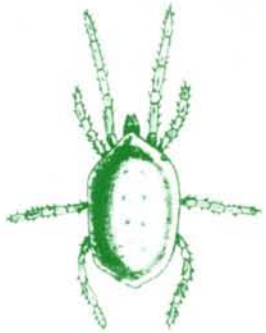
Insect Identification & Control

RED LEGGED EARTHMITE

Halotydeus destructor

Attacks all grain legumes



Description *(See plate 38)*

Black-bodied mites with red legs found on cotyledons, leaves or on the ground. The fully grown mite is about the size of a pin head. They lay two different types of eggs. Winter eggs are bright yellow or orange and are laid in masses on the underside of leaves, in damp places or in contact with the soil. When temperatures are over 18°C in spring, mite activity decreases and oversummering eggs are formed. These are not laid but are retained in the body of the mite when it dies — an adaption that seems to stop the eggs from drying out.

Damage

Mainly a pest of germinating legumes. Mites are most prevalent on sandy soils. Their feeding causes leaves to first turn silvery, then brown and shrivelled, so that plants look scorched. Heavy infestations can kill young seedlings *(See Plates 39, 40)*.

Life cycle

Prolonged plant growth during long, wet springs favours the production of oversummering eggs. Autumn rains trigger hatching in three to nine days. False breaks in the season can cause large losses in mite numbers. Mites take 20 to 25 days from hatching to mature and start laying eggs.

Control

Damaging infestations may be prevented by clean cultivation especially during autumn and early winter. Control of favoured host weeds such as capeweed will also help to keep numbers down. If earthmites build up to damaging numbers as crops germinate they are worth spraying – see page 6 : 9 for control details.

LUCERNE FLEA

Sminthurus viridis

Attacks all grain legumes

Description *(see plate 41)*

Small (2.5mm), plump, wingless, yellow-green hopping insects which make window-pane like holes in leaves *(See Plates 42, 43)*. They can jump up to 30cm at a time.

Damage

Germinating legume crops are vulnerable to lucerne flea. Heavy infestations can kill crops. Young crops in particular may be seriously set back when heavily damaged by these pests. Crops turn an unhealthy pale green and some plants may become shrivelled and stunted.

Life Cycle

Long wet springs favour flea build ups, often causing more serious outbreaks in the following autumn. Oversummering eggs are laid in the soil and hatch soon after opening rains. The eggs take about two weeks to hatch, and the immature stages a further three weeks to grow to sexual maturity. A second generation may be completed before winter temperatures retard development and reduce the numbers. In spring a second burst of activity occurs when rising temperatures allow both pests to breed faster and increase their numbers. This period of activity stops in late spring when dry conditions lead to the production of oversummering eggs.

Control

As for red legged earthmite – see page 6 : 9.

COWPEA APHID

Aphis craccivora

Affects beans, lupins

Description *(See Plate 44)*

The adults have shiny, black bodies and the nymphs (young aphids) are dull and slate colored. Both forms have pale, whitish legs and antennae with black tips. They cluster in colonies on the growing tips and flower shoots, the white skins shed by growing aphids are also usually present *(See Plate 45)*.

Damage

Aphids feed by sucking plant sap, heavy infestations deform the leaves and growing points, stunting the plants and affecting flower set. The remaining flowers and pods may be distorted. The yield of infested plants can be drastically reduced. Affected beans are stunted and have brown spots on leaves. Aphids may also transmit viruses.

Life Cycle

An infestation is generally patchy at first but will spread through the crop if the weather is fine and warm. Infestations start when winged females colonise a few plants in a crop and give birth to wingless nymphs that live in colonies. This may occur from early winter onwards. As the plant deteriorates the aphids move to neighbouring plants, and the area of infested patches within the crop increases *(See Plate 46)*.

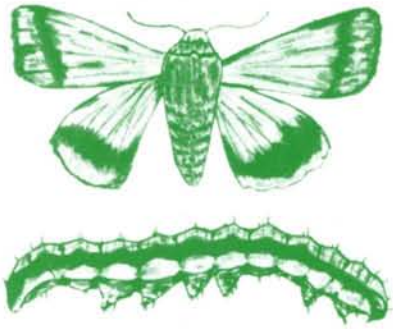
Control

Monitor crops from early winter, and spray if plants with cowpea aphid can be found easily. For spraying details see page 6 : 9. Several of the insecticides for aphid control are highly toxic to bees and should not be applied while bees are foraging.

NATIVE BUDWORM

Heliothis punctiger

Attacks all grain legumes



Description *(See Plate 47)*

Adult moths are nocturnal, so are rarely seen during the day. They vary in color from grey-green to pale cream and have a wing span of 3cm to 4.5cm. The hind wings have a dark, broad band on the outer margin.

The adult moths lay round eggs (0.5mm in diameter), singly on the host plant *(See Plates 48, 49)*. The eggs are white but turn brown just before hatching. The larvae grow to 5cm long and vary in color from green, yellow pink and reddish brown to almost black.

