

ZEAL[®]

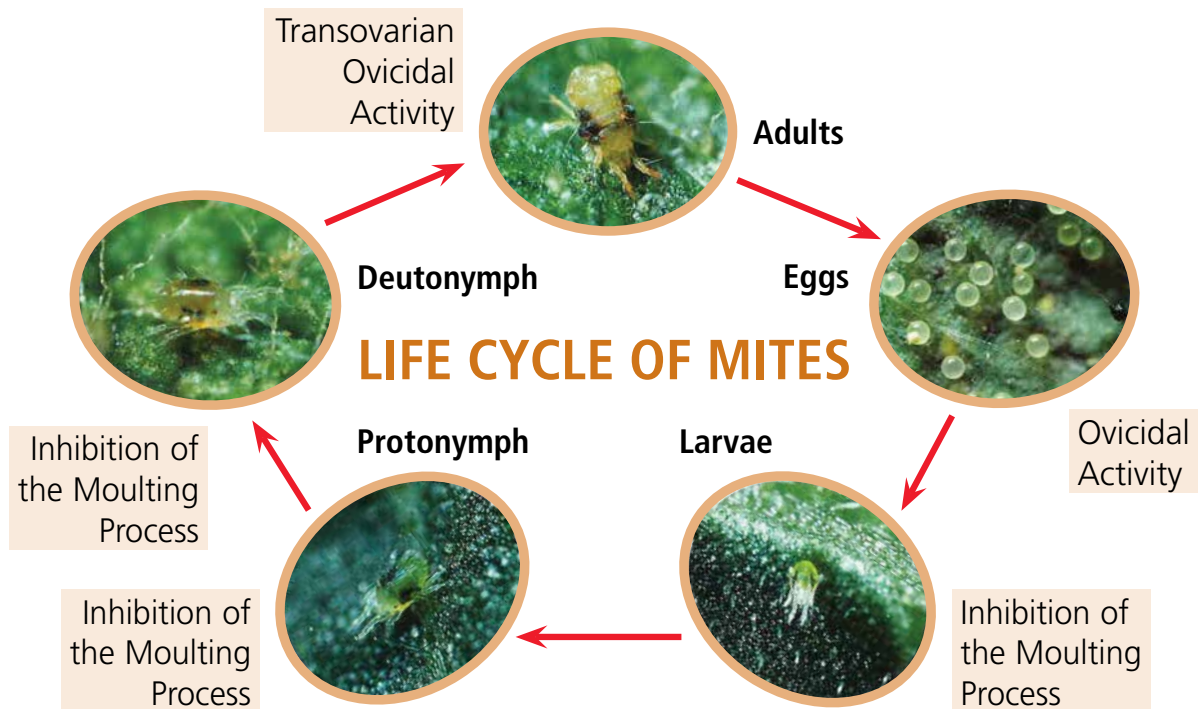
M I T I C I D E

110 g/L Etoxazole

WIN THE FIGHT AGAINST MITES

in cotton, maize* and popcorn*

- Long lasting control
- IPM compatible
- Ideal resistance management partner



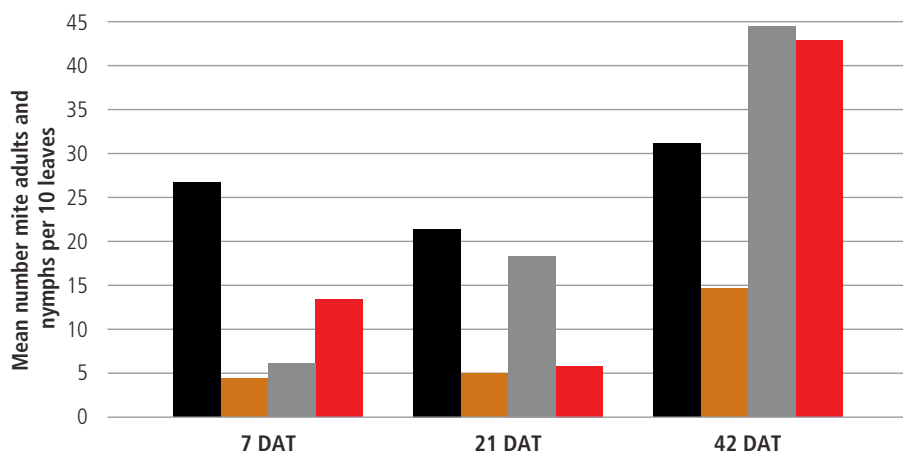
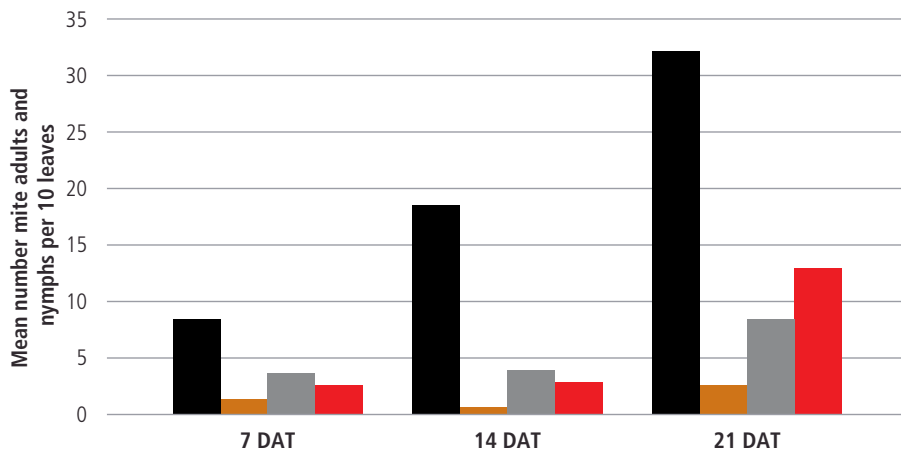
* Permit number PER82075.

