Etiella Management in Lentils

SARDI pestfacts - information for better crops

SARDI RESEARCH AND DEVELOPMENT

Government of South Australia

GRDC Grains Research & Development Corporation

ABB

PULSE AUSTRALIA

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Chris Krawec, SARDI Entomology

1. The Etiella problem

The Lucerne seed web moth, *Etiella behrii*, is a sporadic but serious pest of lentils in southern Australia. Etiella flights commonly occur in mid to late September, which usually coincides with early pod development in most districts. Female moths lay their eggs under the calyx or on the pod surface, and these hatch in 4-7 days depending on temperature. Newly hatched larvae bore into immature pods within 24 hours to begin feeding on developing grain, which results in inferior quality lentils and yield losses due to a reduction in grain weight and grain breakage. Once inside the pods, larvae are protected from insecticide sprays and damage is usually only identified at harvest.

Australian lentil producers face significant cleaning costs to meet current receival standards, which allow for no more than 1% insect damaged grain. Etiella is considered a high priority pest and successful control relies on thorough crop monitoring in order to properly time insecticide applications to target adult moths prior to egg lay.


a.


b.

2. Identifying Etiella

Adult moths are grey, 10-15mm long with a prominent beak. The wingspan varies between 20-25mm, and the forewing has a distinctive white stripe running along its full length. At rest, the wings are folded over the body, giving the moth a sleek, elongate appearance. Etiella moths will commonly fly 1-2m if disturbed by people walking through the crop.

Adult females lay approximately 200 eggs, which are about 0.5mm in diameter and difficult to see with the naked eye. They are initially cream-translucent and turn pink-orange just prior to the larvae hatching. In lentils eggs are commonly laid under the calyx and hatch in 4-7 days.

Etiella has five larval stages (instars). Newly hatched larvae are very small, approximately 1mm in length and are light orange with a dark head. As the larvae develop the colour of the body changes to a pale green to cream, with distinctive pink stripes running along its length. Mature larvae are commonly 10-12mm long and pinkish red in colour.

Once mature larvae exit pods to pupate in the soil. Pupae are smooth, light to dark brown in colour, and 9-12mm in length.

Other snout nosed moths similar to Etiella may be found in lentil crops, but only Etiella has the prominent white stripes running along the wing.


c.


d.


e.

Life history

Etiella has 2-3 generations annually, the number of which are dependent upon temperature, location, and the availability of host plants. The first moth flights usually occur during late September early October. It is unknown whether the Etiella moths that colonize lentil crops have emerged locally or whether they migrated from further distances. Typically only the first generation is a concern for lentil growers. However, in seasons that finish late, the second generation may also cause significant seed damage. Etiella moths may live from one to three weeks.


f.


g.

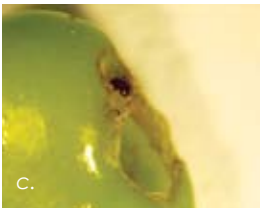
Opposite page: *a. Etiella behrii moth 15mm, b. 5th instar larva, pink colouration 12mm.*
This page: *c. 4th instar larva 9mm, d. Immature egg under calyx 0.5mm, e. Mature egg on calyx, orange colouration f. Newly hatched Etiella larvae 0.9mm, g. Etiella Pupae 10mm*

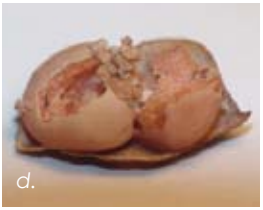
3. Etiella damage

First instar Etiella larvae bore into pods within a short period after hatching, and begin feeding on the developing grain. Usually each larva damages more than a single pod, and often webs several pods together to continue feeding. Larvae often only partially consume seeds, resulting in poor quality lentils and yield losses due to grain breakage at harvest.

Etiella damage is similar in appearance to native budworm damage, and as a result is commonly mistaken. Both insect pests chew lentil seeds, leaving jagged edges around their feeding sites. Etiella feeding damage can often be distinguished from that of native budworm by the presence of silken webbing.

