

Palm Leaf Beetle

(*Brontispa longissima*)

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The palm leaf beetle, *Brontispa longissima*, was first found in Darwin and nearby areas in December 1979. An attempted eradication campaign was unsuccessful and was abandoned in 1981. By 1989 the pest was found throughout Darwin and Palmerston, and in many nearby rural areas including the Cox Peninsula.

Within Australia, the insect is also known from Moa Island in Torres Strait and from Cooktown to Cairns, Cape York Peninsula. Elsewhere, it ranges from Java eastward to New Caledonia and has been accidentally introduced to Tahiti, Western Samoa and American Samoa.

PLANT ATTACKED

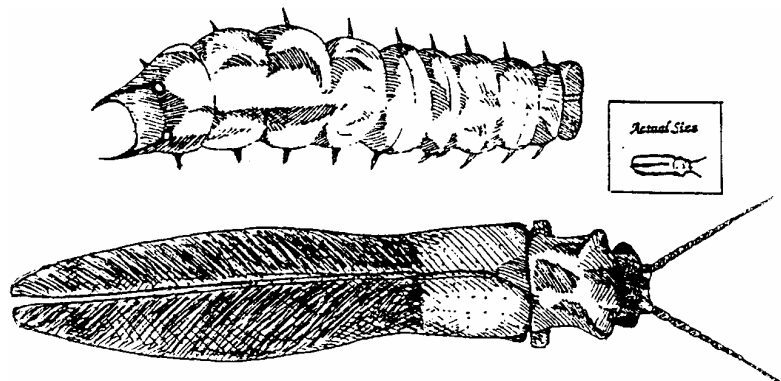
The coconut palm is the usual host of the palm leaf beetle.

Royal palms are sometimes severely attacked, and in Darwin moderate damage has been seen on *Areca catechu* (betel nut palm), *Bentinckia nicobarica*

(nicobar palm), *Carpentaria acuminata* (carpentaria palm), *Caryota mitis* (fishtail palm) and *Hyophorbe lagenicaulis*. Infestations in other species which usually causes only slight damage, has been reported locally and includes *Archontophoenix alexandrae* (alexandra palm), *Arecastrum romanzoffianum* (queen palm), *Chrysalidocarpus lutescens* (golden cane palm), *Cyrtostachys renda* (sealing wax palm), *Dictyosperma album* (princess palm), *Gulubia costata*, *Laccospadix australasica*, *Livistona muelleri*, *Phoenix dactylifera* (date palm), *Pritchardia pacifica* (Fijian fantail palm), *Ptychosperma elegans*, *P. macarthurii*, *Washingtonia filifera* and *W. robusta*.

DAMAGE

Only the youngest leaves are attacked. All life stages of the beetle occur within and between folded leaflets before they have opened appreciably. Once the leaflets have separated as the leaf expands, the beetles leave and seek fresh hiding places in a younger frond. Both adults



and larvae feed on the leaf tissues. Most damage is caused by the larvae, which chew off large areas of the inner surface of unopened leaflets. Underlying cells die and the attacked area turns brown. When the leaf opens, these brown areas shrivel and curl, producing a characteristic scorched appearance. The adults leave narrow, linear chewing marks which are less extensive than the larval damage.

Sustained heavy attack can be fatal to palms, especially if they are young, but it is unusual for death to result directly from palm leaf beetle damage. However, trees weakened by the pests are more vulnerable to drought and disorders that could kill them. Heavy damage is usually most noticeable toward the end of the dry season, and palms which are not watered suffer more than better tended ones.

Young palms can be seriously set back during the phase of substantial damage, and in this situation the use of insecticide is recommended. This is discussed in a later section.

There are other disorders which cause palm leaves to turn brown and shrivel, but the presence of an unbroken surface layer and absence of insect excreta distinguishes these from palm leaf beetle damage.

APPEARANCE AND LIFE CYCLE

The adult is about 1 cm long and very flat, with short legs. The thorax and a third of the wing covers are orange in colour and the hind part of the wing covers is black. The larva is also flattened and has a pair of inwardly curved, immovable hook-like spines at its rear end. The pupa resembles the larva, but is larger and shows the developing wings and legs of the adult.

Female beetles lay eggs in small batches in grooves chewed in the surface of young leaflets. Hatching occurs after several days and the larva which is produced feeds for five weeks, changing its skin as it grows. It then pupates and the adult beetle emerges five days later. It may live for up to three months, during which time a female may lay up to 100 eggs.

The adults are slow-moving and reluctant to fly during the day, but take off more readily at twilight and perhaps also fly at night. From the spread of infestation in Darwin, it seems that flights covering several hundred metres are possible.

The native palm beetle (*Anadastus* sp.) should not be confused with the palm leaf beetle. It is sometimes found in small numbers in the centre of palms, usually without appreciable damage being present. Compared to the palm leaf beetle, it is less flattened, has a small knob at the end of each antenna and has completely blue-black wing covers without any orange colour at the base. It is not a significant pest.

