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2.6 Harrisia cactus stem-boring beetle *(Alcidion cereicola)*

The cerambycid beetle, *Alcidion cereicola*, originated from Argentina and Paraguay, but was made available to South Africa in 1990 by Australian researchers who were already using it to control harrisia cactus in Queensland.

In South Africa, it controls the following two invasive cacti:

- *Cereus jamacaru* (queen of the night cactus)
- *Harrisia martinii* (harrisia cactus).

Life cycle

Adult beetles (figs. 1a, 2 and 6) are about 14 mm long and 4 to 6 mm wide, with antennae almost as long as the rest of their body. Their wings are mottled brown and grey, and these markings camouflage the beetles so effectively that they are almost impossible to see between dry vegetation. Males and females are the same size and look similar, except that the female's abdomen has a sharply pointed tip while the male's abdomen has a 2-lobed tip. They are nocturnal, feeding on mature green tissue of the cactus during the night and hiding in crevices on the plant or in the ground litter during the day. Although they are strong fliers, the adults are reluctant to fly.

The female starts laying eggs one or two weeks after having emerged from the pupa. Eggs are laid at night, from October to June. The female bites several holes close to each other in a woody cactus stem and then, using her abdomen, inserts a single egg into one of the holes (fig. 1b). Each female can lay up to 280 eggs, at a rate of three or four per night, over a period of five to 10 weeks.

The eggs hatch after about a week. The larva or grub is yellowish-white and legless, with thickened bands across its body and with dark brown mandibles. The larva starts feeding on the plant tissue direct under the epidermis (skin) of the cactus, causing a round area of black, rotten tissue, 1 to 2 cm in diameter. When it is about two weeks old, the larva (figs. 1c and 3) tunnels into the central, hard tissue of the stem and uses frass (a mass of discarded fibres) to block the entrance to the tunnel. Larval feeding destroys the xylem (the reinforcement and transport tissue of the cactus), resulting in the death of all above-ground tissue.

After one or two months, when it is about 17 to 38 mm long, the larva stops feeding and uses the chewed plant fibres to construct a compact cocoon (fig. 1d) within the stem. From the time that a larva stops feeding until it pupates, it is called a prepupa. It can either pupate in the cocoon immediately (this normally happens in summer), or remain in the cocoon without feeding for several months and then pupate (this usually happens in winter). A pupa (fig. 1e) resembles an adult beetle with its legs, wings and antennae folded underneath its body, except that the entire body is soft and pale yellow at first, becoming darker just before it is due to emerge. The adult emerges from the cocoon 10 to 11 days after pupation and leaves the stem through a round escape hole that it has chewed. Most of the adults emerge from October to December.

