i>	<i>DAA (date)</i> <i>Mean (±SE)</i>		<i>DAA (date)</i> <i>Mean (±SE)</i>		<i>DAA (date)</i> <i>Mean (±SE)</i>		<i>DAA (date)</i> <i>Mean (±SE)</i>	
124025RA MYZUPE		3 (8/09/2008)†		6 (11/09/2008)†		14 (19/09/2008)†		19 (24/09/2008)†	
Untreated		15.20 ± 5.8	a	12.00 ± 3.3	a	20.50 ± 5.4	a	12.10 ± 4.5	a
Transform	100	3.50 ± 1.5	a	1.40 ± 0.7	b	1.40 ± 0.8	cd	0.10 ± 0	d
Transform	200	4.60 ± 0.7	a	2.10 ± 0.9	ab	0.80 ± 0.3	d	0.30 ± 0.1	cd
Pirimor WG	500 g/ha	7.40 ± 2.5	a	3.90 ± 0.5	ab	3.70 ± 0.3	bc	3.60 ± 1.1	ab
Pirimor WG	1 Kg/ha	2.60 ± 1.5	a	3.00 ± 2.3	ab	0.50 ± 0.2	d	2.10 ± 1.1	bcd
Untreated		9.50 ± 3.5	a	6.90 ± 2.7	ab	8.00 ± 2.7	ab	12.40 ± 4.7	a
CV		34.56		45.08		36.37		39.21	

Means within column followed by different letters are significantly different ($P>0.05$); Tukey's HSD.† Transformed $\log(X+1)$, back-transformed means presented.

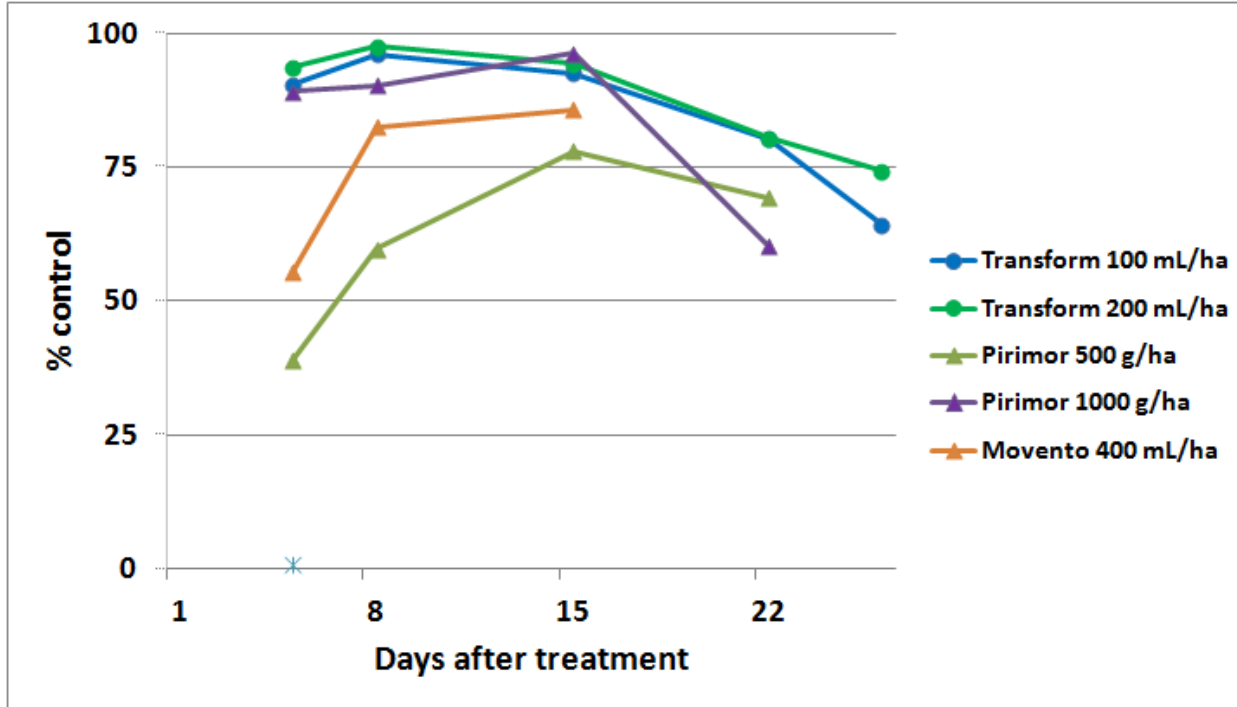
* BS-1000 0.1% v/v (100 mL/100 L, ** Agral 600 18 mL/100L, *** BS-1000 0.2% v/v (200 mL/100L).

