

## Citrus mussel scale (340)

### Common Name

Citrus mussel scale; purple scale

### Scientific Name

*Lepidosaphes beckii*

### Distribution

Asia, Africa, North, South and Central America, the Caribbean, Europe, Oceania. It is recorded from Australia, Fiji, New Caledonia, Niue, Papua New Guinea, Samoa, Solomon Islands, Tonga, Vanuatu, and Wallis & Futuna.

### Hosts

*Citrus* species

### Symptoms & Life Cycle

The cover or armour over the scale is purplish-brown and shaped like a mussel - hence the name (Photo 1); the body of the scale is rarely seen because of the cover (Photo 2). The scale is found on the leaves, especially on the underside, and occasionally on young (green) stems, sucking the sap from the tree, and causing leaf drop and shoot dieback. It also occurs on the fruit. On the fruits, scale infestations look unsightly (the feeding sites remain green), and reduce quality and market value; stem-end infestations can lead to premature ripening and fruit fall.

On the leaves, the areas around the scale turn yellow and, if the infestation is large, the whole leaf becomes discoloured, and may fall early.

Eggs are laid under the scale cover, and hatch into 'crawlers'. These are mobile as the name suggests, but after a few days they settle down to feed, form the waxy cover, and become adults after several moults.

The adult female scales are 2-3 mm long, purple at first, later brown, with a lighter area at the front end from the remains of previous moults. The male is smaller and lighter in colour. It differs from the female in that it has a pupal stage, and the last stage is without mouthparts, but has wings. It lives for a few hours just to find females and to mate.

Mostly, the scales are found in the shady parts of the trees, on the lower and inside leaves.

Spread is by crawlers moving to new parts of the same tree, or they may be blown in the wind to other trees nearby. They may also be spread on animals, birds or human beings.

### Impact

The mussel scale has the potential to cause leaf fall and shoot dieback. However, in most countries of the world, it is controlled adequately by the wasp parasitoid, *Aphytis lepidosaphes*, and no other control measure is necessary. Levels of parasitism of more than 90% appear to be common. As long as pesticides are not used, or limited to insecticidal oils and soaps, it is likely that the impact from the scale will be low.

### Detection & inspection

Look for the characteristic shape of the scales on leaves, stems and fruit of citrus in the shaded parts of the canopy. Identification is done after the insects are slide-mounted and examined by a specialist.



Photo 1. Adult purple scale, *Lepidosaphes beckii*.



Photo 2. Adult purple scale, *Lepidosaphes beckii*. View from underside. The cover or armour has been removed, and the body slide-mounted.

## Management

### NATURAL ENEMIES

There are several predators and parasitoids used in biological control of the mussel scales. The ladybird beetle, *Chilocoris* species prey on nymphs and adults. Chalcid wasp parasitoids are important natural enemies. *Aphytis lepidosaphes* from Southeast Asia feeds on all stages of the scale and has been used for biological in many countries worldwide. The scale is the main host of this wasp. Other *Aphytis* species, *Aphytis melinus* (temperate countries) and *Aphytis lignanensis* (tropical countries) which are natural enemies of red scale (*Aonidiella aurantii*) also attack the mussel scale. In southern Africa, the parasitoid, *Aspidiotiphagus citrinus* is also an effective biological control.

The management of the citrus mussel scale is based on biological control, and in some countries the use of insecticides.

### CULTURAL CONTROL

- Check that nursery stock is free from scale; if present, prune infested parts, and spray with insecticides (see below).
- Establish windbreaks of *Gliricida* to reduce infestations by crawlers carried on the wind.
- Ensure the citrus trees are well cared for with adequate nutrition.

### CHEMICAL CONTROL

Crawlers are more susceptible to insecticides than other stages, but they are very small and difficult to see. There are also overlapping generations, so adults are always present, and this means that several applications of chemicals are necessary to obtain control. And adults are difficult to kill because of their protective scales. (*Note dimethoate, once recommended in Pacific island countries, is under suspension in Australia for use on many crops.*)

- Use lime sulphur (polysulphide sulphur) or wettable sulphur; leave at least 30 days between spraying lime sulphur and sprays of oil. Take care to following manufactures instructions as sulphur can burn the leaves. Note applications of sulphur will most likely affect parasitoid wasps.
- Alternatively, use white oil (made from vegetable oils), soap solution, or horticultural oil (made from petroleum) (**see Fact Sheet no. 56**). Often the damage occurs in patches on the trees, so consider just spot-spraying those areas where infestations occur, rather than the whole tree.
  - White oil:
    - 3 tablespoons (1/3 cup) cooking oil in 4 litres water.
    - 1/2 teaspoon detergent soap.
    - Shake well and use.
  - Soap:
    - Use soap (pure soap, not detergent).
    - 5 tablespoons of soap in 4 litres water, **OR**
    - 2 tablespoons of dish washing liquid in 4 litres water.
- Commercial horticultural oil can also be used. White oil, soap and horticultural oil sprays work by blocking the breathing holes of insects causing suffocation and death. Spray the undersides of leaves; the oils must contact the insects. A second application of soap or oils may be necessary after 3-4 weeks.
- The addition of malathion is useful against scales insects, but it is likely to kill natural enemies. Malathion should be avoided, if possible.
- Use synthetic pyrethroid insecticides; they are likely to be effective against the crawlers - crawlers are the active nymphs that spread infestations, but they are difficult to see as they are so small. Synthetic pyrethroids are likely to kill natural enemies. They should be avoided, if possible.

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*When using a pesticide, always wear protective clothing and follow the instructions on the product label, such as dosage, timing of application, and pre-harvest interval. Recommendations will vary with the crop and system of cultivation. Expert advice on the most appropriate pesticides to use should always be sought from local agricultural authorities.*

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AUTHOR Grahame Jackson

<sup>1</sup>Information from Swaine G (1971) *Agricultural Zoology in Fiji*. Her Majesty's Stationery Office, London; and CABI (2008) *Lepidosaphes beckii* (purple scale). Crop Protection Compendium (<https://www.cabi.org/cpc/datasheet/30368>); and from Citrus Research International Scales: Mussel Scales. (<https://www.citrusres.com/system/files/documents/production-guidelines/CH%203-11-2%20Mussel%20scales%20-%20Apr%202003.pdf>). Photo 1 United States National Collection of Scale Insects Photographs, USDA Agricultural Research Service, Bugwood.org. Photo 2 MAF Plant Health & Environment Laboratory (2011) Purple Scale (*Lepidosaphes beckii*); PaDIL - (<http://www.padil.gov.au>).

Produced with support from the Australian Centre for International Agricultural Research under project PC/2010/090: *Strengthening integrated crop management research in the Pacific Islands in support of sustainable intensification of high-value crop production*, implemented by the University of Queensland and the Secretariat of the Pacific Community.

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