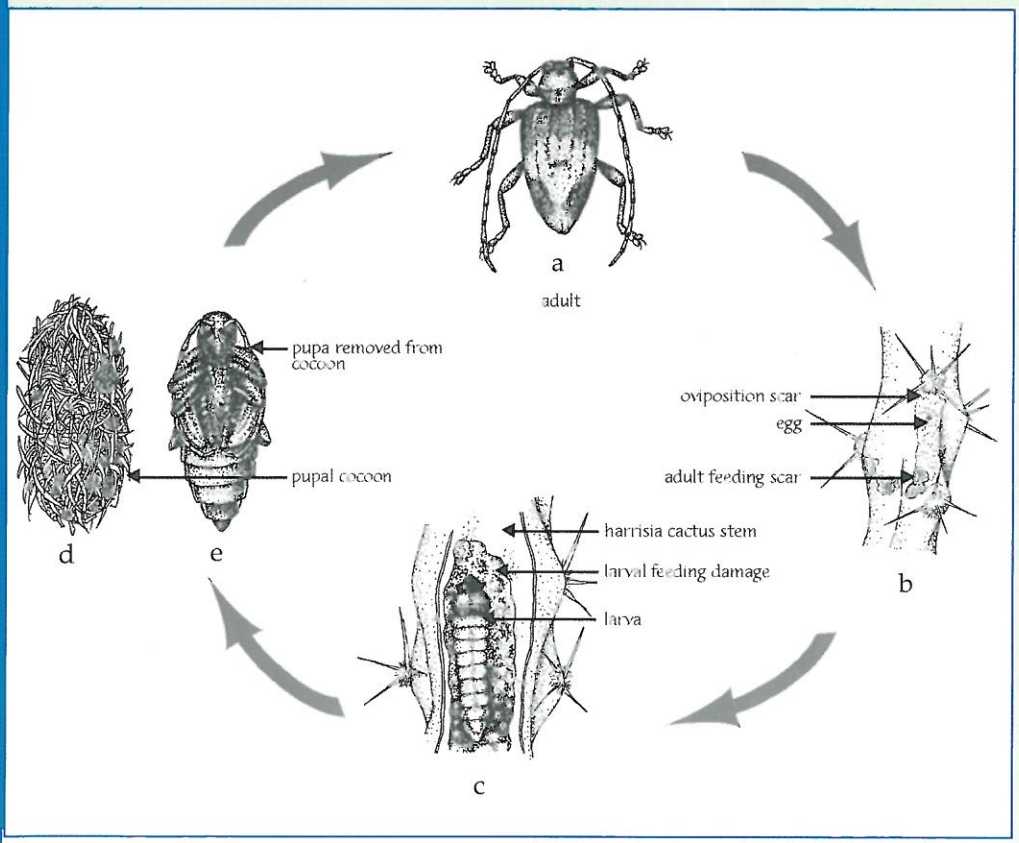

Figure 1. Life cycle of the harrisia cactus stem borer.

Studies conducted in Queensland, Australia (which has a climate similar to the arid parts of South Africa), demonstrated that the adults have a lifespan of between two and six months; the life cycle from egg to adult takes about two months during summer, and there are two or three generations per year. The insects overwinter as feeding larvae or prepupae. In Queensland, adults become inactive at temperatures below 10 °C, and stop laying eggs below 15 °C, but are able to survive at temperatures of even 0 °C. Oviposition and development occurs continuously in the field from September to late May and June.

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How to tell whether the harrisia cactus stem borer is present

The chances of finding adult beetles are very remote, because they seek shelter during the day, and their colouring is a perfect camouflage. Check for recent adult feeding damage. The feeding scars are shallow craters in the stem, about 0,5 cm in diameter (figs. 1b and 4). Oviposition scars are also easy to find, consisting of a group of closely spaced punctures on the stem (figs. 1b, 5 and 6), often containing one puncture with a red-brown colour, which indicates where the egg was deposited. The mines or tunnels created by the young larvae are often visible in queen of the night cactus as winding, brown lines near the surface of the stem (fig. 5). If large numbers of stem borers have been present for a long time, adult emergence holes will appear in the stems and later the stems will die. In the case of queen of the night, the dead stems fall over. The pupal cocoons, made of chewed fibres, might be visible in dead stems (fig. 1d).

How the harrisia cactus stem borer damages its hosts plant

The damage from feeding adults is insignificant. The scars are very shallow and heal soon, unless they are infected by micro-organisms that cause the wound to rot.

The significant damage is caused by larval feeding. The older larvae destroy the vascular (transport) tissue, and so kill the affected branches. If larval numbers are high enough they can kill all above-ground parts of even the largest plants. The damage caused by larval feeding also allows other insects and micro-organisms to enter the plant, and to kill it more quickly.

The underground tubers typical of harrisia cactus are, however, not affected by the insects, resulting in regrowth after the death of the above-ground tissue. Queen of the night cactus, which has no underground tubers, does not usually survive attack by the stem borer.

