BLACK SCALE

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Hort Innovation
Strategic levy investment

AUSTRALIAN OLIVE ASSOCIATION

WESTERN SYDNEY UNIVERSITY

This is No 4 of a series of 9 tutorials on IPDM in olives

The others are:

1. Principles and practices of Integrated Pest and Disease Management
2. Monitoring for pests, diseases and beneficial species; including symptoms and possible causes, identification/diagnostic services, biosecurity
3. Biosecurity, including pests and diseases not present in Australia
5. Olive lace bug: biology, damage and management
6. Apple Weevil: biology, damage and management
7. Anthracnose: life cycle, conditions conducive, symptomatology and damage, and management
8. Peacock spot: life cycle, conditions conducive, symptomatology and damage, and management
9. Cercospora leaf mould: life cycle, conditions conducive, symptomatology and damage, and management

It is an output from the Hort Innovation project OL17001 An Integrated Pest and Disease Management Extension program for the Olive Industry

BLACK SCALE *Saissetia oleae* (Coccidae)

- A cosmopolitan pest with a range of hosts- major ones olive and citrus.

- One of the 2 most important and the most widespread olive insect pest in Australia.

- 2-3 generations/year. Overlapping generations occur, particularly in Queensland, Nth NSW; 2 gen. in southern states.

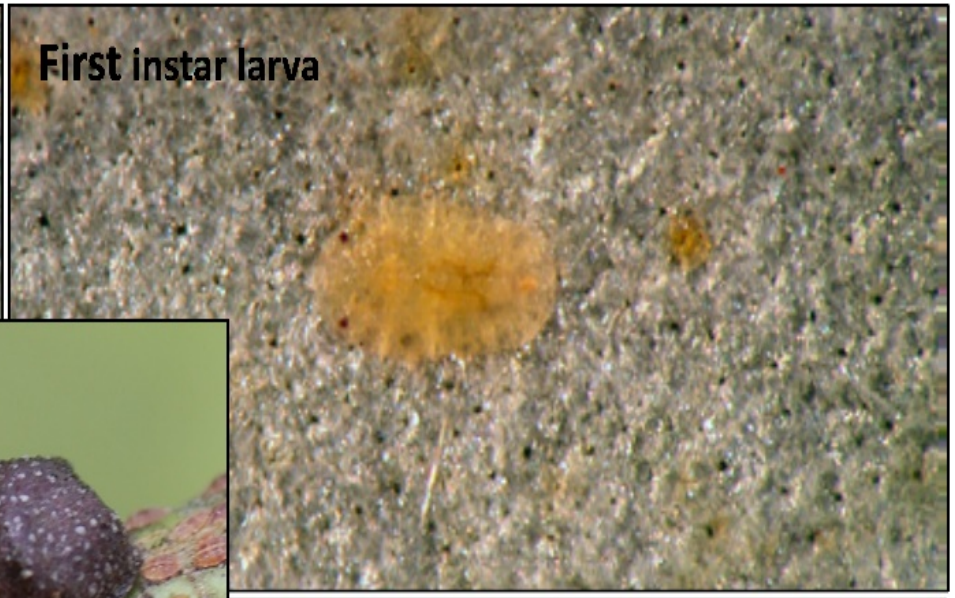
- It behaves differently on olives than on citrus. Until recently, there were only limited details of black scale biology on olives in Australia.

DAMAGE

- All motile stages suck sap from leaves (mid-vein) and twigs
- They produce honeydew, with associated ants and sooty mould
- Heavy infestations cause reduced tree vigour, twig dieback, reduced flowering, even for following season

LIFE STAGES OF BLACK SCALE

(S Broughton & GAC Beattie) There are 3 immature instars.



A Mature black scale female with eggs

B Black scale adults and crawlers (*Scutellista caerulea* on right)

C 3rd instar and female black scales (note H-mark on back)

THIS IS A SCANNING ELECTRON MICROSCOPE IMAGE OF THE 1ST INSTAR (newly emerged larva) BLACK SCALE