However the larvae can be easily identified, despite the colour variation, by a broad yellow stripe along the body *(See Plate 50)*. The young larvae (less than 10mm) prefer foliage. Older larvae prefer pods *(See Plate 51)*.

Other larvae, which look like native budworm, may be found in a grain legume crop, e.g. southern armyworm *(See Plate 61)* and pink cutworm *(See Plate 62)*. These are primarily grass feeders and rarely do any damage to grain legumes.

Damage

The larvae bore into the pods and usually destroy several seeds in each pod. One larva may attack four to five pods before reaching maturity. The amount of damage to each seed varies considerably, and the seed remnants have jagged edges. This contrasts with damage to peas by pea weevil which eat out a cylindrical section within the infested pea and leave a smooth, circular exit-hole *(See Plate 52)*.

Life-cycle

In South Australia native budworm may produce up to five generations a year. The spring generation causes the most damage, especially to grain legume crops. The late summer generation usually attacks lucerne seed crops. During winter native budworm enters a resting period as a pupa in the soil. Adult moths emerge from these overwintering pupae in August and September and live for about two to four weeks. The moths are capable of laying up to 1,000 eggs each.

The eggs hatch one to two weeks after laying in spring and the larvae feed in crops for four to six weeks. The mature larvae leave the host plant to pupate in the soil. During spring, summer and early autumn the pupae develop quickly and a new generation of moths emerges after about two weeks. Native budworm eggs and holes on soursob petals are signs of native budworm activity in the area *(See Plates 59, 60)*.

Control

The spraying program should aim to control larvae less than 10mm long because bigger larvae require higher rates of insecticides. The larvae must be sprayed before they burrow into the seed pods or they will be shielded from insecticides and will continue to damage seed.

Crops should be monitored every three or four days from the beginning of flowering or first moth activity to detect the first larvae. It is essential to detect the first infestations of young larvae and the numbers of larvae present for good control. To monitor grub levels in crops, sweep crops with a net or bucket or shake plants over newspaper. Sprays should be applied when sweeps collect five or more larvae in every 10 sweeps.

In some seasons a second spray application may be necessary. See page 6 : 11 for spray details.

A common question. How long does it take the grubs to grow ? The following table, based on DARABUG from Vic. Dept. of Ag. with meteorological data from 1981 to 1991 gives some approximate times.

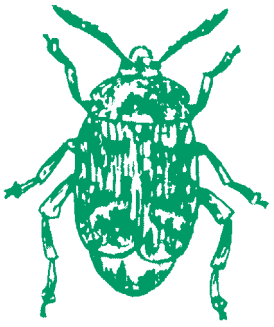
TABLE 6:A
Development time (days) for native budworm in S.A.

Insect stage	Aug 20	Aug 30	Sep 10	Sep 20	Sep 30
Egglaying to Egghatch	21	18	16	13	13
Egghatch to Larvae 7 - 10mm	32	30	28	27	24
Egglaying to Larvae 7 - 10 mm	53	48	44	40	37

PEA WEEVIL

Bruchus pisorum

Infest peas



Description *(See Plate 53.)*

The adult weevil is a chunky beetle about 5mm long, brownish in color, flecked with white, black and grey patches. The eggs are yellow, cigar-shaped and measure 1.5mm by 0.6mm *(See Plate 54, 55)*.

Damage

Pea weevil is a major pest of field peas. Weevil infested peas threaten export markets for peas and other grains and export firms have a nil tolerance for live pea weevil in peas.

Pea weevil larvae feeding inside the seed consume about 20% of the seed weight. Infested grain is usually rejected by the split pea trade because wastage occurs and extra processing is necessary to remove pea weevil bodies *(See Plate 56)*.

Life cycle

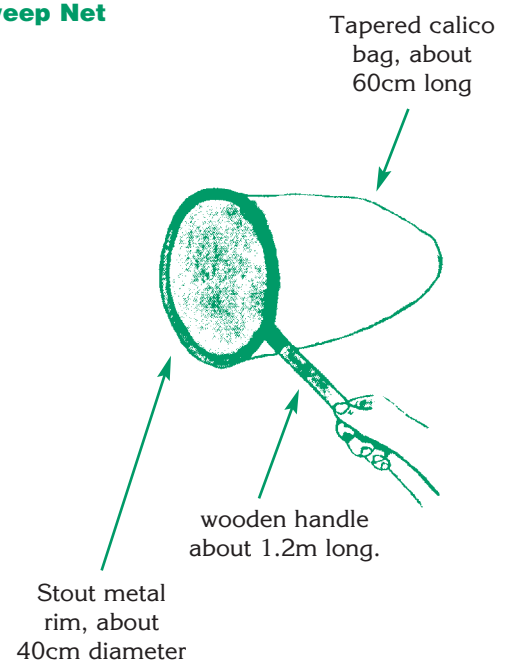
Pea weevil adults emerge from over-wintering sites such as trees and sheds in the early spring, when temperatures rise above 18°C, and fly to the edge of the nearest pea crop. These adults settle in the outer five metres of crop and then disperse further into the crop in a series of short flights. They feed on pollen for five to fifteen days, then the females lay eggs on pea pods *(See Plate 54)*. As the larvae hatch they bore directly from the eggs into the pea pods, so they are not killed by insecticide sprays. Larvae feed and later pupate inside the pea seed. The adult weevils emerge *(See Plate 57)* over several months from late November and over-winter in protected nooks and crannies, e.g. under bark, and along fence lines *(See Plate 58)*. When pea crops dry off before harvest the pea weevil larvae infesting the grain are not fully grown. Early harvest and fumigation of the grain is recommended to kill pea weevil before the new population of adult weevils emerges and infests the district.