Factors affecting the efficacy of the stem borer

- Although the adults are active and able to fly, they tend to stay in a confined area after release, where they cause severe and conspicuous damage initially. In Australia, migration took place over distances of 0,75 km, but colonies established for 10 years have not dispersed to harrisia infestations 3 to 5 km away. In South Africa, the beetles have not been found more than about 0,3 km from the release site, but no intensive surveys have been undertaken either.
- The stem borer larvae need mature, woody plant tissue to develop in. Queen of the night plants are usually suitable host plants, even when young. However, the young parts of harrisia cactus tend to be too juicy, and the larvae drown.
- By destroying the older harrisia cactus plants and leaving all young growth undamaged, the stem borers tend to change the age composition of plants in the field. In areas where the stem borers are active, the majority of harrisia cactus plants will be young.
- To ensure effective biocontrol of harrisia cactus, the stem borers need to be supplemented by the harrisia cactus mealybug, which is highly effective in damaging the young, growing plant parts.

Figure 2. The adult harrisia cactus stem borer on a stem of harrisia cactus.

Figure 3. A stem borer larva tunnelling in a stem of harrisia cactus. Note the rotting caused by bacteria or fungi in the tunnel.

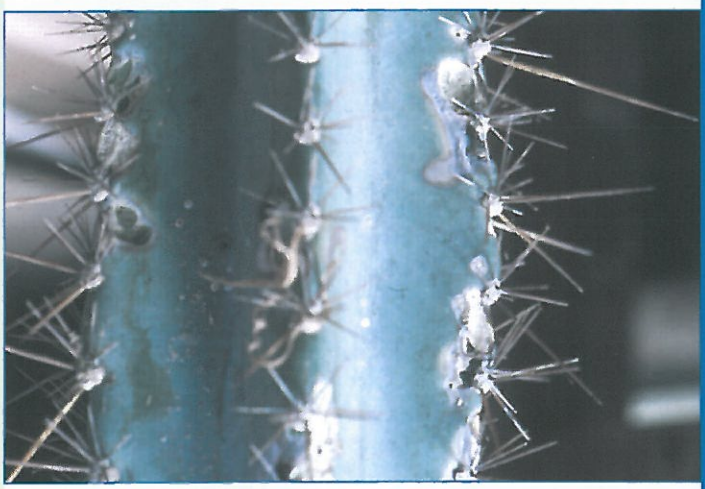

Figure 4. A stem of queen of the night cactus with adult feeding craters.

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Collection and redistribution of the stem borer

At the time of publication, the stem borer was not yet freely available for redistribution in South Africa, and was established in large numbers at one site in the country only. ARC-PPRI could be contacted for the latest information in this regard.

CONTACT PERSONS

Consult leaflet 1.4 for the most updated contact details.

- Biocontrol research and supply of biocontrol agent: 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.

FURTHER READING

MCFADYEN, R.E. & FIDALGO, A.P. 1976. Investigations on *Alcidion cereicola* (Col.: Cerambycidae) a potential agent for the biological control of *Harrisia martinii* (Cactaceae) in Australia. *Entomophaga*, 21: 103-111.

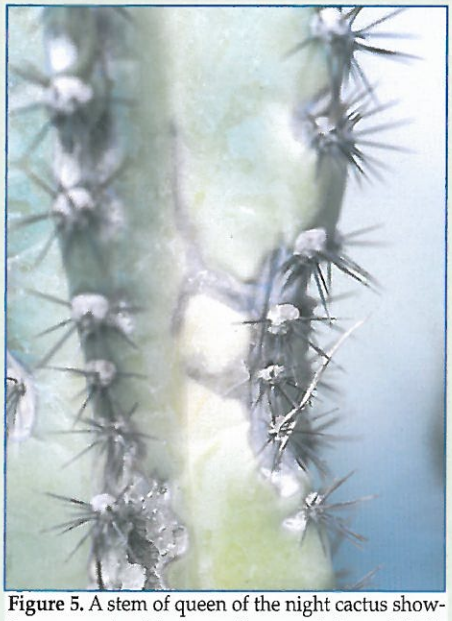

Figure 5. A stem of queen of the night cactus showing two oviposition scars(bottom right and left), with brown lines indicating the superficial tunnels of the young larvae.

Figure 6. Adult stem borer on a harrisia cactus stem, showing adult feeding craters and probing holes.

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