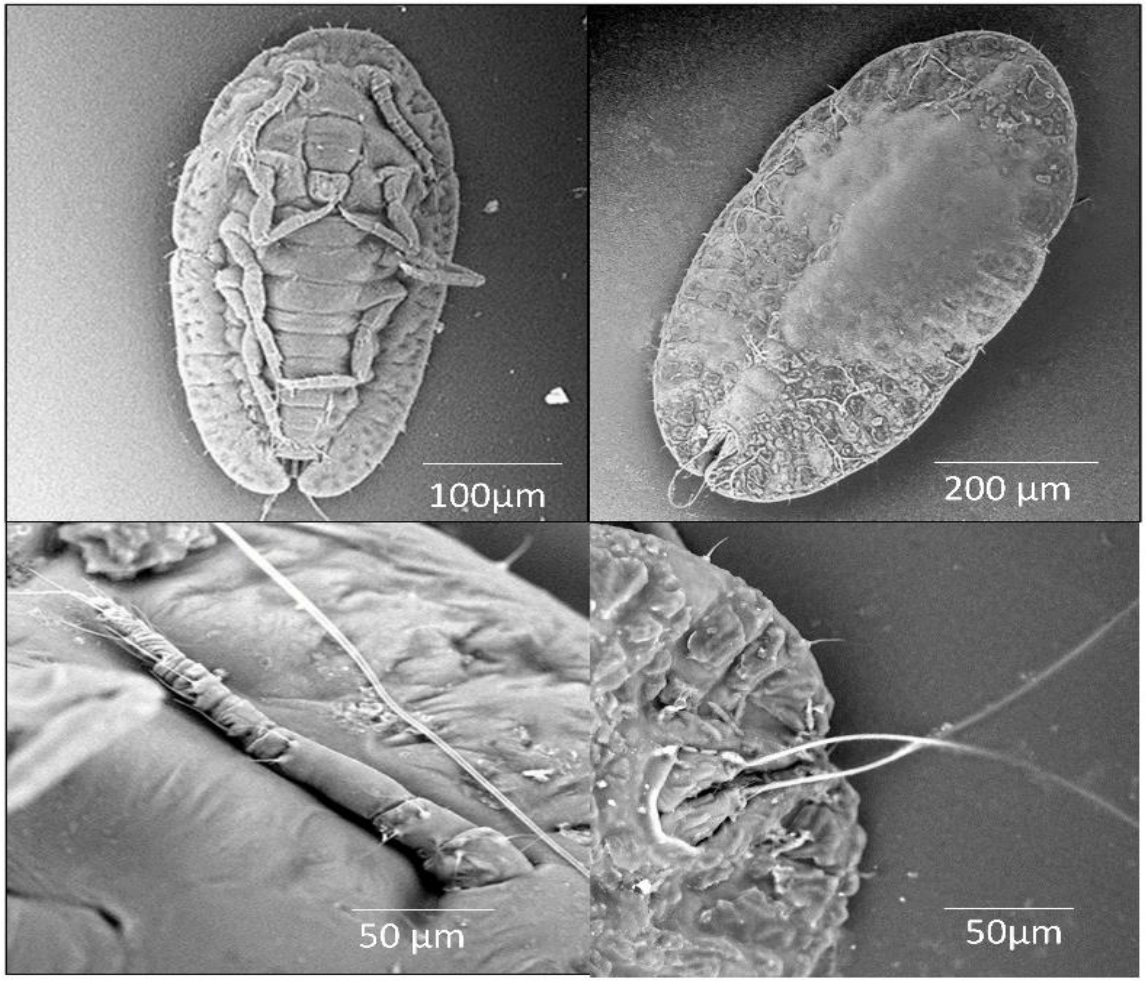
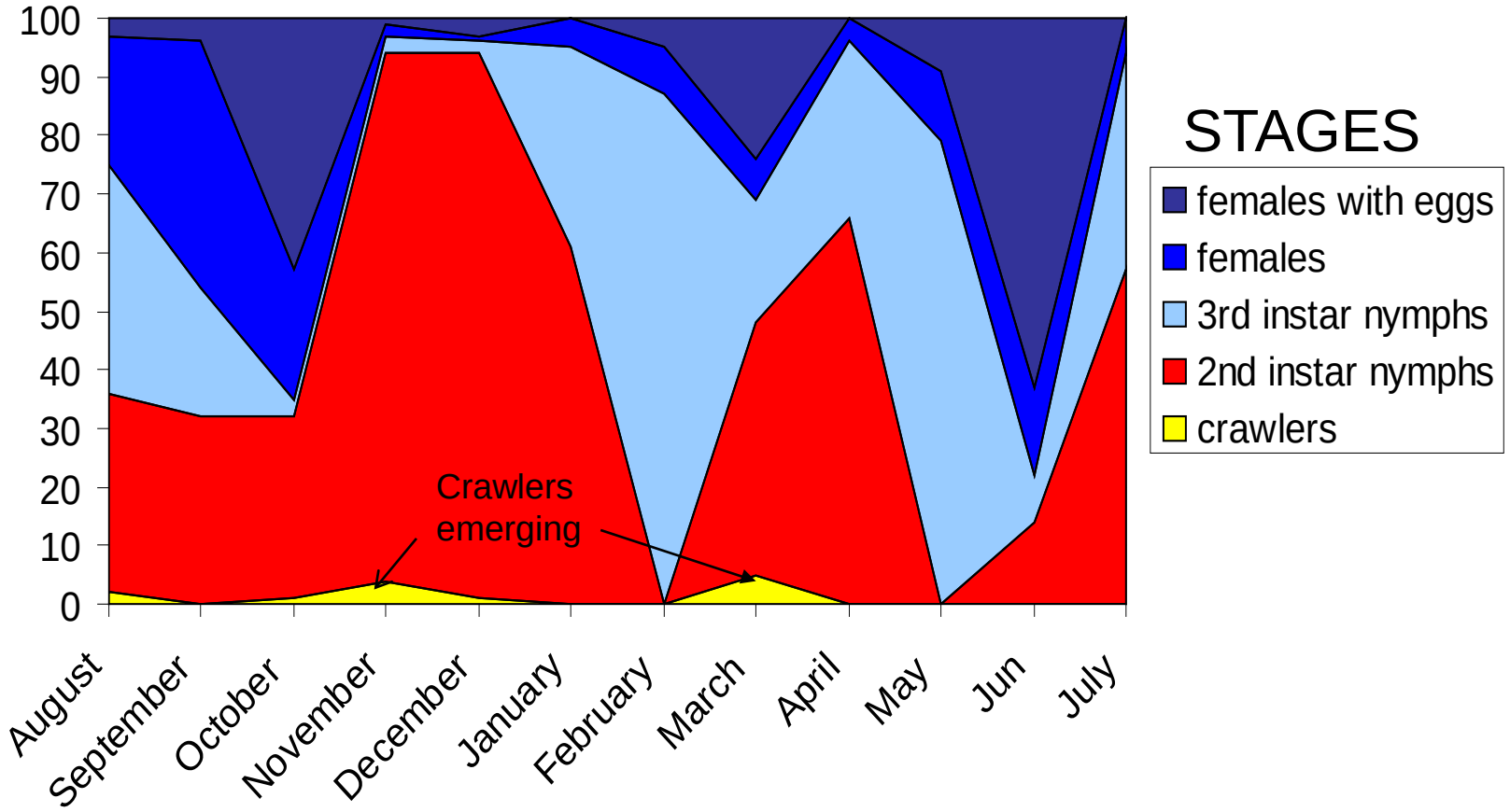


