PROBLEM PESTS: Mealybugs, Six-spotted mite and Apple looper
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Mealybugs

Damage
Infestations of mealybugs result in the production of sooty mould, fungi that feed on the sugary exudates of these sap sucking insects. Mealybugs can cause premature leaf-fall which affects fruit quality and yield. The presence of sooty mould and mealybugs themselves can sometimes result in rejection of grapes for wine. Sooty mould may interfere with the wine making process. Late maturing varieties are more at risk. Mealybugs are a vector of Grapevine Leafroll-associated Virus Type 3 (GLRaV-3).

Identification
Mealybugs are covered in a white powder and have spines protruding from around the edge of their body and the four spines near their tail are very long, with the middle two the longest. Longtailed mealybug is the main species in WA vineyards. Another species that can infest grapevines and is present in deciduous fruit tree orchards in WA is the obscure or tuber mealybug. These mealybug species are distinguished by the colour of the body contents – pale yellow for longtailed mealybug and orange for obscure/tuber mealybug. Longtailed mealybug produces live young, crawlers, sometimes seen clinging to the underside of the adult female, while obscure/tuber mealybug lays eggs into a sack. Both species have four stages of nymphs that become male adults which are frail, short lived, non-feeding and winged. Adult females have three nymph stages.

Monitoring
Mealybugs overwinter mainly as adults on the trunk, crown and cordon. They produce eggs or live young in late winter/early spring. Infestation of leaves occurs as soon as vine leaves are present. There are 2 to 3 generations per season feeding on leaves and within bunches. DAFWA has produced guidelines on monitoring for mealybugs.

Action threshold
Experience with mealybugs in each vineyard will determine what actions are required, both as regards the need for intensive monitoring and whether control will be required. Mealybug numbers can increase quickly, especially over the hotter weather of summer. Low numbers early in the season can be important later. From monitoring during winter, if 5 to 10% of vines are infested be prepared to treat – see below for options. From monitoring of leaves in spring, if more than 25 to 50% are infested, be prepared to treat – see below for options.
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**Mealybugs (cont’d.)**

Management

Mealybugs are prey for a range of natural enemies, two of which can be purchased from laboratories in Queensland – the mealybug destroyer (*Cryptolaemus montrouzieri*) and green lacewing (*Mallada signata*). These and other predators such as a fly larva and brown lacewing occur naturally in WA vineyards, but are usually in low numbers until the end of the season. There is also a wasp parasite but its numbers are usually quite low. Ants which “farm” mealybugs will deter natural control agents.

Dense, protected canopies favour mealybug survival and potential to increase. Cane pruning may reduce numbers compared to spur pruning. Bunches that touch cordons are more likely to be infested compared to those that are free hanging. Crawlers (first stage nymphs) are the most susceptible stage for attack by natural enemies and for control using insecticides.

The main insecticides, method and time of application and comments are:

<table>
<thead>
<tr>
<th>Insecticide</th>
<th>Method of application</th>
<th>Timing</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Numerous products containing chlorpyrifos</td>
<td>Canopy drench</td>
<td>Dormant vines as per scale control</td>
<td>Only apply after heavy infestations the previous season and confirmed by monitoring dormant vines. Spot treat if extent of infestation is known.</td>
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<tr>
<td>Samurai</td>
<td>Drip line soil drench</td>
<td>Near bud burst</td>
<td>Only apply if mealybugs were a problem the previous season or winter monitoring indicted they are likely to be a problem. Systemic activity.</td>
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<tr>
<td>Applaud, Clap</td>
<td>Foliar spray</td>
<td>Up to 80% capfall</td>
<td>Only apply after leaf monitoring indicates crawlers at potentially pest numbers. Requires good coverage on crawlers. Acts as an insect growth inhibitor.</td>
</tr>
<tr>
<td>Food grade detergent</td>
<td>High volume foliar application</td>
<td>Near harvest.</td>
<td>Physically removes mealybugs and associated sooty mould.</td>
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*Damage*
Feeding by six-spotted mites results in premature loss of leaf function which affects the ability of the vine to ripen fruit.

*Identification*
Six-spotted mite is similar in size to two-spotted mite, but has six or more spots over the body.
They are more yellow than two-spotted mite.
Eggs of six-spotted mite have a spine extending above the egg.
First stage nymphs have six legs and all later stages have eight legs.
Six-spotted mite do not produce webbing when present in high numbers as two-spotted mite does.

*Monitoring*
The first season of infestation in a vineyard will probably not be detected early.
Experience of an infestation will determine the need for monitoring.
Six-spotted mites feed adjacent to the main veins resulting in discoloured “shadowing” next to the veins – pale yellow in whit grape varieties and pink to red in red grape varieties.
Mites are most likely to be seen from mid January.
Six-spotted mites remain active on leaves up to leaf fall.
The overwintering sites for six-spotted mite are not known.

*Action threshold*
During summer, numbers of mites can increase quickly.
Apply miticide when leaf infestation reaches about 20%.

*Management*
In some vineyards, six-spotted mite has been eliminated through the presence of naturally occurring natural control agents. The main ones are a species of predatory mite, the predatory beetle *Stethorus* and predatory thrips, six-spotted thrips.
For heavy infestations, the need for the availability of a miticide for use during the growing season near vintage was identified. An application to APVMA for use of miticide containing propargite is to be submitted to be available for the 2010/11 season.
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*Damage*

Larvae of apple looper feed on immature berries causing yield loss.
Later flowering varieties such as Semillon and Sauvignon Blanc are more susceptible.
Damage to berries may introduce bunch rots.

*Identification*

Apple looper is a native insect. Adult moths are about 8mm long and have a wingspan of around 15mm. They are grey with brown bands across the wings and are roughly triangular when at rest.
Eggs of apple looper are off-white and spheroid and are laid individually as single eggs. They are probably laid on or near flowers and fruitlets.
Larvae are typical loopers with six legs on the thorax and legs on the end of the body. They characteristically loop as they move. Mature larvae vary from green to mottled brown and when mature are the thickness of a match and approximately 20mm long.
After spinning a light silken cocoon, mature larvae moult to a brown pupa within the cocoon on the canopy.

*Monitoring*

Moths probably infest vineyards during October, after flowering.
Larvae have not been seen to feed on leaves, so it is necessary to check for larvae in flower clusters by tapping over a container or tray.
Check berries for signs of feeding by looper larvae – side of the berry, base of the berry at pedicel attachment.

*Action threshold*

Low numbers of larvae may be important because they occur when berries are small and the type of feeding indicates they move around within bunches.
Check to clarify the extent of an infestation and consider treatment if more than 5% bunches are infested across a variety.

*Management*

Because damage to berries occurs as soon as larvae commence feeding, the natural enemies that have been recorded cannot be relied upon to protect vines.
Apply foliar insecticide. A range of insecticides is available for use through an APVMA Emergency Use Permit. The permit number is 11306 and can be obtained from the APVMA website [http://www.apvma.gov.au/](http://www.apvma.gov.au/).