MANAGING MITES WITH BIOPEST

TECH NOTE SERIES

KEY POINTS

- Mite populations can flare following insecticide applications or with warm, dusty conditions.
- *BIOPEST®* has been shown to successfully reduce mite populations as a foliar applied prior to populations building.
- Many miticides are registered to be used in mixtures with *BIOPEST®* to improve coverage and efficacy.
- *BIOPEST®* is registered in its own right for control of a range of mite species either at the dormant timing or as a foliar application in a range of crops at rates of 1-3L/100L.
- For best results, always ensure thorough coverage with adequate water volumes under quick drying conditions and avoid spraying stressed crops or during full bloom.

Figure 1: Evidence of mite damage in almonds, Robinvale Feb 2015
(Source: Phytogen Consulting)

Mites are increasingly becoming a significant pest in many horticultural crops – particularly as a result of warm spring conditions and insecticide programs which no longer include broad spectrum organophosphates, resulting in the flaring of mite populations.

The following factors have driven up mite populations and led to a renewed interest in the use of horticultural spray oils;

- Removal of broad spectrum insecticides such as organophosphates.
- Increased prevalence of difficult to control pests such as carphophilus beetle which requires the use of mite flaring insecticides.
- Resistance developing to conventional insecticides.
- Technology advances making horticultural spray oils more effective and safer on crops.

SACOA has been conducting research into integrated pest management in many horticultural crops for over a decade. Most recently, work has focussed on controlling mites in a range of crops from bananas to avocadoes and almonds (see Figure 1). This research has focused on the role of *BIOPEST®* as a mite control product both as a prophylactic preventative to reduce egg laying and populations building, as well as a post infestation product to manage existing populations both alone and in mixtures with common miticides.

Narrow range horticultural spray oils or paraffinic spray oils (PSO's) such as *BIOPEST®*, have long had a place for the control of pests such as scale and mites, not only as a result of their direct insecticidal effects, but also as carriers and deposition aids for other insecticides. However with the advent of broad spectrum organophosphate and synthetic pyrethroid insecticides over the last 30 years, their popularity has declined.

More recently, the removal of many broad spectrum insecticides due to health concerns and the rapid development of resistance in target pests, has led to their revival as a safe and effective method of controlling mites and scale in horticultural crops.

Citrus Red Mite control with naphthenic and parrafinic spray oils in the laboratory

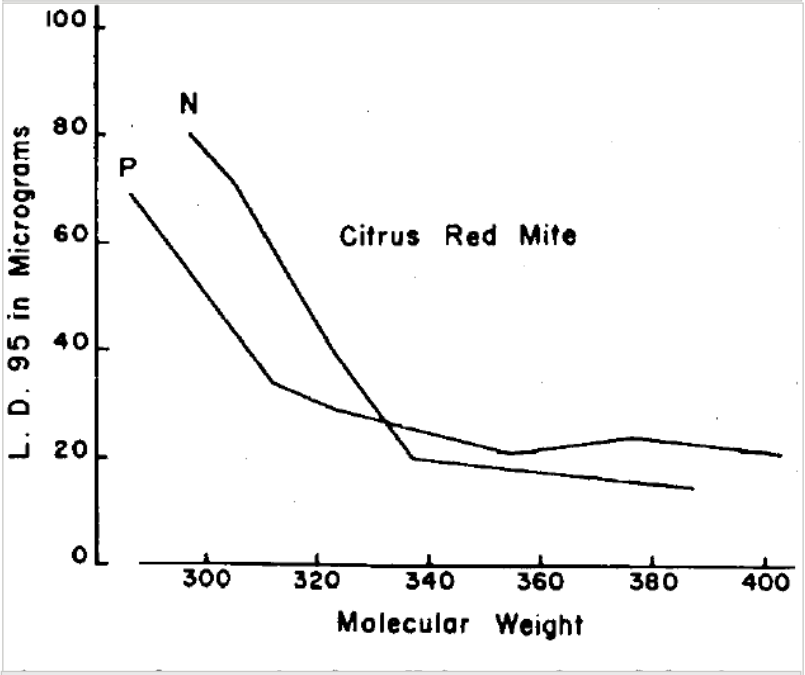

Chart 1: Increase in the efficiency of naphthenic and parrafinic spray oils with increasing molecular weight for control of Citrus Red Mite in laboratory experiments.
(Source: Ebeling 1959, 'Spray Oils')