Image Phuong Sa

Crawlers are most susceptible stage to hot, dry weather and sprays

THIS IS AN EXAMPLE OF A BLACK SCALE POPULATION STAGE COMPOSITION IN QUEENSLAND (showing % composition of each stage)



Note: This graph shows 2 major crawler emergences; a longer period in late spring-early summer, and another in late summer-early autumn. There is also evidence of some crawler emergence in August.

One approach to monitor crawler emergence place scale-infested twigs in a plastic/glass bottle with fine air holes in the lid. Placed in area to mimic the temperature of the orchard – not in direct sunlight. When crawlers emerge, the inside of the bottle turns brown. Check adult scales on trees by removing them to confirm if crawlers are present

(Information and image Stewart Learmonth)

NATURAL ENEMIES OF BLACK SCALE

- >24 species of beneficial insects, including 22 parasitoid spp. have been released in Australia.

- 15 parasitoid species have been recorded in association with black scale in Australia. The most common are *Scutellista caerulea* and *Metaphycus* spp.

- Attempts have been made to mass rear and release 2 *Metaphycus* spp. in olive groves in WA, SA and Vic but with limited success

***M. helvolus* (L)**

***M. bartletti* (R)**

Scutellista caerulea (egg predator and scale parasite) is the most common in NSW, Qld, and Vic, and is also present in WA

S. caerulea

PhD student Dr Phuong Sa investigated black scale and its natural enemies (in particular *Scutellista*) in olives and citrus