Formulations used in this study: Transform™ Insecticide (Sulfoxaflor 240 SC), Pirimor® 500 WG (Pirimicarb), BS-1000 (non-ionic surfactant), Agral® 600 (non-ionic surfactant).



Green peach aphid

Summary across all trials



Cabbage aphid

Table 1. The number of aphids per leaf or terminal (*winged and wingless*) in Western Australian canola 2008-12

<i>Treatment</i>	<i>Rate</i> <i>mL/ha</i>	<i>DAA (date)</i> <i>Mean (±SE)</i>	<i>DAA (date)</i> <i>Mean (±SE)</i>	<i>DAA (date)</i> <i>Mean (±SE)</i>	<i>DAA (date)</i> <i>Mean (±SE)</i>
124023 BRVCBR		2 (14/09/2012)†	7 (19/09/2012)†	14 (26/09/2012)†	
Untreated		40.90 ± 11 a	82.00 ± 13.9 a	44.50 ± 9.3 a	
Transform	100	5.40 ± 1.7 b	0.00 ± 0 b	0.00 ± 0 b	
Transform	200	4.40 ± 1.4 b	0.10 ± 0 b	0.00 ± 0 b	
Pirimor WG*	500 g/ha	0.20 ± 0.1 c	0.10 ± 0.1 b	0.10 ± 0.1 b	
Pirimor WG*	1 kg/ha	0.30 ± 0.1 c	0.10 ± 0.1 b	0.10 ± 0.1 b	
CV		39.63	28.88	46.39	
124024RA BRVCBR		2 (14/09/2012)†	7 (19/09/2012)†	14 (26/09/2012)†	22 (4/10/2012)†
Untreated		22.09 ± 1.65 a	21.65 ± 3.44 a	16.33 ± 3.53 a	2.94 ± 1 a
Transform	100	1.00 ± 0.24 bc	0.05 ± 0.02 c	0.03 ± 0.03 b	0.36 ± 0.3 b
Transform	200	1.87 ± 0.53 b	0.01 ± 0.01 c	0.11 ± 0.11 b	0.58 ± 0.22 ab
Pirimor WG*	250 g/ha	0.55 ± 0.08 c	0.79 ± 0.19 b	0.01 ± 0.01 b	1.45 ± 0.57 ab
Pirimor WG*	500 g/ha	0.60 ± 0.21 c	0.27 ± 0.11 bc	0.01 ± 0.01 b	0.83 ± 0.42 ab
CV		19.99	28.90	35.49	66.61

Means within column followed by different letters are significantly different ($P > 0.05$); Tukey's HSD. † Transformed $\log(X+1)$, back-transformed means presented.

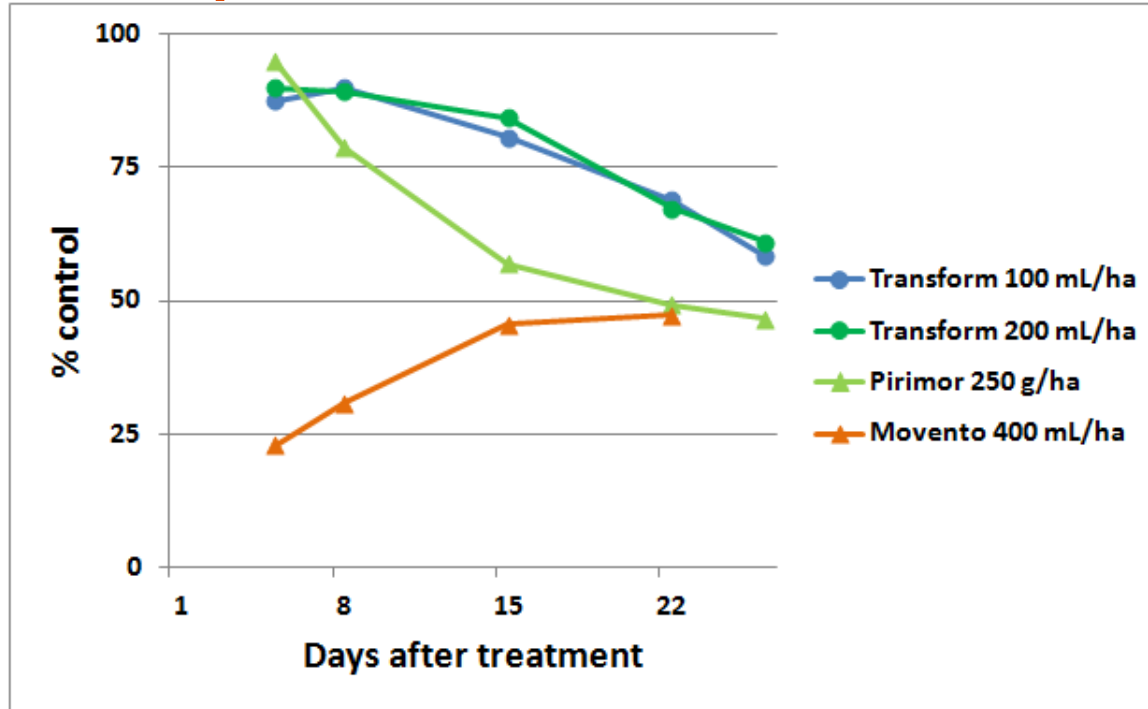
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Cabbage aphid

