

SOFT SCALES

Coccus hesperidum L.
Pulvinaria aethiopica (De Lotto)
Saissetia oleae (Olivier)
other *Saissetia* spp.

1 PEST PROFILE

1.1 Distribution and status

Brown soft scale, *Coccus hesperidum*, and green soft scale, *Pulvinaria aethiopica*, (previously known as soft brown and soft green scales) occur in all areas as sporadic pests. Black scale, *Saissetia oleae*, is common on citrus in the southern parts of the Western Cape and occurs sporadically in the Eastern Cape. Other *Saissetia* spp. are unusual elsewhere in southern Africa. These pests are under effective biocontrol. As with waxy scale, the economic importance of these pests is usually linked to the usage of poorly selected plant protection products together with inadequate ant control. Easy peeling cultivars such as Empress mandarin appear very susceptible to soft scales.

1.2 Description

The adult female of the brown soft and green soft scale is about 4 mm long and 3 mm broad. Depending on the species the insects are brown (brown soft scale) or green (green soft scale). They have flat, soft bodies with a somewhat crinkled surface and maintain close contact with the substrate on which they occur. Adult green soft scale can also be distinguished from adult brown soft scale by an irregular loop of dark spots seen through the upper surface. The adult females are immobile. Males do not occur. Eggs hatch within minutes of being laid to yield crawlers. They are mobile but settle quickly and thereafter do not readily change position. The nymphs moult twice before reaching the adult stage.

Mature female black scales are dark brown in colour, with a distinctly convex shape unlike other more common citrus scales. They are 3-5 mm long, whereas other *Saissetia* spp. vary in size. Crawlers are flattened in appearance, compared to the adults, and are usually reddish-brown in colour.

1.3 Infestation sites on tree

These insects tend to settle on the under-surface of leaves alongside the centre vein. In the case of heavy infestations both sides of leaves become infested. Soft scale colonies can also become established on green twigs. Black scale tends to move onto fruit more often than do brown soft and green soft scale. In such an instance it is easy for the uninitiated eye to confuse black scale crawlers with red scale.

1.4 Damage

1.4.1 Symptoms

These insects do not cause direct damage to citrus trees. However, they produce copious quantities of honeydew which can lead to the following secondary problems:

- The honeydew acts as a substrate for the growth of sooty mould fungi. The black mould cover inhibits the passage of sunlight to the leaves and consequently has a detrimental effect on photosynthesis. In situations where severe contamination with sooty mould occurs, tree growth, yield and both fruit size and colour can be detrimentally affected as a result of disturbance of the normal physiological processes. Sooty mould on fruit is a culling factor in packhouses and is subject to defined standards.
- Ants are attracted to the sweet honeydew and their presence can disrupt the biological control of red scale and other pest insects.
- Honeydew reduces the efficacy of thrips control with sugar-containing baits, because it serves as an alternative food source for thrips.
- Excessive honeydew deposits can cause necrostoma symptoms on grapefruit.

1.4.2 Seasonal occurrence

Soft scale infestations of commercial significance occur most frequently in late summer and autumn. There are probably three

generations per year, each starting with a fairly conspicuous crawler movement.

2 MANAGEMENT ASPECTS

2.1 Infestation/Damage assessment

Trees of all ages can be subject to attack by soft scales.

2.1.1 Inspection

These insects do not achieve pest status overnight nor do they require special inspections. As a result they can be included in the regular inspection programme conducted for other pests. The presence of sooty mould on leaves and fruit can be an indication of soft scale infestation.

2.1.2 Treatment threshold

There are no fixed thresholds for the application of treatment. Where necessary, treatments must be applied to ensure that a build-up of sooty mould does not inhibit tree performance or cause crop loss. In the case of grapefruit the early control of soft scales is important to prevent the development of necrostoma blotches on fruit.

2.2 Control options

2.2.1 Biological

Soft brown scale is usually efficiently controlled by a wide range of parasitoids and predators. However, soft green scale does not seem to be as well controlled. Parasitised scales become humped and turn black. The holes through which adults emerge are clearly visible. Five parasitoid species attack soft green scale and a complex of 25 species is associated with soft brown scale. Most parasitoids belong to the genera *Coccophagus* and *Metaphycus*. *Coccophagus semicircularis* is recognisable as a small (1 mm) black parasitoid with a striking yellow semi-circular spot at the base of the wings. Not much is known about the parasitoids of black scale in South Africa, except that parasitised scale can be recognized by an exit hole in the scale covering. Various ladybirds also feed on soft scales such as *Chilocorus angolensis* (only in the northern

production areas), *Cryptolaemus montrouzieri*, *Exochomus* sp. and others. The larva of the moth, *Autoba costimacula*, has also been found to prey on soft green scale. High densities of soft green scale can also be attacked by the entomopathogenic fungus, *Lecanicillium lecanii*. The pests most often become a problem where the action of these natural enemies is prevented or inhibited by treatments. Ants can also be a disruptive influence and as a result must be well controlled when the scales are present.

2.2.2 Cultural

Natural ground cover in the interrows should contribute to the biocontrol of soft scale infestations but where trunk barriers are used for ant control, weeds must be controlled under the trees.

2.2.3 Plant protection products

Direct control with a plant protection product is recommended where soft scale infestations present a threat to the crop.

2.2.3.1 Brown soft scale

Spray treatment

One of the following products can be applied as a medium cover film spray for the control of brown soft scale. Check residue restrictions before application to fruit.

Product	Dosage/100 ℓ water
Oil (horticultural mineral oil)	1.0 - 1.4 ℓ (depending on grade)
Ultracide ¹	50 ml
Rogor ²	100 ml

¹ Not later than 90% petal fall

² Not later than 50% petal fall

Note that particularly the oil sprays are more effective if targeted against the crawler stage.

Trunk treatment

Citrimet has been registered as a trunk treatment for soft brown scale control. Refer to

the trunk application procedure described in Chapter 2.

2.2.3.2 Green soft scale

The following products are registered as sprays for the control of green soft scale:

Product	Dosage/100 ℓ water
Lannate SL + hort. mineral oil	90 ml + 500 ml
Lannate SP + hort. mineral oil	20 g + 500 ml
Ultracide ¹	150 ml*

¹ Not later than 90% petal fall

* Previously with 500 ml oil

Note that the mineral oil spray, as registered against brown soft scale will also be effective against green soft scale, particularly if timed against a crawler movement. In such a case, even 0.8% medium grade oil has been shown to be very effective.

2.2.3.3 Black scale

No plant protection products are registered for the control of black scale or other *Saissetia* spp. However, Ultracide (+ horticultural mineral oil) at the same rate as registered for green soft scale control, and oil alone at 1.0-1.25%, have been shown to effectively control black scale.

Comment

Confidor and Mospilan (stem applied) have been found to suppress soft scales to a varying degree.

Treatments applied during summer which contain oil at 0.5% or more, will suppress soft scales. Where dry sooty mould remains on fruit following infestations of soft scales, aphids, mealybugs, etc., a spray of 0.5% light to medium horticultural mineral oil can be used to loosen it. However, such a treatment must be used within the framework of precautions relating to oil treatments (refer to Plant Protection Products, under RED SCALE in this chapter).