Insect damaged grain is often unsaleable, and Australian growers are having to pay significant cleaning costs to meet the current receival standards, which allow for no more than 1% insect damaged grain.





a. Etiella damage to lentil seeds, b-c. Etiella larva feeding on lentil seed, initial damage, d. Etiella feeding damage - single pod

4. Monitoring techniques

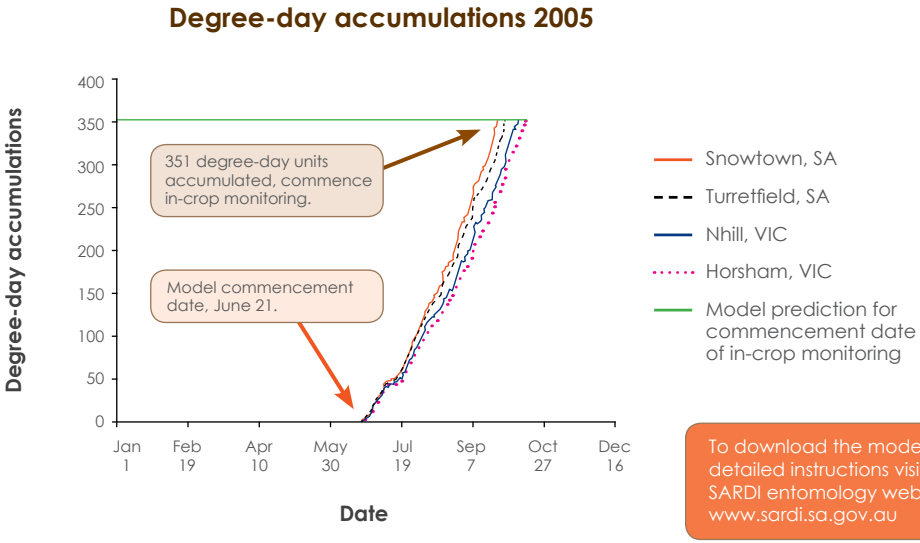
The ability to successfully identify the presence of Etiella moths within lentil crops is essential for timing spray decisions. Moths must be controlled prior to egg lay, as insecticides are unable to control Etiella eggs, and once the larvae bore into pods they are protected from sprays.

A number of monitoring methods have been developed, and they should be implemented as part of an integrated strategy to successfully control Etiella moths from the onset of pod formation. These include:

- Degree-day model
- Pheromone traps
- Light traps
- Sweep netting

Degree-day model

A degree-day model has been developed which uses maximum and minimum daily temperatures to forecast the flight activity of Etiella moths.



To download the model with detailed instructions visit the SARDI entomology website. www.sardi.sa.gov.au

The model is able to accurately predict the timing of initial spring flights for the various lentil-growing districts, and should be used to identify the peak period of Etiella flight activity.

The model is available to download from the SARDI entomology website: http://www.sardi.sa.gov.au

Daily maxima and minima must be entered from June 21 onwards. The model identifies the date to commence in-crop monitoring for Etiella moths.

Pheromone traps

Pheromone traps can be used in lentil crops to monitor for evidence of Etiella flight activity. These are sticky traps baited with a specific sex attractant. They have the advantage over light trapping of being specifically attractive to Etiella, and are therefore particularly useful for people who have difficulties in identifying Etiella moths.

A minimum of two to three traps should be placed within a crop, positioned approximately 250mm above the canopy. Trial data suggests that traps remain effective for up to one month.