Summary across all trials



Turnip aphid

Table 1. The number of aphids per leaf or terminal (*winged and wingless*) in Western Australian canola 2008-12

Treatment	Rate mL/ha	DAA (date)		DAA (date)		DAA (date)		DAA (date)	
		Mean (±SE)		Mean (±SE)		Mean (±SE)		Mean (±SE)	
104003RA LIPAER		3 (2/09/2009)†		8 (7/09/2009)†		15 (14/09/2009)†		22 (21/09/2009)†	
Untreated		3.76 ± 1.06	a	6.28 ± 1.01	a	13.96 ± 2.56	a	8.89 ± 0.95	a
Transform**	100	0.01 ± 0	b	0.00 ± 0	b	0.05 ± 0.03	b	0.26 ± 0.16	b
Transform**	200	0.15 ± 0.14	b	0.00 ± 0	b	0.08 ± 0.06	b	0.19 ± 0.11	b
Pirimor WG***	500 g/ha	0.09 ± 0.03	b	0.06 ± 0.05	b	0.47 ± 0.19	b	1.62 ± 0.87	b
CV		54.19		30.07		25.89		39.35	

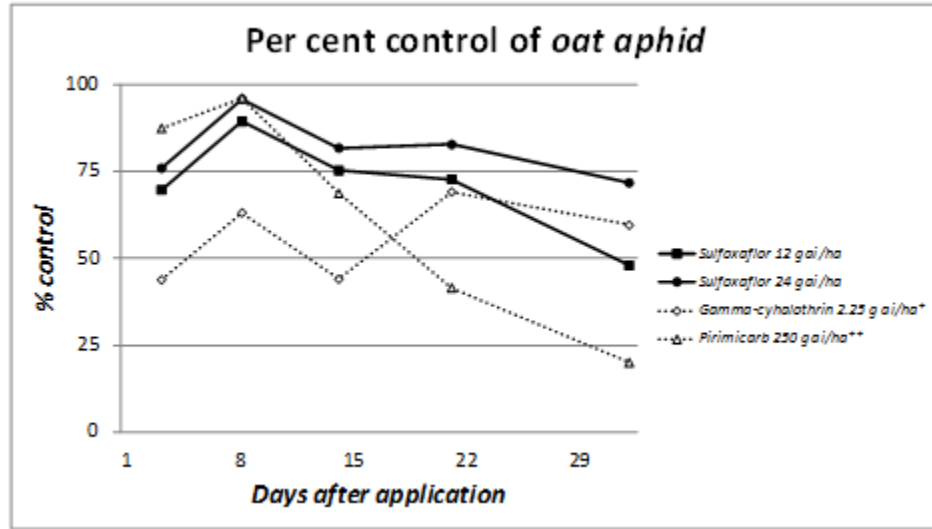
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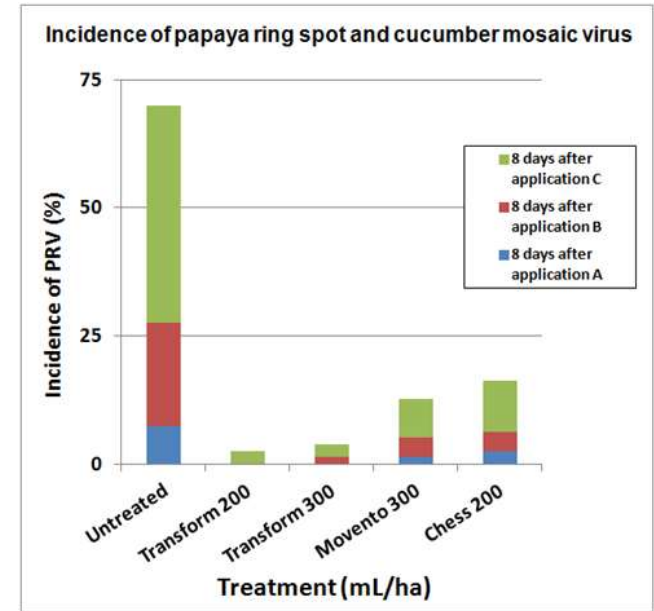
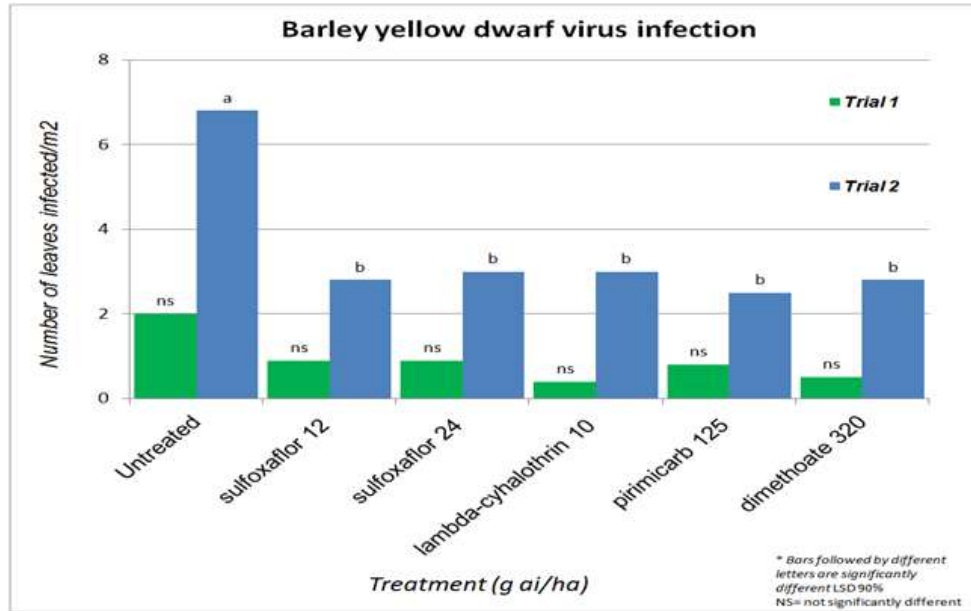


