FACTSHEET

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Mealybugs: A Threat To Citrus IPM?

There are two important pests in inland Australia called citrophilous mealybug (CM) – above left, and longtailed mealybug (LTM) – above right.

Why are these mealybugs important pests of citrus in inland Australia?

1. Because there has been an increase over the past decade in mealybug abundance, in particular of citrophilous mealybug, in the Riverland, Hillston and Colignan districts.

2. This has fuelled an increase in spraying with synthetic pesticides. This is costly and disruptive to the biological control of other citrus pests.

3. Despite the increase in orchard spraying to control mealybugs, unacceptable levels of sooty mould associated with mealybug infestation still occur, thereby reducing the packout of quality fresh fruit.

4. Finally, detections of live mealybugs on exported fruit results in costly delays and fumigation treatment at the overseas port of entry.

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INTEGRATED PEST MANAGEMENT (IPM) OF CITROPHILOUS MEALYBUG

To improve the IPM of citrophilous mealybug, a project funded by the Horticultural Research and Development Corporation, was initiated in late 1994 by Greg Baker of SARDI and Mike Keller of the University of Adelaide.

Specifically, the project set about to:

- study the life-history and ecology of citrophilous mealybug,
- establish an important citrophilous mealybug parasitic wasp called *Coccophagus gurneyi*, and
- Identify IPM-compatible spray treatments that control mealybugs with minimal damage to beneficial insects.

WHAT HAS BEEN ACHIEVED?

1. Parasitic wasp released.

- The wasp, *Coccophagus gurneyi* has now been released at 19 sites throughout the Riverland, 3 in Sunraysia and 1 in Hillston,
- A new strain of the previously-introduced citrophilous mealybug parasite, *Tetracnemoidea brevicornis*, has been introduced to the Riverland to add to its genetic base. These measures should enhance the biological control of citrophilous mealybug in these districts.

2. Life-history and ecology of citrophilous mealybug

Important aspects of citrophilous mealybug biology have been revealed.

The regional distribution of the mealybug species associated with inland citrus in NSW, VIC and SA has been defined, and this has aided negotiations to facilitate access of Australian citrus to markets in the USA and Korea.

Studies also revealed that in addition to the introduced parasites, two native parasites now commonly parasitize citrophilous mealybug.

Citrophilous and longtailed mealybugs usually have 3 generations per year, of which 2 occur on navel fruit during November-January and February-June. Although a partial synchronization of the populations occurs on navel fruit when colonized by the young crawlers around November, there is considerable overlap between the generations, with all immature and adult stages present most of the time.

Citrophilous and longtailed mealybugs mainly infest leaves curled by citrus leafminer, under the calyx of fruit and less commonly in navel buttons. Most of the time the majority of mealybugs in the citrus canopy are found on curled leaves. Citrophilous mealybugs are also found on nightshade weeds in citrus orchards, but the presence of these weeds does not appear to contribute to the citrus infestations.

There is no consistent relationship between the abundance of the Nov-Jan and Feb-June generations. A relatively high density November population may, without any spraying, decline away to insignificance in the autumn, or vica-versa.

However, their honeydew which causes the sooty mould development in early winter, accumulates on fruit from November onwards, and hence mealybugs need to be managed for the entire period of fruit development.

3. Identify IPM-compatible spray treatments that control mealybugs

The third focus of the project which is to better integrate insecticidal and biological controls, has proved a challenge.

Insecticidal control of citrus mealybugs is inherently difficult, because of three main reasons:

- Mealybugs are less sensitive to petroleum spray oils than are other citrus pests,
- Mealybugs feed in sheltered sites, and
- There is a supposed narrow timing-window for controlling mealybugs around calyx closure. This study has demonstrated that for at least a fortnight either side of calyx closure, the effectiveness of a mealybug spray is unaffected by spray timing. There is in fact a broad timing-window.

TRIAL FINDINGS

The impact of a large range of organophosphate (OP), carbamate, oil and oil-OP shandy mixes on CM and two important parasites (*Coccophagus gurneyi* and the red scale parasite *Aphytis melinus*) were evaluated and the findings of these evaluations were:

1. Chlorpyrifos

- Is as good as, or superior to, other insecticidal sprays registered for the control of mealybugs in citrus. However residues of the registered rate of chlorpyrifos remain toxic to the adult parasites for 10-14 days.
- Although further work is required, there is evidence that reduced rates of chlorpyrifos (1/2-1/4 of the registered rate), either alone or in an oil shandy, can control moderate infestations of mealybugs.
- When applied at these reduced rates the toxicity of chlorpyrifos to the parasites diminished more rapidly than at the registered rate. Hence these reduced rates of chlorpyrifos are likely to have a lesser on beneficials compared to the registered rate.

2. Oils

- Oils, applied alone with standard oscillating-boom spray equipment, may produce a modest reduction in the abundance of mealybug infestations. The level of mealybug kill is less than that from OP's, but is achieved with less deleterious impact on beneficials.

3. Spray Coverage Essential

- What was evident throughout all the spray trials was the critical importance of good spray coverage to the achievement of effective mealybug control, particularly if 'softer' IPM-compatible treatments such as oil or reduced rate chlorpyrifos sprays are used.
- High volume spraying to fully wet the canopy is essential to access the mealybugs under the fruit calyxes and leaf curls. Unfortunately many growers' spray plants, including many oscillating boom sprayers, are inadequately set up to achieve good coverage.
- For effective control of mealybugs an oscillating boom spray must be operated at a pressure of at least 500 psi (3,450 kPa) at the jets and at least 600-700 psi (4,100-4,800 kPa) at the pump, with an oscillation rate of 100-110/min (if the oscillation rate is less than this then reduce the ground speed to less than 2.5 kph) and with the jets set to give pencilled spray cones that merge at about 1.5-1.75 metres.

RECOMMENDATIONS

- Based on these findings are a number of specific recommendations:
- spray for mealybug control only if spray thresholds are exceeded at the time
- if mealybug control is warranted in the spring, spray within 2 weeks either side of calyx closure
- apply a high volume spray of at least 8-10,000 L/ha to fully wet the canopy, and
- Specific action to control nightshade for CM management is not warranted.

With good spray coverage, less IPM-disruptive sprays can effectively control mealybugs when required, and together with the enhanced biological control, reduce the negative impact of mealybug control on citrus IPM.