Control of two-spotted mite in cotton

Sprayed 22 Jan 1999, Narrabri NSW

Ground spray boom sprayer at 81 L water/ha

Zeal used early prevents population from exploding

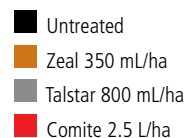


Control of two-spotted mite in cotton

Sprayed 18 Jan 1999, Boggabri NSW

Ground spray boom sprayer at 81 L water/ha

Zeal used early prevents population from exploding



How to get the best from Zeal

- **Spray early:** The graphs above illustrate the importance of applying Zeal early to control the populations. Spray a week earlier than you would with knockdown miticides.
- **Spray on low thresholds:** As for timing, best results are achieved before population numbers build. Refer to recommendations in cotton pest management guide for thresholds. As an IGR Zeal does not control adult mites, they will take 5 - 8 days to die off naturally, but are sterilised by Zeal. Spraying early on lower thresholds will stop the mite life cycle and prevent population numbers exploding.
- **Spray coverage:** Good spray coverage is essential, and a minimum of 30 L/ha of water should be used for aerial applications, although 40 L is preferred. Use 100 L/ha for ground spraying.

Resistance management

Grant Herron's (NSWDPI) report *Resistance testing summary for the 2013-2014 cotton season: cotton aphid *Aphis gossypii* and two-spotted mite *Tetranychus urticae** contained:

- Compared to previous seasons abundance was reversed; TSM was most abundant and cotton aphid almost absent.
- TSM showed discriminating dose survivors against bifenthrin (Talstar®), abamectin (Agrimec®), propargite (Comite®) and diafenthiuron (Pegasus® (CGA-140408)).
- More than 50% of TSM strains were bifenthrin (Talstar) resistant with one strain 79% resistant and other 100% resistant and the reason for such an increase is not clear.
- Similarly, abamectin (Agrimec) resistance was detected in six out of the eleven TSM strains tested and worryingly one of those strains comprised 79% resistant TSM. Possibly this relates to abamectin being applied as a prophylactic treatment in combination with mirids sprays.
- Although three TSM strains showed diafenthiuron (Pegasus (CGA-140408)) survivors I consider this was caused by vigour tolerance and not resistance so the discriminating dose will be increased to avoid false positives.

While no widespread cases of field failures of miticides have been seen, Grant Herron's work indicated the need for resistance management. Zeal is a completely different mode of action and chemical group (Group 10B) which makes it an ideal resistance management partner.

Directions for use

SITUATION	PEST	RATE	CRITICAL COMMENTS
Cotton – ground and aerial application	Two-spotted mite (<i>Tetranychus urticae</i>) and Bean spider mite (<i>Tetranychus ludeni</i>)	350 mL/ha	Apply when the threshold for your area has been reached. As a guide this is generally when 20-30% of the leaves have mites or when mite numbers are increasing at 1% per day. Best results will be obtained when Zeal is applied to low but increasing populations. Good coverage is essential. For aerial application use a minimum of 30 L spray volume per hectare. Generally Zeal takes about 7 days to reach maximum mite control. If re-treatment is required, use an approved miticide from a different chemical group. Refer to notes on resistance under General Instructions section of the label.

Aerial application

Mandatory no-spray zones for protection of the aquatic environment

For aerial application (Cotton)		
Wind speed range at time of application	Downwind mandatory no-spray zone	
	Fixed-wing	Helicopter
From 3 to 8 kilometres per hour	40 metres	40 metres
From 8 to 14 kilometres per hour	40 metres	40 metres
From 3 to 20 kilometres per hour	60 metres	60 metres
For ground application (boom)		
Wind speed range at time of application – from 3 to 20 kilometres per hour		
CROP	Downwind mandatory no-spray zone	
Capsicum, Ground (non-trellis) tomatoes and Cotton	10 metres	

No-spray zones for protection of international trade

For aerial application (Cotton)		
Wind speed range at time of application	Downwind mandatory no-spray zone	
	Fixed-wing	Helicopter
From 3 to 20 kilometres per hour	20 metres	20 metres
For ground application (airblast)		
CROP	Downwind mandatory no-spray zone	
Capsicum, Ground (non-trellis) tomatoes and Cotton	Not required	