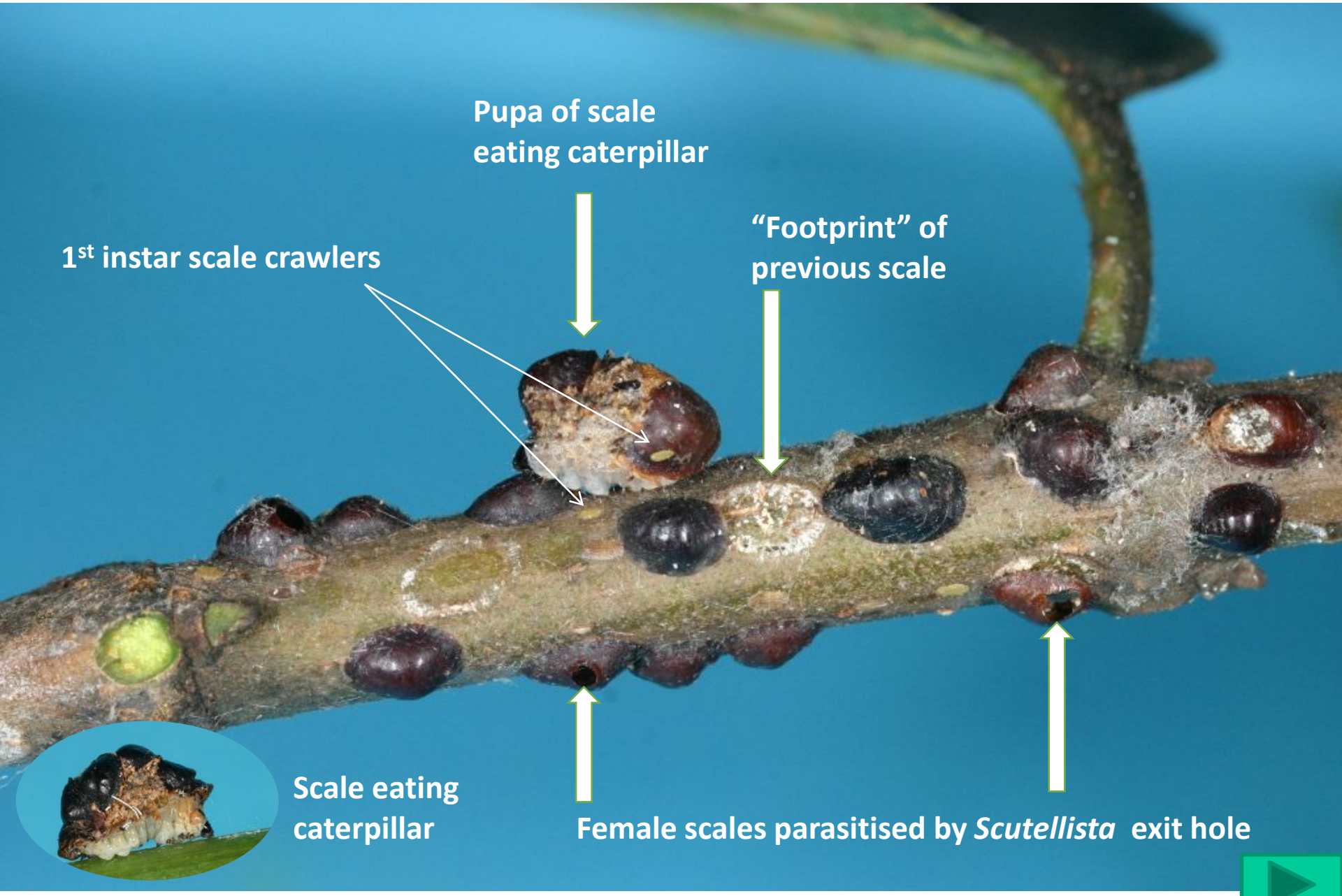
She found that for olive sites in NSW, average parasitism of black scale adults by *S. caerulea* was **63% (with a range 48–75%),** and that the average number of eggs and crawlers recorded from scales parasitised by a single *S. caerulea* was **89% (range 81–98%) fewer** than for unparasitised scales.

Larva (grub) of *S. caerulea* among black scale eggs

Other natural enemies include ladybirds (left) and scale-eating caterpillar (right), but these are not generally as effective as parasitoids.

