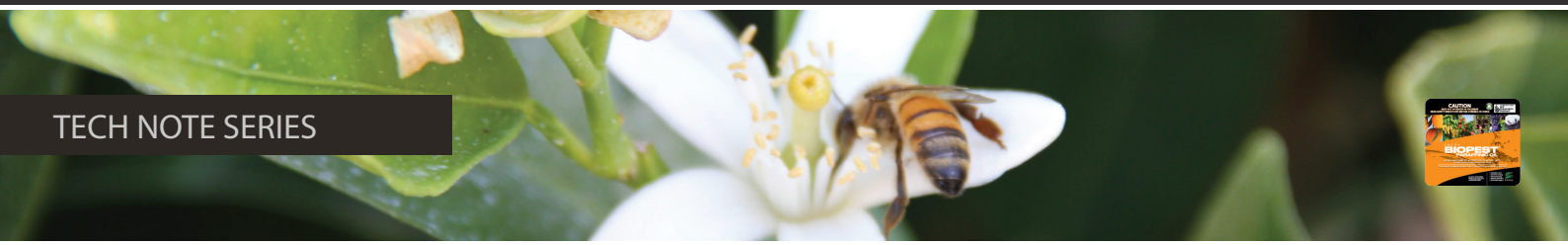
BIOPEST IN ORCHARDS



TECH NOTE SERIES

KEY POINTS

BIOPEST™ has been the product of choice for pest control in many orchards for over a decade, with many unique characteristics including;

- Safe to beneficials – particularly pollinators, perfect IPM fit.
- Organically certified – with no residue issues.
- No risk of resistance development – due to unique physical and behaviour modification actions.
- Pure and optimal weight oil – highest level of refining possible means less risk of crop damage, whilst maintaining high levels of pest control.
- Extensive label for a wide range of tree crops and situations.
- Compatible with a number of products including foliar fertilisers – backed by ongoing field evaluation.

Orchard practices continue to change significantly with updated application technologies, removal of broad spectrum insecticides, the increased use of foliar fertilisers and export markets requiring IPM production practices. SACOA continue to invest heavily in research to keep abreast of these changes and provide *BIOPEST*™ users with the best advice around product usage. Over the last 18 months SACOA have conducted field work investigating the following;

- Proving crop safety of *BIOPEST*™ with foliar fertilisers in citrus.
- Evaluating *BIOPEST*™ for control of mites mid-season in almonds.
- Evaluating *BIOPEST*™ for gall wasp control in citrus.
- Proving crop safety of *BIOPEST*® in standard insecticide programs in avocados and macadamias.

BIOPEST™ USE IN IPM PROGRAMS - TIMING IS KEY

When using *BIOPEST*™ for pest control, the following guidelines should be followed to maximise pest control and minimise the risk of crop damage.

1. Targeting the correct pest stage is crucial

Applications to control scale should be made when the 1st instar or crawler stage are visible. Controlling ants at the same time is critical for optimal results (see Image 1). Set pest thresholds, monitor and spray when necessary (see Table 1 for optimal pest timing). Consider multiple applications if required.

2. Coverage is crucial

Use high water volumes with air assist to ensure thorough coverage through the canopy. Water rates should reflect the type of equipment being used and the tree size, to get optimal coverage (see Image 2). In addition, regular calibration of spray equipment is necessary to ensure correct application. *BIOPEST*® is registered for multiple applications from 0.25% - 0.6% and for single applications from 0.5 - 1%. Water volumes vary - for small to medium trees (up to 3m) of 2000 - 8000L/ha and for large trees (3m+), 8000 -15,000L/ha.

3. Avoid spraying stressed trees

BIOPEST™ should be applied to well watered and non-stressed trees where temperatures are not expected to exceed 35C within 24 hours of applicaiton. Rapid drying of the leaf surface under ideal temperature and humidity conditions will minimise the risk of phyto-toxicity (see Image 3).

Image 1: Ants farming scale on citrus. *(Source: SACOA)*

Image 2: This oscillating boom is applying a water volume of 8500L/ha. *(Source: SACOA)*

Image 3: BIOPEST™ + Copper droplets on leaf surface. *(Source: SACOA)*

4 - Compatibility

BIOPEST™ has been tested for both crop safety and physical compatibility with a large range of products including foliar fertilisers (see Table 1). Field research conducted in 2014 and 2015 has shown *BIOPEST*™ to be safe to apply with both copper and zinc foliar fertilisers. *BIOPEST*™ is safe to apply to trees at rates of up to 1% in mixtures with copper up to 16g/L. However, using copper during flowering can cause petal fall (see Image 5). As fertiliser rates vary between states, refer to the foliar fertiliser's label for correct use rates prior to application. In addition, *BIOPEST*™ has been shown to be safe to apply to trees at up to 1% with 2% calcium nitrate (see Image 4). For further information on the latest compatibility data, contact SACOA.

CHEMICAL	COMPATIBLE
Abamectin	Yes
Acetamiprid	Yes
Azinphos-Methyl	No
Benomyl	Yes
Bifenthrin	Yes
BTS	Yes
Buprofezin	Yes
Carbaryl	No
Chlorpyrifos	Yes
Clothianidin	Yes
Copper Hydroxide	Yes

CHEMICAL	COMPATIBLE
Copper Oxychloride	Yes
Fenamiphos	No
Fenbutatin-Oxide	Yes
Imidacloprid	Yes
Lime-Sulphur	No
Maldison	Yes
Mancozeb	Yes
Metaldehyde	No
Methidathion	No
Methiocarb	No
Methomyl	No

CHEMICAL	COMPATIBLE
Omethoate	Yes
Parathion-Methyl	Yes
Permethrin	Yes
Pirimicarb	Yes
Propargite	No
Pyrethroids	Yes
Pyriproxfen	Yes
Spinetoram	Yes
Spirotetramat	Yes
Sulfoxaflor	Yes
Thiamethoxam	Yes

Table 1: Mixing compatibility – Indicative guide to popular chemicals used in citrus that can be mixed with *BIOPEST*™ (and possibly other mineral oils). Those that should not be mixed are highlighted.

