

SOUTH PACIFIC COMMISSION

COTTONY CUSHION SCALE, SEYCHELLES SCALE, AND EGYPTIAN FLUTED SCALE



Fig. 1a (Top left). *Rodolia cardinalis* (actual size 3-4 mm).

Fig. 1b (Top right). The Cottony Cushion Scale, *Icerya purchasi*, with crawlers (actual size 7-9 mm).

Fig. 1c (Bottom left). The Egyptian Fluted Scale, *Icerya aegyptiaca*, with pupa of *Rodolia pumila* at the left of the picture (actual size of the scale 7-9 mm).

Fig. 1d (Bottom right). The Seychelles Scale, *Icerya seychellarum*, with ants attending them (actual size of the scale 7-9 mm).

COTTONY CUSHION SCALE, SEYCHELLES SCALE, AND EGYPTIAN FLUTED SCALE are all widely distributed throughout the world and are pests of many plants. Individually, these large scale insects have different distributions in the South Pacific Commission region.

The Cottony Cushion Scale (*Icerya purchasi*), which is originally from Australia, has been recorded from the Commonwealth of the Northern Marianas, Fiji, French Polynesia, Guam, Kiribati, Marshall Islands, New Caledonia, and Norfolk Island. It is also found in Australia, New Zealand, and Hawaii.

The Seychelles Scale (*Icerya seychellarum*) has been recorded from Cook Islands, Federated States of Micronesia, Fiji, French Polynesia, Kiribati (Ocean Is.), Niue, Palau, Solomon Islands, Tonga, Vanuatu, and Western Samoa. It has also been found in many other countries, mostly in the Indo-Pacific region.

The Egyptian Fluted Scale (*Icerya aegyptiaca*), thought to have originated in Egypt, has been recorded in the Commonwealth of the Northern Marianas, Federated States of Micronesia, French Polynesia, Kiribati, Marshall Islands, Palau, and Tuvalu. A report from Fiji is unconfirmed. It is also found in Australia, Wake Island, and many other countries.

BIOLOGY

These insects look like large mealy bugs and belong to a family of scales, the Margarodidae. They are between 7–9 mm long, with reddish brown bodies covered in a thick white or yellowish wax in various patterns. Adult female Cottony Cushion Scales have a characteristic large elongated white fluted egg case projecting from under one end of the reddish upper body surface and long dark legs (Fig. 1b). The adult female Egyptian Fluted Scales are covered in about ten long

white waxy projections which are curved at the tip and cover the body and egg case (Fig. 1c). The adult female Seychelles Scale is covered in a white powdery wax with areas of bright yellow and long fine silky hairs. There is a ridge along the middle of the body and a double row of rounded plates on each side (Fig. 1d). Unlike some other scales, the females of all three species are mobile when mature and retain their antennae, eyes and legs. Over 100 oblong reddish eggs are laid into an egg sac of waxy plates attached to the end of the female's body. Eggs take from a few days to several weeks to hatch, depending on the temperature. The pinkish brown crawlers emerge from between the wax plates of the egg sac and move onto the host plant to start feeding. Males are rare but in *Icerya purchasi* where they are present, they form white cocoons soon after hatching. A few weeks later the delicate, red bodied, dark winged adult males emerge. As the females are usually hermaphrodites, males are not necessary for repro-

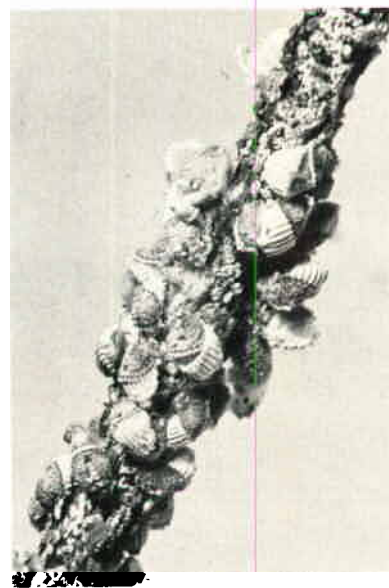


Fig. 2: *Icerya purchasi* on stem of citrus.



Fig. 3: *Icerya seychellarum* causing damage to annatto leaves.

duction, and are only produced at certain times of the year. In the Pacific these scales breed more or less continuously and there are several overlapping generations per year. Ants often attend these scales to harvest the honeydew (Fig. 1d).