% control oat aphid WA cereals (3 trials)



†Formulations used in this study: sulfoxaflor (= Transform™ Insecticide), gamma-cyhalothrin (Trojan® Insecticide), pirimicarb (Pirimor® 500 WG). *gamma-cyhalothrin was used in two trials. ** pirimicarb was used in one trial.

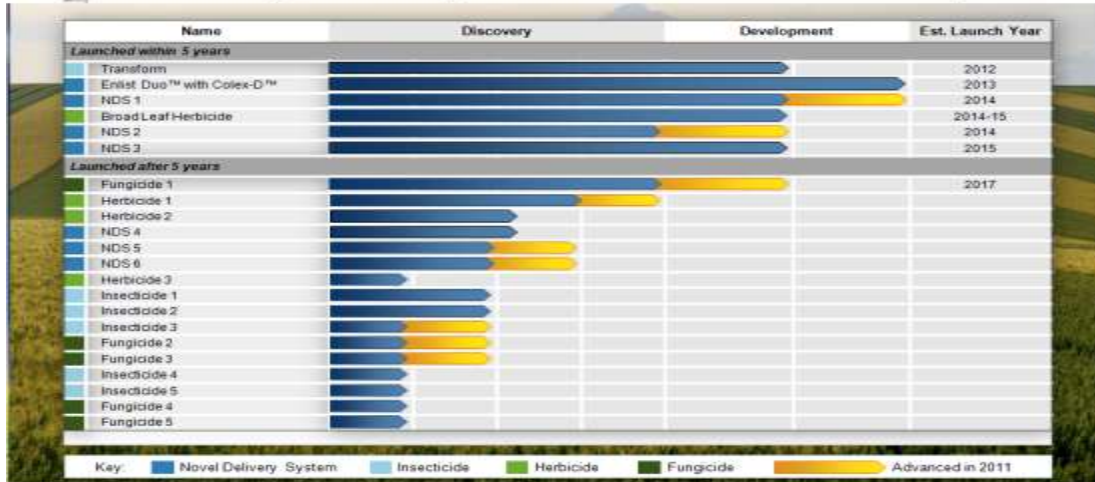
Virus transmission



Investing heavily in R&D and extension



Investing Heavily in Research & Development



All Subject to regulatory approval



Conclusions

- Registration of new molecules is getting harder and resistance is increasing
- Transform will be an industry-leading sap-feeding insecticide with no cross resistance to existing insecticides
- Transform will be registered in 2013 for use on a broad range of crops





Department of
Agriculture and Food



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Questions?

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