Image 4: *BIOPEST*™ compatibility trial with calcium nitrate.*(Source: SACOA)*

Image 5: *BIOPEST*™ compatibility with copper. Using copper sprays during flowering can cause petal fall. *(Source: SACOA)*

PESTS	MONTH											
	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
Aphids												
(Black) Citrus aphid			D	D	D	M				M	D	D
Hard/Armoured Scales												
Chaff scale			M	D	D	D	D	D	M	M		
Circular black scale			M	M	D	D	D	D	M	M		
Glover's scale			M	M	D	D	D	D	D	M		
Purple scale			M	M	D	D	D	D	D	M		
Red scale			M	M	D	D	D	D	D	M		
Yellow scale			M	M	D	D	D	D	D	M		
Soft Scales												
Black scale			M	D	D	D	D	D	D	M		
Citricola scale			M	M	M	M	D	D	D	M		
Florida wax scale			M	M	D	D	D	M	M			
Green coffee scale			M	M	D	D	D	M	M			
Hard wax scale			M	M	M	M	D	D	D	D	M	
Hemispherical scale			M	M	D	D	D	D	M			
Long soft scale			M	M	D	D	D	D	M			
Nigra scale			M	M		D	D	D	M			
Pink wax scale			M	M	D	D	D	D	D	M		
Cottony citrus scale			M	M	D	D	D	D	M			
Soft brown scale			M	M	D	D	D	D	M	M		
White wax scale			M	M		D	D	D	D	D		
Mealybug												
Citrophilous mealybug			M	M	D	D	D	D	D	M		
Longtailed mealybug			M	M	D		D	D	D	M		
Rastrococcus mealybug			M	M	M	M	D	D	D	D	M	
Thrips												
Greenhouse thrips			M	M	D	D	D	D	M	M		
Whiteflies												
Citrus whitefly		M	M	D	D	D	M	D	D	M		
Leafminer												
Citrus leafminer	M	M	M	M	M,D	M,D	M,D	M,D	M,D	M,D	M	M
Mites												
Brown citrus mite			M	M	D	D	D	D	D	M	M	
Citrus red mite		M	D	D	D	D	D	D	D	D	D	M
Citrus rust mite			M	D	D	D	D	D	D	M	M	
Flat mites			M	D	D	D	D	D	D	M	M	

M - Pest **Monitoring** Period
D - Pest Activity/Damage Period

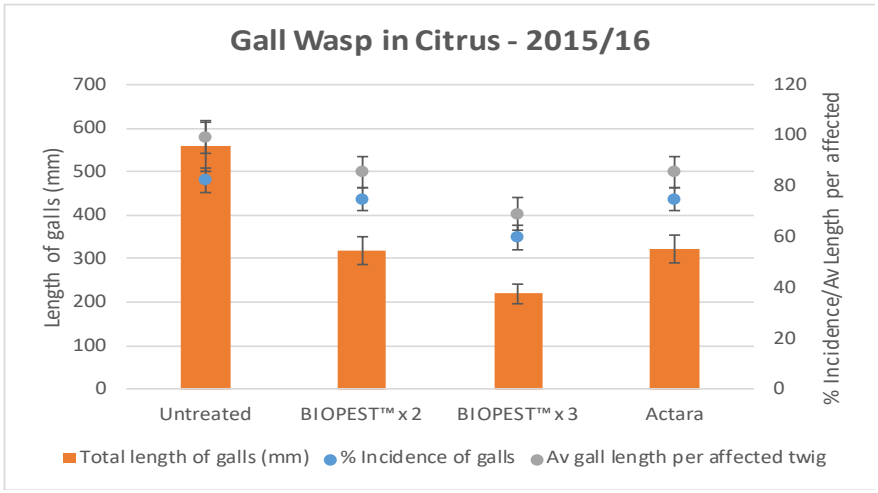
All areas | **Queensland**
All areas, except early varieties in QLD | **Central NSW coast**

Table 2: This chart shows recommended timing of sprays. Note: This is a guide only. Status of each pest varies regionally and monitoring is critical to avoid unnecessary or poorly timed sprays.
(Source: AgWA Bulletin Nc 4313 'Orchard Pest and Disease Management Guide'. Smith et al (1997) 'Citrus Pests and their Natural Enemies')

GALL WASP MANAGEMENT IN 2016

Trials conducted by SACOA have shown the benefits of *BIOPEST*™ in controlling gall wasp in citrus (see Graph 1 & Image 6). In this work, 3 weekly applications of *BIOPEST*™ at 0.6% in 10,000L/Ha of water applied in Spring proved more effective than Actara in reducing gall wasp damage.

Image 6: Gall wasp damage in citrus. flowering can cause petal fall.*(Source: SACOA)*



Graph 1: Gall Wasp in sweet lemons. *(Source: M.Wallace, Mundubbera, Sept 2016)*

REFERENCES

- AgWA Bulletin Nc 4313 'Orchard Pest and Disease Management Guide'.
- Smith et al (1997) 'Citrus Pests and their Natural Enemies'.

FIND OUT MORE

Further information is available at www.sacoa.com.au or by contacting SACOA on 08 9386 7666 or contact your local SACOA representative;

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