DAMAGE

These scale insects damage plants by sucking out the sap. This reduces the vigour of the plant so that the leaves often turn yellow and fall prematurely. Heavily infested young shoots can be killed. The insects which are phloem feeders are mainly found on the stems (Fig. 2) and the undersides of older leaves, principally along the midribs (Fig. 3). They are less often found on the flowers and fruit. The sticky honeydew they excrete drops onto the leaves and fruit below and encourages the growth of a black fungus, sooty mould, which reduces the leaf surface available for photosynthesis. Sooty mould on the fruit can be unattractive to buyers. Damage to plants and fruit may be worse in prolonged dry periods and the amount of marketable produce may be reduced.

Very many, mainly woody, plants are attacked by these scale insects. The Cottony Cushion Scale is especially associated with damage to citrus, and the Egyptian Fluted Scale with damage to breadfruit. All of these scales can be found on avocado, coconut, coffee, guava, mango and many other plants.

CONTROL

Biological control

In some parts of the world these scales are kept in control by natural enemies, particularly the predacious vedalia ladybird beetle *Rodolia cardinalis*. This insect, originally from Australia, has been introduced to many countries in the Pacific but has not become established in all of them. It is well established in Fiji, New Zealand and Guam. *Rodolia cardinalis* is 3-4 mm long, hemispherical and reddish brown in colour with black markings (Fig. 1a). The bright orange-red eggs are laid on the scale insect host, and the newly hatched ladybird larvae find their way through the waxy plates of the scale's egg sac to feed on the eggs inside. Another ladybird beetle, *Rodolia pumila*, (Fig. 1c), which occurs in Micronesia, gives good control of the Egyptian Fluted Scale.

In Australia, Hawaii and New Zealand, Cottony Cushion Scale is parasitised by a small fly, *Cryptochaetum iceryae*; *C. grandicorne* parasitises the Seychelles Scale in Indonesia and Japan; and small wasps of the genus *Ophelusia* parasitise Seychelles Scale in some countries. None of these parasites has been reported in the Pacific. Where ladybird beetles are absent, green lacewings (*Chrysopa* spp.) are often found attacking the younger stages of these scales, but little is known about their effect on the scale insect populations.

Chemical control

In Fiji and other islands where *Rodolia cardinalis* or other predators keep the scale to reasonable levels, chemical

control is not required. Where predators and parasites are not giving adequate control, the scales can be controlled by spraying with an insecticide such as diazinon or malathion in a mixture of white oil and water. As it is very difficult to kill eggs and mature scales, sprays are most effective when applied to young stages of the insect and should be repeated every 2-3 weeks while crawlers are emerging until adequate control is achieved. Local advisory services should be consulted for up-to-date control measures.

In many orchards ants make their nests at the base of trees, climb the foliage to tend the scales and also drive away predators. If the ants' nest is found it should be destroyed, but if not, the ants can be prevented access to the scales by applying a band of grease at least 20 cm wide to the base of the tree. Care should be taken to trim any drooping branches touching the ground which would act as bridges for the ants. Formerly, dieldrin

was used to band trees or was sprayed around their bases to prevent ants reaching scales. Many countries now have restrictions on the use of dieldrin and advisory staff should be consulted for local recommendations.

All insecticides are hazardous. The safety precautions for their handling should be carefully observed as well as the waiting period before the product can be marketed or consumed.

QUARANTINE PRECAUTIONS

Because of their importance to horticulture, attempts should be made to prevent the spread of these insects to countries where they are not present. Imported plant material should be thoroughly inspected. When these scales are found it may be necessary to fumigate with methyl bromide, or, in the case of propagating material, to clear up the infestation with an insecticide/white oil treatment before release from quarantine.

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*This leaflet was prepared by C.F. Butcher, Entomology Division, Department of Scientific and Industrial Research (DSIR), Auckland, New Zealand. Photographs were taken and prepared by M.L. Lessiter and B.S. Eykel, Photographic Section, DSIR, Auckland. The photograph of *Icerya aegyptiaca* was supplied by Dr M. Kirby, U.S.D.A., Guam. The illustration of *Rodolia cardinalis* is from Common insects of New Zealand by Dr Miller and thanks are given to the publishers of this book, A.H. & A.W. Reed, Wellington, for allowing use of this illustration. Further information can be obtained from the Plant Protection Officer, South Pacific Commission.*

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