Citrus Red Mite control with naphthenic and parrafinic spray oils in orchards

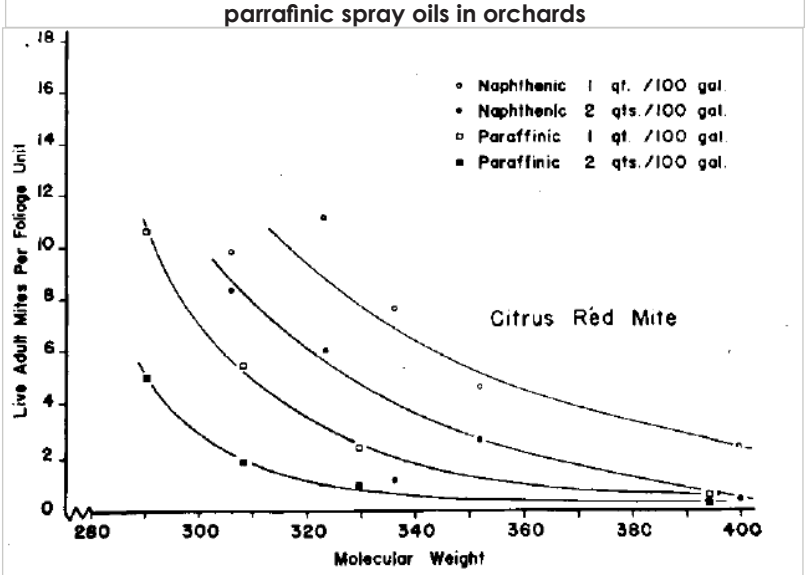

Chart 2: Increase in the efficiency of naphthenic and parrafinic spray oils with increasing molecular weight for control of Citrus Red Mite in orchard experiments.
(Source: Ebeling 1959, 'Spray Oils')

Advancements in petroleum refining technology and quick breaking emulsions have enabled mineral oil based products, such as *BIOPEST®*, to be produced with optimal density, higher loadings of paraffinic components and reduced aromatic compounds. These offer a far greater degree of crop safety and pesticide activity than those available 20 years ago. Besides the paraffinicity of oils, other characteristics such as carbon number, distillation range, unsulphonated residue and type of emulsifier package are important. Oils with higher paraffinic loading and with optimal molecular weight have been shown to provide increased activity on mites (see Charts 1 and 2).

APPLICATION TIMING

BIOPEST® works best when applied preventatively, to an early developing population, rather than used as a curative on an existing well developed population. The unique formulation characteristics of *BIOPEST®* provide control of existing low numbers of adults through physically smothering and forming a protective layer on leaf surfaces, thus preventing egg laying. This mode of action has been validated in numerous independent studies (see Chart 3).

Control of mites with prophylactic and curative applications of PSO

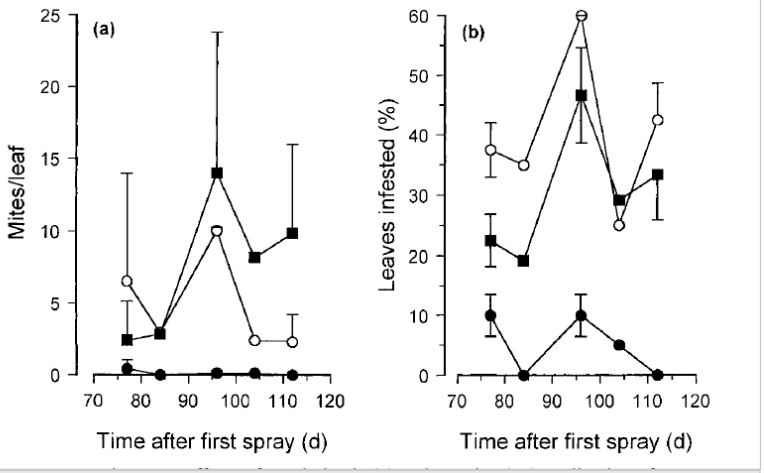

Chart 3: Effects of prophylactic (●) and curative (**o**) application of PSO on the number of T. urticae/leaf (a) and the percentage of leaves infested with mites (b) compared with the control (■) in roses. Given are means ± sd and means ± 0.25sd (b), n = 20.
(Source: Nicetic et al 2001, ' Integrated pest management of Two-spotted mite.')

