

2. BIOLOGICAL CONTROL OF INVASIVE CACTUS SPECIES (FAMILY CACTACEAE)

 2.10 Prickly pear (*Opuntia ficus-indica*)

ORIGIN OF THE WEED

Prickly pear (fig. 1) is indigenous to Mexico, South America

BIOCONTROL AGENTS

Read more about biological control in general in leaflet 1.3 in this series, and about biocontrol of cactus species in leaflet 2.1.

The most important biocontrol agent for prickly pear in South Africa is a cochineal insect. To a lesser degree, the cactus moth and two stem-boring beetles also contribute towards the successful control.

a. The prickly pear cochineal, *Dactylopius opuntiae*

This insect is indigenous to Mexico, Texas and Arizona, USA. It was first imported to Australia in 1920 to control *Opuntia stricta*, and a starter colony from that country was introduced into South Africa in 1937.

Background information on agent

Consult leaflet 2.2 in this series for essential information on the life cycle of this insect, its potential as biological control agent and its implementation.

Cochineal damage to prickly pear

The nymphs and adult females (fig. 2) suck the sap from the cladodes (leafpads) and, in the process, they probably secrete toxic saliva into the plants, although no evidence of any such toxin has been found yet. This causes yellowing of the cladodes of infested plants before these rot and drop off. Cochineal is more destructive in drier areas, because regular rains erode the wax layers around the females, exposing them to natural enemies such as ladybird beetles, and also washes many adults and crawlers off the cladodes.

When plants are heavily infested with cochineal, the segments at the outside of the plant start to break off and drop (fig. 3). They soon dry out completely and in due course disintegrate. Cochineal can cause considerable damage to plants or destroy susceptible varieties, especially young plants and those weakened by grazing stock. All new growth is rapidly attacked and falls off the plant. Cochineal is, however, unlikely to kill large, woody plants on its own. These can be killed by hand-felling the plant after it has been attacked by cochineal for some two years.

b. The cactus moth, *Cactoblastis cactorum*

This moth species is indigenous to Argentina, Uruguay, Paraguay and the southern part of Brazil and was introduced into South Africa in 1932.

Background information on agent

Consult leaflet 2.3 in this series for essential information on the life cycle of this insect, its potential as biological control agent and its implementation.



Figure 1. A prickly pear plant.



Figure 2. Clusters of cochineal (females and nymphs) sucking the sap out of prickly pear cladodes.



Figure 3. Feeding damage by cochineal causes cladodes to die and drop off the plant.

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Cactus moth damage to prickly pear

The moth larvae (fig. 4) can kill small prickly pear plants unaided, but on large plants they kill individual leafpads only. The females seem to prefer small plants when laying eggs, and very few colonies are seen on large plants. Where the moth occurs alone, it is therefore insufficient as a biocontrol agent because it usually does not kill prickly pear plants that have more than 14 leafpads. The large plants may, however, be killed by the combined action of cochineal and the cactus moth (fig. 5).

The damage caused by feeding larvae and the presence of excrement in the leafpads causes the leafpads and stems to rot (fig. 4) and eventually the entire plant may fall over if it is small. After this, the plant may regrow, but the regrowth is attacked again, and larvae develop faster on the regrowth. Under ideal conditions, in the absence of predators, the cactus moth could cause severe damage to established plants after several generations and, even at low population numbers, it could reduce the growth rate and reproduction of prickly pears significantly. The winter generations are more damaging to the plant than the summer generations.

In South Africa, ants reduce the populations of the cactus moth significantly by feeding on the eggs and, in certain areas, baboons have learnt to excavate the larvae and pupae from the leafpads to eat them. This is probably the reason why the cactus moth is not as effective in South Africa as it was in Australia during the 1930s when it played a major role in clearing large tracts of Queensland and New South Wales of *Opuntia stricta*.



Figure 4. Cactus moth larvae feed inside the prickly pear cladode and cause it to rot.



Figure 5. Prickly pear plant killed by the combined action of cochineal and the prickly pear moth.



Figure 6. Larval feeding by the orange-spotted stem borer causes woody stems to break off.

c. Orange-spotted prickly pear stem borer, *Metamasius spinolae*

Metamasius spinolae (formerly known as *Cactophagus spinolae*) is the most destructive cactus insect in its native country, Mexico. It is a large, black weevil with two orange markings on each front wing (fig. 6).

Background information on agent

Consult leaflet 2.4 in this series for essential information on the life cycle of this insect, its potential as biological control agent and its implementation.

Damage by the orange-spotted stem borer

The beetle is especially effective on large plants with woody stems. Larval feeding causes wounds through which micro-organisms can enter the plant to result in decay. Under ideal conditions, this beetle can destroy leafpads, branches and even large plants, but this is seldom the case in South Africa. This insect is not a very significant biocontrol agent because of its slow dispersal and low rate of increase. It is only present at one locality in South Africa, near Uitenhage.

d. Brown prickly pear stem borer, *Archlagocheirus funestus*

This species, also indigenous to Mexico, is a large, broad, brown long-horned beetle with marbling of the darker markings.

Background information on agent

Consult leaflet 2.4 in this series for information on the life cycle of this insect and its potential as biological control agent.

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Damage by the brown prickly pear stem borer

Like the orange-spotted stem borer, this beetle does not contribute much towards the control of prickly pear because of the limited distribution and slow increase. The adults feed externally on the leafpads, but the damage is not significant. Larval feeding often causes infested branches to break off and entire plants to collapse. However, the leafpads usually survive, unless they are also infested by the prickly pear cochineal or the cactus moth.

Several factors reduce the effect of these beetles in the field. The prickly pears have little canals in their leafpads that secrete a thick, sticky liquid (mucilage) if wounded. This liquid often flushes out the eggs and young larvae. The females also seem to need rain before they will start laying eggs, which limits their establishment in dry areas. In addition, monkeys, birds, ants, lizards, rodents and spiders prey upon the beetles.

CONTROL STRATEGY

Small cactus plants with up to 14 leafpads	Biological control - cochineal and/or cactus moth
Isolated cactus plants	Biological control - cactus moth, which disperses best, or cochineal aided by manual redistribution. Alternatively chemical control - e.g. MSMA.
Large cactus plants with more than 14 cladodes	Biological control - both cochineal and cactus moth, aided by hand-felling of infested plant. Alternatively chemical control - e.g. MSMA.
Large, dense cactus infestations	Allow biological control to thin or clear thicket from centre, meanwhile apply chemicals from edges.
In wet areas or during wet years	Supplement or replace biological control by chemical control.

CONTACT PERSONS

Consult leaflet 1.4 in this series for the most updated contact details.

- Biocontrol research: Weeds Research Division, ARC-PPRI (Rietondale), Private Bag X134, Pretoria 0001; Tel (012) 329 3269; Fax (012) 329 3278; e-mail weeds@plant2.agric.za.
- Chemical control and supply of biocontrol agents: National Department of Agriculture: Directorate of Agricultural Land and Resource Management (D:LRM): your nearest Provincial Office

FURTHER READING

ANNECKE, D.P. & MORAN, V.C. 1978. Critical reviews of biological pest control in South Africa. 2. The prickly pear, *Opuntia ficus-indica* (L.) Miller. *Journal of the Entomological Society of southern Africa* 41: 161-188.

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