

## Citrus snow scale (105)

### Common Name

Citrus snow scale, white louse scale

### Scientific Name

*Unaspis citri*

### Distribution

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

### Hosts

Almost exclusively *Citrus* species, but the Pacific banana (fe'i, *Musa x troglodytarum*) is a host.

### Symptoms & Life Cycle

The male and female scales look quite different. The female is oval, oyster-shaped and brown-black; it is just over 2 mm long (Photo 1). The male is much smaller, 1 mm long, and white (Photo 2). Both have ridges running the lengths of their bodies. Numerous white males on trunks and branches give the appearance of snow, hence its common name.

Eggs hatch and the crawlers move to new sites on the same tree; they are spread further by wind, on birds, other animals and human beings. They eventually settle in crevices in the bark, start to feed and form protective scales over their bodies. Males moult twice and females four times, the last two are the pre-pupa and pupa stages with signs of adult features. The adult male is orange, with eyes, antennae and one pair of wings, but no mouthparts.

After the females are fertilised, the males die, usually within a few hours, and the females soon starts laying eggs. Unfertilised females also lay eggs and these develop as females. The entire life cycle is 2-3 months depending on temperatures (Diagram).

### Impact

The scale (Photo 1) occurs mostly on the trunk and large branches, except in heavy infestations when it spreads to the twigs, leaves and fruit. Heavy infestations cause leaves to yellow and fall, twigs to dieback and entire branches to die. The weakening of the trees in this way can lead to fungal rots and invasion by wood-boring insects.

Even after the scale has been brought under control, damage may still occur. The bark of previously infested trees does not expand properly as inner tissues grow, resulting in splitting and then invasion by other pests.

Populations are higher and damage is worse in dry times. It has been reported to be a locally important pest of oranges and lemons in Fiji, and a major pest and a constraint to growing West Indian limes in Samoa. In Solomon Islands, Waterhouse and Norris (1987)<sup>1</sup> state that it is among the 10 worst pests of the country, "... causing widespread and serious damage every year". It is also important in Tonga.

### Detection & inspection

Look for large white masses of the male scales, which are very distinctive. The darker oval female scales are more difficult to detect as they are small and do not occur in large numbers in any one place. Identification requires examination of the females under a microscope.



Photo 1. Female citrus snow scale, *Unaspis citri*. The female is very different from the male; it is oval, brown-black and 2 mm long, whereas the male is 1 mm, and white.



Photo 2. Male pupae on citron, citrus snow scale, *Unaspis citri*.

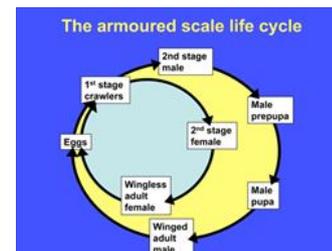


Diagram. Life-cycle of an armoured scale.

## Management

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

### NATURAL ENEMIES

There are a large number of natural enemies of citrus snow scale. These fall into three groups: parasitoid wasps, predacious caterpillars and ladybird beetles. Of the many listed, two Asian wasps, *Aphytis lingnanensis* and *Aphytis gordonae* have greatest potential. However, different strains exist with different effectiveness against scale populations. *Aphytis lingnanensis* was introduced into Solomon Islands for control of citrus snow scale in 1976, but its establishment is unknown. In Australia, the caterpillar of a moth, *Batrachedra arenella* feeds on the scale. Many coccinellids eat the scale: *Scotoscymnus prapawan* has been released in Vanuatu. *Chilocorus circumdatus* is another successful biological control agent.

### CULTURAL CONTROL

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

### RESISTANT VARIETIES

Nothing is reported, but see comments in the "Impact" section above for susceptible species.

### CHEMICAL CONTROL

Sulphur and malathion have been used, but the waxy coverings protect the scales from chemical sprays. Crawlers are more susceptible to insecticides than other stages, but they are difficult to see because they are so small. There are also overlapping generations, so adults are always present, and this means several applications of chemicals are necessary to obtain control. And adults are more 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.
- acting compared to modern chemicals, it needs only to be applied every 2-3 years.
- Alternatively, use white oil (made from vegetable oils), soap solution, or horticultural oil (made from petroleum) (**see Fact Sheet no. 56**).
  - 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. And 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.*

AUTHOR Grahame Jackson

<sup>1</sup>Information from Waterhouse DF, Norris KR (1987) *Unaspis citri* (Comstock). *Biological Control Pacific Prospects*. Inkata Press; and CABI (undated) Citrus snow scale *Unaspis citri*. Plantwise Knowledge Bank (<http://www.plantwise.org/KnowledgeBank/Datasheet.aspx?dsid=55685>); and MAF Plant Health & Environment Laboratory (2011) Citrus Snow Scale (*Unaspis citri*): PaDL - <http://www.padi.gov.au>; and from Buckley CR, Hodges AC (2017) Citrus snow scale. UF/IFAS Extension Service, University of Florida. ([http://entnemdept.ufl.edu/creatures/om/scales/citrus\\_snow\\_scale.htm](http://entnemdept.ufl.edu/creatures/om/scales/citrus_snow_scale.htm)). Photo 1 (and Diagram) Gillian Watson, Senior Insect Biosystematist, Plant Pest Diagnostics Branch, California Department of Food & Agriculture, Sacramento, CA, USA. Photo 2 Hamdeo. Scale covering a citron tree, killing it. ([https://commons.wikimedia.org/wiki/File:Citrus\\_Scale\\_.jpg](https://commons.wikimedia.org/wiki/File:Citrus_Scale_.jpg)).

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