Mite control with PSO program vs synthetic miticide program

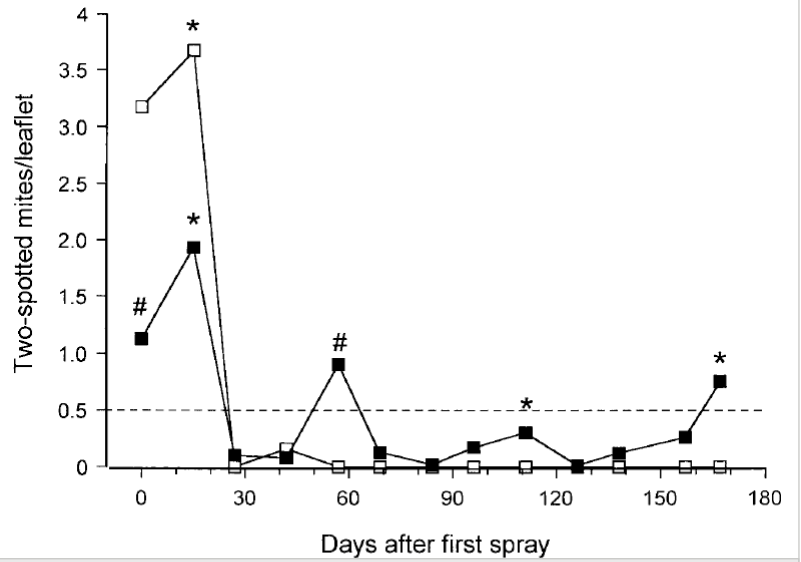

Chart 4: Comparison between PSO-based program (□) and synthetic miticide program (■). The PSO program consisted of 0.5% PSO sprays from Day 0 at approximately 14 day intervals with a single knockdown spray of abamectin on Day 13. The conventional miticide program consisted of the application of dicofol (#) and abamectin (*). (---) economic threshold of 0.5 mite per leaflet.
(Source: Nicetic et al (2001) 'Integrated pest management of Two-spotted mite')

COMPATISON WITH CONVENTIONAL MITICIDE PROGRAMS

When used as a calendar spray, applications of PSO's such as *BIOPEST®*, have been shown to provide equivalent levels of control to standard miticides without regular flaring events. However if existing populations are high, the use of a one-off conventional miticide as a knockdown, such as abamectin, to reduce populations below threshold, followed by regular *BIOPEST®* applications will provide the best levels of control (see Chart 4).

SACOA's RECENT MITE RESEARCH

Over the past two years SACOA has conducted independent field trials assessing the effectiveness of BIOPEST® on mites in bananas and almonds. This work will continue over the summer of 2016/17 in avocadoes and almonds.

Over the summer season of 2013/14, *BIOPEST®* was found to provide significant levels of mite control in bananas, (see Chart 5) which resulted in a significant yield increase.

During 2014, *BIOPEST®* was evaluated both as a dormancy spray and a foliar spray in combination with a miticide in almonds. In this work a dormant application of *BIOPEST®* was found to provide significantly better control of mites than conventional winter oils applied at the dormant timing (see Chart 6). Applying *BIOPEST®* 0.5% in a mixture with Sorcerer® in mid-December was found to be safe over foliage – however existing mite numbers were too low to provide useful data. One observation of this work was the shift in mite species type with Bryobia mite occurring early in summer and two-spotted mite occurring later.