BIOLOGICAL CONTROL

So far, few natural enemies of the palm leaf beetle have been found in Darwin. The green muscardine fungus, *Metarhizium anisopliae*, can infect various stages of the beetle and cause death, especially during wet spells. Tree frogs and geckoes seem to occur more frequently on heavily infested palms than on those which are healthy or slightly infested. They probably catch and eat adult beetles and perhaps also larvae, but are normally unable to control an infestation. Large numbers of torn, empty eggshells of palm leaf beetle have been found in a nest of an ant (*Tetramorium similimum*), but its significance in controlling the pest is not known.

In some places overseas, such as New Caledonia, Tahiti and the Solomon Islands, a parasite of the palm leaf beetle is claimed to have greatly reduced damage by the pest. It is a tiny wasp about 1 mm long, and was first released in Darwin in December 1982, after six months of careful safety testing in laboratories in Brisbane following its importation from Western Samoa. Females of the parasite (*Tetrastichus brontispae*) lay their eggs in the pre-pupa or pupa of the beetle from which up to 20 adult wasps emerge after about 18 days.

Many more wasps were released during 1983, but none were recovered from the field and it was concluded that the initial attempt had failed. A new introduction of the same species obtained from New Caledonia was made in mid-1984. This time some parasitised beetle pupae were found in the field within two weeks of the first release of adult wasps. The wasps continued to multiply and spread in succeeding months, and by 1986 the effects could be seen in many mature coconut palms throughout Darwin and Palmerston. The typical pattern in an individual palm is for a sequence of several fronds to show substantial beetle damage. As this occurs, wasp numbers are building up to a level which causes the beetle population to crash. The palm then produces a sequence of fronds with negligible damage, while beetle numbers slowly increase until the cycle is repeated.

In late 1989 there was an upsurge in damage to palms in Darwin and subsequent checks suggested that the wasp parasite may have died out. New introductions were made in 1995 and field recoveries have occurred.

In areas where palm leaf beetle is definitely known to exist but which may not have been colonised by the parasite, introduction of the latter can be attempted.

Before doing this, however, be absolutely certain that the pest is established at the intended introduction site. This is important because the simplified technique which is recommended will allow the escape of beetles as well as parasites.

The method is to locate one or several palms in the urban area (in a friend's garden) at the stage where a young frond showing heavy damage is partially open. This is likely to contain parasitised beetle pupae, and must be carefully sawn off as near its base as possible. Rough handling will dislodge the pupae and nullify the exercise, but removal of the frond will not harm the palm from which it is cut. A garbage bag is slipped over each end of the cut frond before it is carefully transported to the introduction site. This is best done at a cool time of day so that any developing parasites are not killed by excess heat. After the garbage bags are removed, the cut frond should be tied in the centre of the crown of an infested palm. This gives any wasps which emerge the best chance of quickly finding hosts at the new location. Beetles which emerge from unparasitised pupae do not matter, since many are there already.

CHEMICAL CONTROL

Insecticides can be used to control palm leaf beetle. Before spraying is attempted, check the stage of development of the youngest leaf. If it is still a "spear" (tightly folded along its entire length), or has only started to open at the top, it should be slightly opened by hand. This allows better penetration of the spray into the spaces between the leaflets. It can be done by grasping the spear about 60 cm above its base and steadily bending and twisting it to and fro, which causes the leaflets to separate.

The recommended insecticide is carbaryl (Sevin[®] and Bugmaster 80[®]) at a rate of 1.25 g (about one rounded teaspoon) of 80 per cent wettable powder per litre of water. A few drops of

agricultural wetting agent eg Agral[®], All Wet[®], Top Wet[®] (or similar products) should be added to the diluted insecticide.

This mixture can be either poured from a watering can or sprayed onto those leaves which have not completely opened. Because the insecticide works mainly by contact, it is important to completely cover both surfaces of leaves being treated and to use enough liquid to thoroughly penetrate the spaces between leaflets. On the other hand, it is a waste of time and material to apply the insecticide mixture to leaves which are fully open, because these no longer harbour the pest. Either a ladder or an extension spray lance will be needed to treat all except very young palms, as the whole length of the youngest leaf needs to be covered for best results.

Spraying must be repeated after an interval of one week, so that larvae which have hatched from eggs, or adults which have emerged from pupae since the first spraying, do not escape.

Although carbaryl is considered relatively safe to humans, gloves and goggles or a face shield should be used when handling it. The usual precautions of not eating, drinking or smoking while working with insecticides must be observed. Also, as carbaryl is lethal to bees, it should not be applied to palms when a fresh flower spike is present. Spray must not be allowed to drift on to hives or areas in which bees are foraging. The beetle parasite is also very easily killed by insecticide.

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