



# Biological Control of Gorse with the Gorse Soft Shoot Moth

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*This Landcare Note describes the gorse soft shoot moth, a biological control agent for gorse, Ulex europaeus.*

## Common and scientific names

Gorse soft shoot moth, *Agonopterix umbellana* Fabricius  
Order Lepidoptera, Family Oecophoridae.

## Background

Gorse (furze) *Ulex europaeus* L. is native to central and western Europe. It was introduced to Australia in the early 1800s and now occurs in Victoria, Tasmania, South Australia, Western Australia, NSW and the ACT. Gorse is listed as a Weed of National Significance as it is such an invasive environmental and agricultural weed in Australia, particularly Victoria and Tasmania. It invades bushland, reducing access and conservation values and threatens the survival of rare and endangered plant species. On pastoral land, gorse significantly reduces pasture and animal productivity. Gorse also provides habitat and shelter for vertebrate pests such as rabbits and foxes, and increases fire hazards.

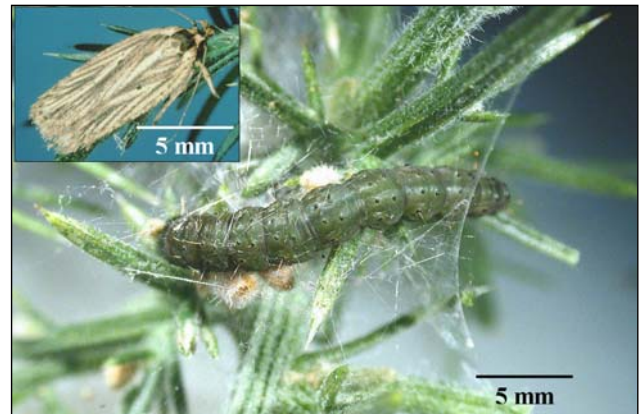
Native to Europe, the gorse soft shoot moth has been successfully introduced as a biological control agent to Hawaii, Chile and New Zealand, and was approved for release in Australia in 2007 by the Australian Quarantine and Inspection Service and the Department of the Environment, Water, Heritage and the Arts.

## Description

Adult gorse soft shoot moths have light brown forewings with distinctive dark brown diagonal lines. They are approximately 1cm long with a 2cm wingspan (Fig. 1). When resting their antennae lie characteristically along the folded wings.

Eggs are barrel-shaped, about 1mm in length and bright yellow in colour when first laid. During development, a red ring will appear on the top of the egg, before turning black when the eggs are ready to hatch.

Young larvae (first to fourth instar) are dark brown with black heads and black thoracic plates. Mature larvae (fifth instar) turn a dull olive green colour and are approximately 2cm in length (Fig. 1)



*Figure 1. Final instar larva of gorse soft shoot moth and adult (inset).*

## Life cycle

Gorse soft shoot moths have only one generation per year. In early spring adults emerge from diapause, mate and lay eggs near buds in the axils of gorse spines and stems. Egg hatching coincides with the availability of succulent new growth. Newly hatched larvae migrate to young buds and spin a silken tube, feeding on the developing spines of the apical tip. As larvae develop they spin larger tubes (Fig. 2) and feed on the lateral spines of the growing shoot. Larvae pupate within the silken tube by mid summer and adults emerge by late summer moving into the centre of the gorse bush to begin their winter diapause.



*Figure 2. Webbing of gorse soft shoot moth larva.*

At 20°C development from egg to adult takes around 8 weeks. Females can lay up to 250 eggs, which take about 10 days to hatch. Larvae pass through 5 instars, taking about 32 days and will pupate for another 10 days before emerging as adults.

## Impact

Feeding damage is caused by the juvenile stage of the gorse soft shoot moth. The early instar larvae will cause some damage but it is the later instar larvae feeding on the developing lateral spines of the growing shoots that cause the greatest impact. If the larvae fail to kill the shoot, the destruction of spines from larval feeding destroys the plant's reproductive buds, which reduces or prevents flower production in the following spring.

## Releases

Gorse soft shoot moth larvae were imported from New Zealand field colonies into DPI Victoria's quarantine facility at Frankston in December 2006. During 2007 the imported material was reared through a mandatory generation under quarantine conditions to ensure the culture was free of disease. In September 2007 the culture was cleared from quarantine and releases commenced in Victoria and Tasmania. The gorse soft shoot moth will continue to be mass reared and released at gorse infestations across Australia.

Carefully selected nursery sites will be established within Victoria and Tasmania to enable the moths to multiply in the field. Once densities start to increase, community groups should be able to assist in the harvesting of larvae from these sites for redistribution to other infestations, eventually increasing the geographic coverage of the gorse soft shoot moth in Australia.

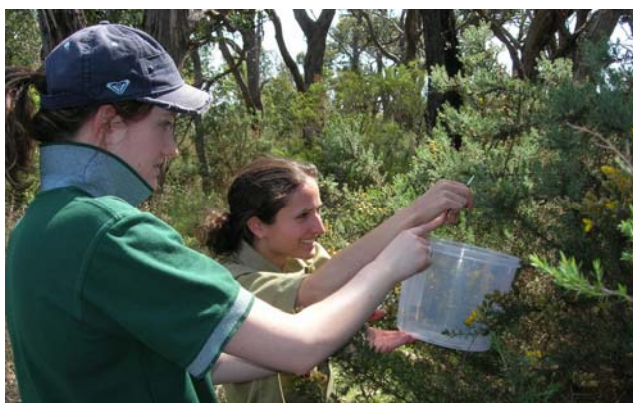


Figure 3. Releasing the gorse soft shoot moth larva in Victoria.

## Integrated control

Biological control cannot eradicate a weed but can reduce the spread and density of infestations. In some cases

control is achieved to the level where the weed is no longer of concern and no other control is necessary. More commonly, other methods are still required to achieve the desired level of control. Biological control should not be considered the complete answer to a gorse problem. It is a technique that should be used in conjunction with other control measures in an integrated management program.

The gorse soft shoot moth is the fourth biological control agent to be released on gorse in Australia. The gorse seed weevil, *Exapion ulicis* (see Landcare Note LC0432), was released in 1939 and is now well established throughout the range of gorse in Australia. The weevil larvae consume gorse seeds within developing pods during spring and summer. However, seed produced in autumn and winter is not attacked as the weevil is not active during this time of the year. The gorse spider mite, *Tetranychus lintearius* (see Landcare Note LC0167), was first released in Victoria and Tasmania in 1998 and is now firmly established. Studies in Tasmania show that damage by the gorse spider mite can reduce the growth of gorse plants by around 36%.

However, predators such as the Chilean predatory mite, *Phytoseiulus persimilis*, and mite eating ladybirds, *Stethorus* spp., are likely to limit its effectiveness. The gorse thrips, *Sericothrips staphylinus* (see Landcare Note LC0170), was first released in Victoria and Tasmania in 2001 and is now established at a number of sites but is spreading slowly.

Biological control of gorse will be more effective if a suite of natural enemies are introduced into Australia that attack gorse in different ways and at different times of the year, so investigations of other potential agents are continuing.

## Further information

If you would like to be part of the gorse biological control program please contact DPI Victoria, Frankston centre, PO Box 48, Frankston, Vic., 3199, ph. 03 9785 0111.

## Acknowledgments

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Photographs supplied by Richard Halloway (Figure 1), Landcare Research New Zealand Ltd. (Figure 1 inset) and DPI Victoria.

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