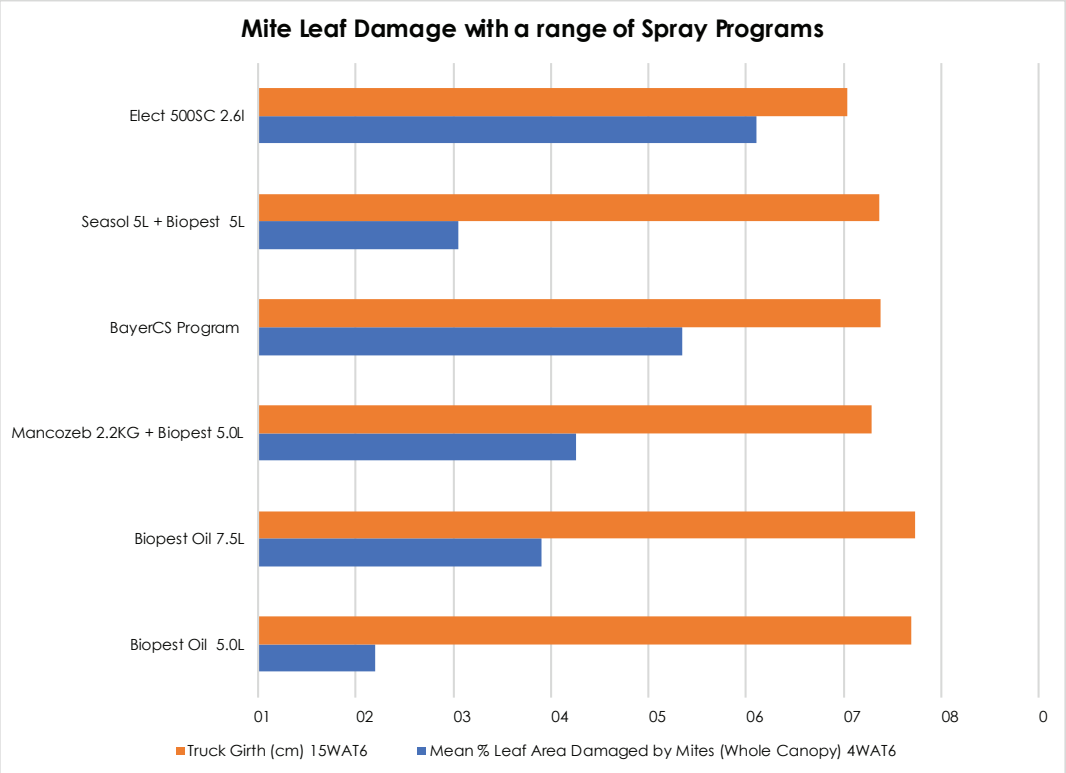

Chart 5: Mite leaf damage and trunk girth in bananas with a range of spray programs. *(Source: Farnsworth B. – Evaluation of replicated small plot spray programs –Innisfail April 2014)*

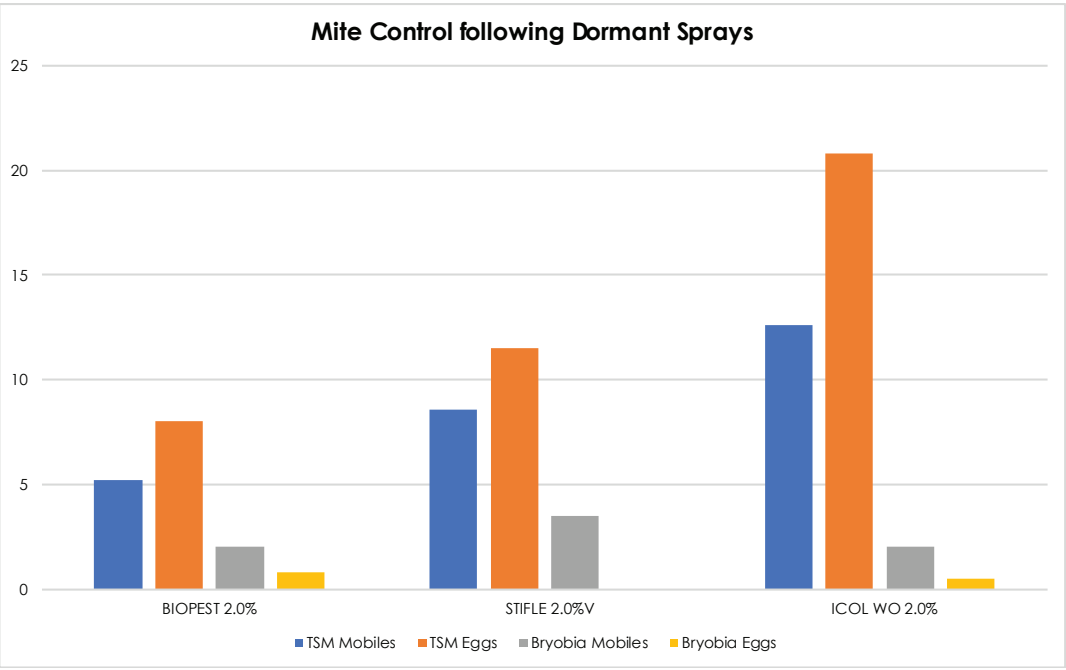

Chart 6: Mite presence on almond leaves following dormant spray applications. Assess 3 22/1/15. All treatments applied 1/7/14 in 2500L/Ha water.
(Source: Kimpton T, (2014) SACOA BIOPEST® Trial in Almonds 2014-15, Robinvale, Victoria – February 2014)

Figure 2: Almond Orchard, Robinvale, where last summers reseach was conducted.
(Source: Phytogen Consulting – Feb 2015)

FURTHER INFORMATION

- http://agriculture.vic.gov.au/agriculture/pests-diseases-and-weeds/pest-insects-and-mites/two-spotted-mite/integrated-control-of-twospotted-mite-in-orchards
- http://agriculture.vic.gov.au/agriculture/pests-diseases-and-weeds/pest-insects-and-mites/two-spotted-mite
- https://www.daf.qld.gov.au/plants/fruit-and-vegetables/a-z-list-of-horticultural-insect-pests/two-spotted-mite
- https://www.agric.wa.gov.au/pome-fruit/miticides-wa-deciduous-fruit-trees

REFERENCES

- Beattie, A & Hardy, S (2005) Ag Facts H2.AE.5: Using petroleum based spray oils in citrus. NSW Department of Primary Industries.
- Ebeling 1959 – Subtropical Fruit Pests
- Farnsworth B. 2014 – Evaluation of replicated small plot programs – Innisfail April 2014
- Kimpton T. 2015 – Phytogen Consulting – SACOA Biopest trial in Almonds – Robinvale, Victoria
- Nicetic O. et al 2001 – Integrated Pest management of Two spotted mite

FIND OUT MORE

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