For more information about cycad scale on sago palm, call the UH-CTAHR Cooperative Extension Service office in Hilo, 981-5199, or the Hawai'i Department of Agriculture (HDOA) Hilo office, 974-4140. On other islands, call HDOA at 973-9534 (O'ahu), 873-3555 (Maui), 274-3069 (Kaua'i).

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Photos by W. Nagamine, A. Hara, S. Chun, and N. Nagata.

Caution: Pesticide use is governed by state and federal regulations. Read the pesticide label to ensure that the intended use is included on it, and follow all label directions.

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Heu, R.A., M. Chun, W.T. Nagamine. 2003. Sago palm scale *Aulacaspis yasumatsui* Takagi. New Pest Advisory no. 99-01. Revised Sept. 2003. www.hawaiiag.org/hdoa/npa/npa99-01-spalmscale2.pdf

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Stathas, G.J. 2000. The effect of temperature on the development of the predator *Rhyzobius lophanthae* and its phenology in Greece. BioControl 45:439–451.

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Cycad Scale on Sago Palm

PEST ALERT

Cooperative Extension Service
College of Tropical Agriculture and Human Resources
University of Hawai'i at Mānoa

Cyad Scale on Sago Palm

Cycad scale infestation on Queen sago

The cycad scale damages sago palm by feeding on the undersides of its leaves, sucking sap. Over several months, the leaves turn yellow, lose photosynthetic ability, and eventually turn brown and die. In severely infested plants with yellow or dead foliage, new leaf flushes may be stunted.

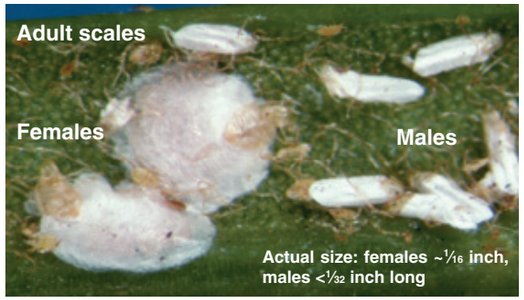
Cycad Scale—Not Easy to Control

Cycad scale also attacks the sago palm trunk and leaf petioles (left), and roots (left, below). These plant parts are difficult to reach with pesticides and can be a source of scale reinfestation after infested leaves are pruned.

Cycad scale (*Aulacaspis yasumatsui*) was first found in the Hawaiian Islands on sago palm on O'ahu in 1998. It had spread to the Big Island by 2000, Kaua'i by 2003, and Maui by 2004. Sago palm (*Cycas revoluta*) is more susceptible than queen sago (*C. rumphii*). The scale is native to Thailand, where natural enemies keep it under control. It was discovered on sago palm in 1996 in Florida, where it threatened the survival of several endangered cycad species in botanical gardens.

Identifying and Managing Cycad Scale on Sago Palm

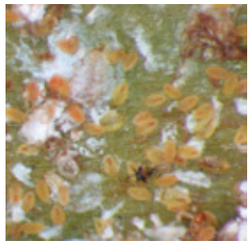
Identifying the Cycad Scale



Female adult scales are covered with a hard, waxy, white, oval-shaped armor. The male pre-adult has an elongated, striated, shell-like covering. The adult male has wings and is capable of flying. Under its armor, the exposed body of the female is orange. The adult female lays approximately 100 eggs under the armor; they hatch in 7–14 days into nymphs (crawlers), which leave the armor and settle to feed. These crawlers are light, buoyant, and easily dispersed by wind prior to settling.

The life cycle of the cycad scale is approximately 35 days from egg to adult; average longevity is 75 days.

Nymphs (crawlers)



Nymphs develop into mature adult scales in approximately 30 days.

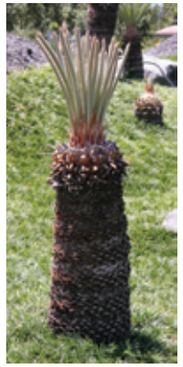
Mature adult female

Exposed red-orange body of adult female scale (circled), with orange eggs.

Pest Management for Cycad Scale

Cultural and physical control

Inspect for lady beetles and partially eaten cycad scales. If lady beetles are not present, trim heavily infested leaves that have become yellow or brown; bag discarded leaves to prevent further spread. Replace susceptible cycads with a non-host or a less susceptible species, such as the smallspined cycad, *Dioon spinulosum*, from Mexico.



A pruned sago palm with a new leaf flush. New leaf flushes may be stunted by inadequate nutrition, caused by over-pruning of the green leaves needed for photosynthesis. If possible, make applications of control measures just before leaf flushes to prevent scales from spreading to new leaves.

Chemical control

Control of cycad scale with insecticides is difficult because the female scale is protected by its covering, and the undersides of leaves are difficult to cover thoroughly with sprays. Therefore, spraying insecticides is *not recommended* for homeowners unless the lady beetle fails to establish.

If sprays must be used, horticultural oil (e.g., Ultrafine®, Volck®) is preferable to poisonous insecticides because it provides good scale control, poses a lesser threat to the lady beetle predator, and is safer to apply. Trim heavily infested leaves, then thoroughly spray the remaining leaves. In Florida, horticultural oils were most effective against the tiny scale crawlers when applied with good coverage and with four repeated applications at 10–14 day intervals.

Do not use broad-spectrum insecticides (malathion, diazinon, pyrethroids), which are highly toxic to the lady beetles. Among systemic insecticides, Safari® (dinotefuran) is labeled for use on cycad scale and should be effective. Low to moderate infestations of scale might be controlled with the new insect growth regulators Distance® (pyriproxyfen) or Talus® (buprofezin). Consult pesticide labels for specific instructions.

Biological control

A tiny black lady beetle, *Rhyzobius lophanthae*, is *highly effective* in controlling the cycad scale and should be the primary control strategy. Observe your plants and those in your neighborhood for lady beetle adults and larvae. If you find them, trim some leaves and place them on scale-infested plants to help the predator migrate.

The adult beetle feeds on cycad scale eggs, crawlers, and adults. It chews through the scale's hard shell to get at the underlying adult scale and eggs. Male and female adult beetles can consume more than 400 and 800 scales, respectively, over a lifespan.

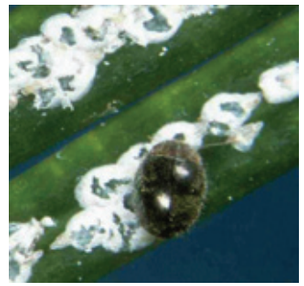
This lady beetle was introduced to Hawai'i in 1894 for biological control of other armored scales. Recent surveys on Hawai'i, O'ahu, Maui, and Kaua'i indicate that the lady beetle is present and can effectively control the cycad scale. The life cycle of the beetle from egg to egg-laying adult ranges from 24 to 32 days, shortening as temperature increases; average longevity is 120 days. A single female beetle can lay more than 600 eggs.

Lady beetle larva
Actual size: 1/8–3/16 inch long

Lady beetle pupa
Actual size: 1/8 inch long

Adult lady beetle
Actual size: 1/16–3/32 inch diameter

Inspect for presence of lady beetles and larvae before spraying.



Look for lady beetles' feeding holes in the scale's shells.

The alligator-like larva of the lady beetle (four larval stages, approximately 14 days total) will feed on both scale eggs and adults.