See the SARDI entomology website for up to date information on how to obtain Etiella pheromone traps. www.sardi.sa.gov.au

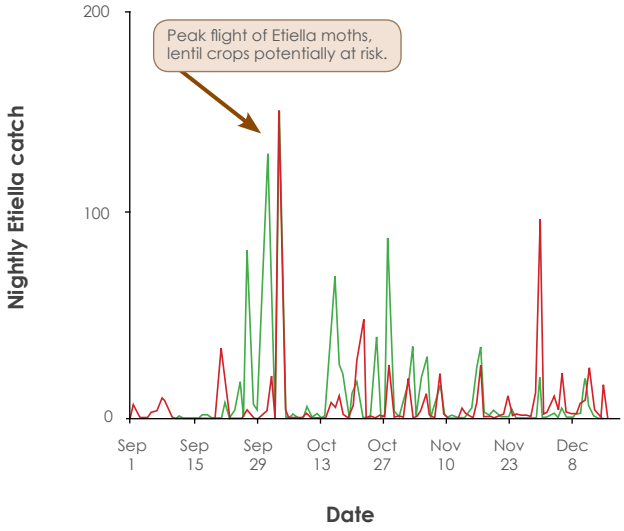
Sweep netting

Sweep netting is a common method of monitoring for Etiella moths. Lentil crops should be sampled at least once a week during podding for evidence of Etiella activity. A minimum of three groups of 20 sweeps should be randomly undertaken within each lentil field. An action threshold of 1-2 Etiella per 20 sweeps is recommended.

Light traps

Light traps are another means of monitoring Etiella moths. However, they catch a broad range of insects, which makes checking for Etiella amongst the catch difficult and time consuming. Checking outdoor lights around buildings during the evening is a simple means of detecting Etiella flight activity in spring.

Nightly light trap catch results 2005



Graph represents Etiella flight activity. Verify Etiella presence in-crop prior to applying spray.

5. Chemical control

Etiella control is achieved by applying insecticides to target adult moths prior to egg lay. Insecticide trials were conducted in South Australia and Victoria during 2004 and 2005 to obtain efficacy data to support the registrations of deltamethrin and esfenvalerate for Etiella control in lentils. The results suggest that the use of either product applied at the correct time can control Etiella damage to the acceptable industry threshold of <1% insect damaged grain.

A laboratory bioassay was also undertaken to test the field rates of deltamethrin and esfenvalerate under optimal conditions. The mortality of moths and larvae were assessed for several concentrations at and below the field rates for both insecticides. The results suggest that Etiella moths and larvae are highly susceptible to the field rates of deltamethrin and esfenvalerate, both of which caused 100% mortality to both life-stages within 24 hours.

Deltamethrin and esfenvalerate both have short withholding periods, which enable them to be used late in the season if needed. Permits for the use of these two insecticides to control Etiella in Australian lentil crops are in place until 2011.

Sprays applied to control native budworm early in the podding period may offer some control for Etiella if present. However, monitoring for Etiella should again commence no longer than one week after spraying.

6. Managing Etiella in lentils

Etiella management is based on timing spray applications to target Etiella moths within the crop. The degree-day model should be used to identify the onset of significant Etiella flight activity within crops. Crop monitoring using either sweep nets or pheromone traps should then commence, and continue at 4-5 day intervals. If moths are detected in a podding crop, a spray should be applied as soon as possible (unless already sprayed in the previous 7-10 days). Continue monitoring lentil crops from 7-10 days after the application of an insecticide treatment, up until crop desiccation.

The adoption of these recommendations will ensure the optimal timing and effectiveness of an Etiella insecticidal treatment, and minimize the likelihood of crop damage and grain rejections.

Management summary table

Event	Management Action
September 1st or prior to pod formation.	Start running degree-day model, (update twice weekly).
From early pod set, or from the monitoring commencement date predicted by the model.	Initiate field monitoring program - Locate pheromone traps within crops, (check weekly) - Sweep net lentil crops, three groups of sweeps (minimum weekly) - Check outdoor lights at nights for evidence of Etiella activity.
First finding of Etiella exceeding spray threshold.	Determine time of last insecticide application. If greater than 10 days apply Etiella spray as soon as possible.
7 days after spraying.	Continue monitoring program at weekly intervals until crop desiccation.

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