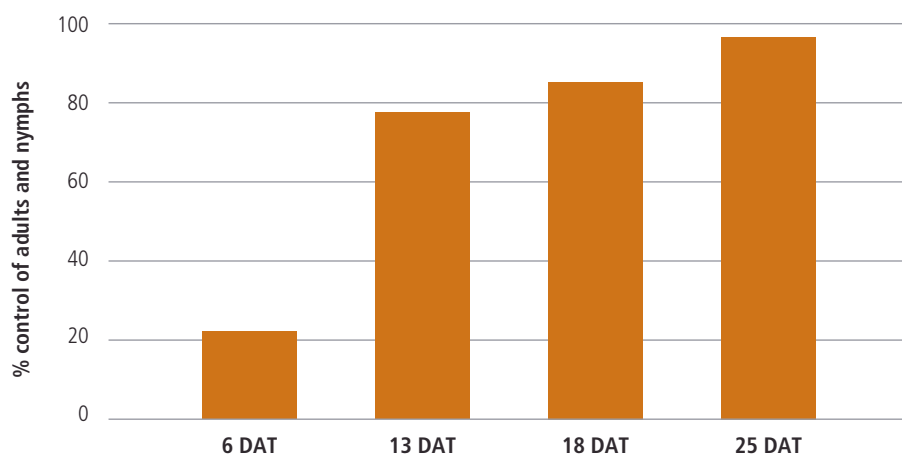
Control of two-spotted mite in cotton by air

Sprayed 22 Jan 2011, Narrabri NSW

Aerial spray at 30 L/ha

Zeal used early prevents population from exploding

■ Zeal 350 mL/ha



Impact of insecticides and miticides on predators, parasitoids and bees in cotton

Insecticides (in increasing rank order of impact on beneficials)	Rate (g ai/ha)	Target pest		Beneficials																Pest resurgence			Toxicity to bees	
		Mites	Persistence	Overall ranking	Predatory beetles				Predatory bugs				Lacewing adults	Spiders	Hymenoptera				Mite	Aphid	Helicoverpa			
					Total	Red and blue beetle	Minute 2-spotted lady beetle	Other lady beetles	Total	Damsel bugs	Big-eyed bugs	Other predatory bugs			Apple dimpling	Total (wasps)	Eretmocerus	Trichogramma				Ants		Thrips
Etoxazole	38.5	✓	short	low	VL	VL	—	L	VL	VL	VL	VL	VL	M	L	—	VL	VL	L	—	—	—	VL	
Dicofol	960	✓	long	low	L	—	—	—	L	—	—	—	L	—	L	—	M	—	—	VL	—	—	—	VL
Diafenthiuron	350	✓	medium	low	M	H	VL	M	L	M	VL	L	H	VL	L	L	H	VL	H	L	—	—	+ve	M
Abamectin	5.4	✓	medium	moderate	L	M	H	VL	M	L	M	M	H	VL	M	M	H	M	H	M	—	—	—	H
Dimethoate (low)	80	✓	short	moderate	M	L	H	H	M	L	—	H	M	M	L	M	—	M	H	M	+ve	+ve	+ve	H
Dimethoate (low + salt)	80	✓	short	moderate	M	L	H	H	M	L	—	H	M	M	L	M	—	M	H	M	+ve	+ve	+ve	H
Propargite	1500	✓	medium	moderate	M	H	H	M	M	H	VL	VL	L	VL	M	M	L	H	H	M	—	+ve	+ve	L
Clothianidin (low)	25		medium	moderate	M	VL	—	H	L	M	VL	VL	H	H	M	M	H	M	VH	VL	—	—	+ve	—
Amitraz	400	✓	medium	moderate	H	M	VH	H	L	—	—	—	H	VL	M	M	H	L	H	M	—	—	—	L
Chlorfenapyr (low)	200	✓	medium	moderate	M	L	VH	VL	M	VL	H	H	VH	L	L	M	—	VH	H	M	—	—	—	H
Dimethoate (high)	200	✓	short	high	M	M	H	H	M	H	—	H	H	VH	M	H	H	H	VH	M	+ve	—	+ve	H
Chlorfenapyr (high)	400	✓	medium	high	H	M	VH	L	H	H	H	H	VH	L	M	M	—	VH	VH	M	—	+ve	—	H
OP's		✓	short-medium	high	H	M	H	H	H	M	H	H	VH	L	M	H	VH	H	VH	H	+ve	—	—	H
Pyrethroids		✓ ⁷	long	very high	VH	—	—	—	VH	—	—	—	VH	VH	VH	VH	VH	VH	VH	VH	+ve	+ve	+ve	H

VL Very low L Low M Moderate H High VH Very high

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Safety to beneficials

Pest attacked by beneficial insect	Beneficial insect	Effect of Zeal on beneficial insect
Aphids, mealybug and TSM	Beetles (stethorus and ladybirds)	None to low toxicity
TSM	Predatory mites	Moderate toxicity (not to adults)
Aphids, scales and mealybug	Lacewings	None to low toxicity
Caterpillars and thrips	Bugs (pirate bugs)	Low toxicity
Pollination	Honey bee	None

For further information on Zeal, please contact:

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