Bitou Bush

Biological control of bitou bush with the leaf-rolling moth (*Tortrix* sp.)

Bitou bush, *Chrysanthemoides monilifera* subspecies *rotundata*, first found its way to Australia in 1908, dumped as ballast from ships from South Africa on the banks of the Hunter river. The species was then recognised as an effective coloniser and was deliberately planted for soil and dune stabilisation from 1946 – 1968 by the Soil Conservation Service of NSW along the eastern coast of Australia. By 1982, bitou bush was found along 60% of the NSW coast (660km) and the dominant species along 220km of coast.

Where bitou bush invades, the native plant community declines, leading to a decline in floral biodiversity and changes in the diversity of birds, mammals and ground-dwelling insects. Bitou bush also harbours pest animals like foxes and introduced birds which disperse the seeds.

The leaf-rolling moth (*Tortrix* sp) is the most damaging insect feeding on bitou bush in its home country of South Africa. In Australia and South Africa, CSIRO Entomology and the Keith Turnbull Research Institute have completed extensive host specificity testing. Two strains of the leaf-rolling moth have been collected. The other strain is specific to a close relative of bitou bush, boneseed, *Chrysanthemoides monilifera* subspecies *monilifera*. In South Africa, the leaf-rolling moth has not been found on any other plant species except bitou bush and boneseed.

Contacts

CSIRO Divison of Entomology, Canberra
Website: www.ento.csiro.au
Anthony Swirepik Tel (02) 6246 4252
Ruth Aveyard Tel (02) 6246 4348

NSW Agriculture, Weed Biological Control Unit
Royce Holtkamp Tel (02) 6763 1234
Phil Stephenson Tel (02) 6640 1649

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Natural Heritage Trust
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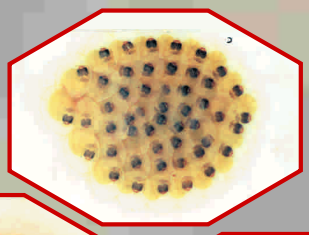
Integrated Control

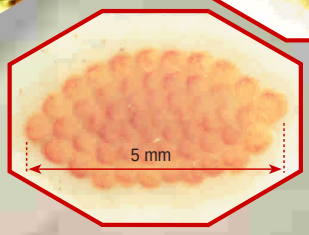
Biological control agents, like the tip moth, seed fly and leaf-rolling moth, complement each other and increase pressure on bitou bush, making it less competitive. However, successful, long-term, control of bitou bush will generally require a combination of methods, often site specific, which may include herbicide, hand pulling and/or fire. Revegetation work may also be required to complement natural regeneration, as remnant native seed banks will have declined with time under bitou bush infestations.

Bitou Bush | *Tortrix* sp.

Lifecycle

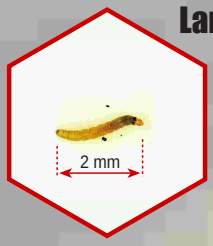
1 Egg

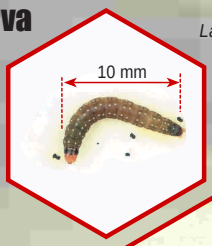




Egg batches are green to yellow when first laid, then turn orange and just before hatching the black head capsules of the larvae are clearly visible. The batches are flat and covered with a transparent film, which remains after the larvae hatch. Egg batches can be found on both the upper and lower surface of the leaf.

2 Larva





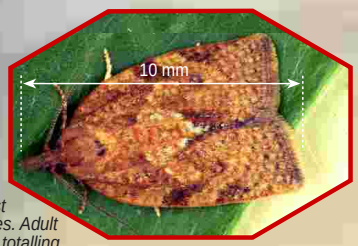
Larvae have 5 or 6 instar stages. First instars have an orange body and dark head. As instars develop their light brown head colour changes to orange. Their body becomes yellow/green to olive green. Later instars develop dark green to black bodies, with stripes of small white spots.

Larvae feed inside a shelter formed by binding leaves together with silk. The larvae can also drift around on silk threads to move to fresh foliage. When disturbed larvae wriggle vigorously and may drop from the plant.

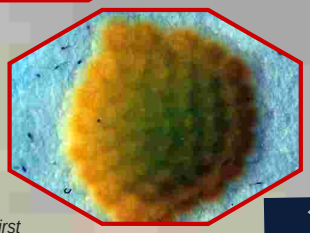
3 Pupa

Pupae are found in the larval shelter.

4 Adult



Adults camouflage well with the damage caused to bitou bush after larval feeding. They are most active at night, especially the males. Adult females lay about 7 egg batches, totalling approximately 200 eggs per female.



Lifecycle

The lifecycle (egg to adult) of the leaf-rolling moth takes about 8 weeks to complete (longer in the cooler winter months and probably a bit shorter in the warmest summer months). Eggs hatch after 8 days and the larvae move to the shoot tips to begin feeding. The larval stage lasts about 30 days, pupa 10 days and adults 14 days. In the field, in South Africa, there are peaks in egg production during July, November and late January.

Impact

The larvae feed on leaves, stems and surfaces of young shoots resulting in death of shoot tips. High larvae populations in summer, when the insect is most active, may severely defoliate, weaken or kill plants. Revegetation strategies may need to be implemented to stabilise sites severely affected by the leaf-rolling moth.

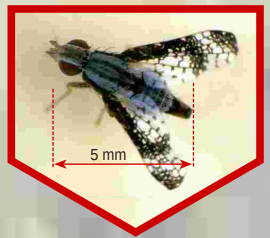
In South Africa, the leaf-rolling moth suffers heavy attack from predators and specialised parasites. The quarantine process excludes the release of these natural enemies in Australia, however native predators and parasites may adapt and reduce its effectiveness.

Releases

A collaborative project between CSIRO Entomology and NSW Agriculture (funded by NHT) has commenced to rear, release and evaluate the performance of the leaf-rolling moth. The first release of the leaf-rolling moth on bitou bush was near Grafton NSW in 2001. Subsequent releases have been made along the NSW coast from Moruya in the south to the Queensland border.

To date the process has focussed on the release of egg batches and larvae. Egg batches, which have been laid on cardboard or leaves are released by stapling them face down onto leaves at the site. Branches of bitou bush containing larvae are attached with twitch wire, or simply laid across branches at the release site. The larvae are mobile and quickly move off the dying branches onto the new food source.

Other Biological control Agents



The bitou bush tip moth, *Comostolopsis germana* (pictured left), feed in stem tips destroying developing leaves, buds and flowers reducing seed production. It is now widely established in the field but does suffer heavy predation and parasitism at some sites.

The bitou bush seed fly, *Mesoclanis polana* (pictured bottom left), is also now widely established. The larvae feed on developing seed, causing major reductions in seed production.

Several leaf-feeding beetles, *Chrysolina* sp. and *Cassida* sp., have been released but none have established.

Currently studies are being conducted on two other possible agents to control bitou bush. A rust fungus, *Aecidium osteospermi*, and the leaf buckle mite, *Aceria neseri*.