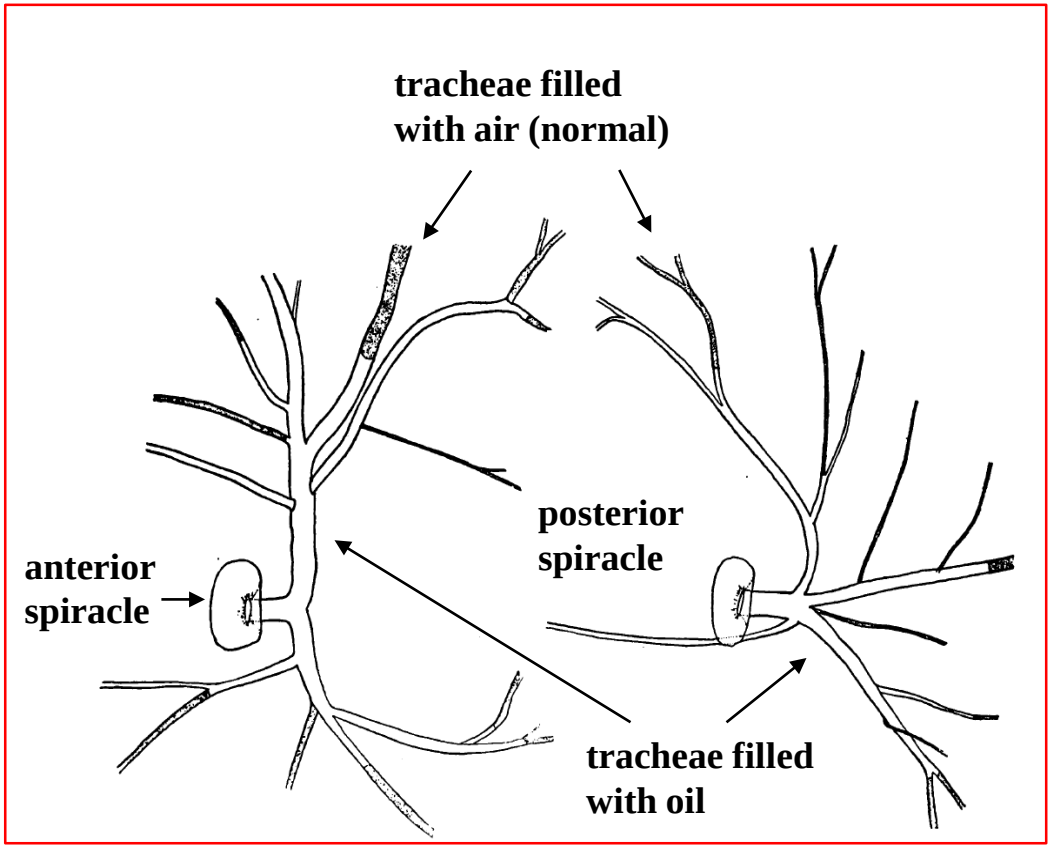
Ants are attracted to honeydew produced by the scales, and are commonly association with black scale infestations. They are a key factor negatively impacting biological control. Hence, managing ants is an important part of black scale management (and vice-versa).

BLACK SCALE POPULATION SHOWING NATURAL ENEMIES



OIL SPRAYS

- Oil sprays are commonly used for managing small, sessile insect and mite pests. They are minimally disruptive to beneficial species, so are effective in IPDM programs.
- They cause death of susceptible pests mostly related to suffocation with movement of oil through spiracles into the tracheae of the respiratory system as spray deposits dry (see diagram below).
- However, they also have important behavioural effects such as inhibition of feeding, settling and oviposition that are related to oil deposits that may persist for several days or more on plant surfaces



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REVIEW QUESTIONS

- Q1: Why is monitoring for black scale crawler emergence critical?
- Q2: What role do natural enemies play in black scale management in many olive groves? Which natural enemies are the most important?
- Q3: Why are ants commonly associated with black scale infestations?

ANSWERS

- Q1: Crawlers and newly-settled scales are the most vulnerable stage for managing with approved chemicals, so timing of application to target them is important for effective management.

- Q2: Natural enemies can be very significant in managing black scale populations. Many growers do not apply control measures because natural enemies keep populations at acceptable levels. The most important natural enemies are parasitic wasps and ladybirds, although other insects can also play a role.

- Q3: Ants are attracted by the honeydew produced by black scale. They defend black scale against attack by natural enemies.

QUESTIONS TO CONSIDER AFTER READING THIS TUTORIAL

- Is black scale a problem in your grove, at least from time to time? Have you had difficulty managing populations?
- If so, do you monitor to determine crawler emergence?
- Do you check black scale populations for levels of parasitism?

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OLIVE FUND

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For more information on the fund and strategic levy investment visit horticulture.com.au