Crop Monitoring

Monitoring the crop for the presence of pea weevil is the only way of determining whether and when to spray.

Monitoring is best done with a sweep net on calm days.

Sweep Net



Because the numbers of invading pea weevil can vary greatly around the edge of the crop it is wise to monitor two sites along each face of the crop. Sweep the net between one and five metres from the crop edge. Make 25 sweeps with the net at each monitoring site and then count and record the number of weevil captured. Empty the net and move to the next site. The numbers of pea weevil captured are likely to be greater near sheds, pine trees and gums.

Pea weevils invade pea crops for around three to five weeks. Egg laying starts within seven to fourteen days of the first invasion into the flowering crop. After two weeks the pea weevil can reach up to fifty metres into the crop.

Crops should be monitored every three to four days from the start of flowering.

Control

The crop should be sprayed to control pea weevil if an average of two or more pea weevil per 25 sweeps are netted along the crop's edge.

Pea weevil adults must be controlled before they lay eggs on the pea pods, this means most crops should be sprayed when the first flowers begin to wither and pea weevils are present. In most seasons two separate sprays will be required - one for pea weevil control and the other, later on, for native budworm, and possibly pea weevil, control. See page 6:9 for spray details.

Spray Timing

Early sown crops may flower before pea weevil adults invade the crops. Monitor these crops from the start of flowering and spray about seven days from when pea weevil adults are first found.

Border sprays are effective on these crops if a minimum of 40 metres is sprayed.

Later sown crops should be sprayed as the first flowers wither and the first pods set. Because pea weevil are likely to have spread throughout these crops by this time a full crop spray is recommended.

Insecticides control pea weevil adults for only seven to ten days so all crops should be monitored by sweep netting from seven days after spraying to decide whether another spray will be needed to control later invasions of weevils.

Early Harvest

Early harvest and delivery or fumigation *(See Page 9 : 8)* of peas is recommended to stop the new generation of adult weevils from emerging and infesting the property and neighbouring district.

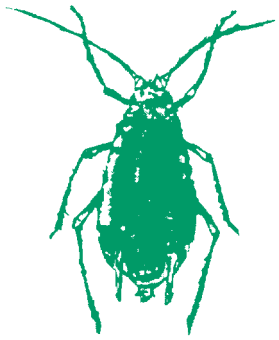
This practice is a key factor in limiting pea weevil abundance in South Australian and Victorian pea districts.

Early fumigation will also help reduce larval damage to harvested grain and ensure that export grain is free of live insects.

BLUE-GREEN APHID

Acyrthosiphon kondoi

Attacks lentils, lupins & peas



Description *(See Plate 63)*

Adults are small (3mm), green or blue- green with two long spines extending from the rear of the back. They usually cluster in colonies at first near tops of individual plants and if numbers continue to increase they move to the undersides of older leaves as well. *(See Plate 64)*.

Damage

Blue-green aphids suck sap from fresh young growth. This results in bunched leaves and wilted and stunted plants *(See Plate 65)*. Pea or lupin crops may be damaged, especially in early spring although this may happen only rarely in southern Australia.

Life Cycle

Blue-green aphids prefer cooler weather (10°C to 18°C) for breeding. Females produce up to 100 young at a rate of approximately 7 a day. Winged aphids develop when infestations become crowded. These fly or are blown by the wind to start new infestations elsewhere.

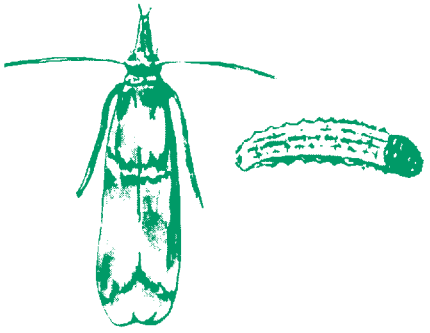
Control

Spray with insecticide *(See Page 6 : 11)* where damage to growing points is obvious.

ETIELLA

Etiella behrii

Attacks lentils, lupins & peas



Description *(See Plate 66)*

Adult moths are grey, 10 to 15mm long, with a prominent beak. The wing span varies between 20 to 25mm, and the forewing has a distinctive white stripe running along its full length. At rest, the wings are folded over the body, making the moth appear long and narrow.

The moths will fly off if disturbed by people walking through a crop. Larvae are small 10 to 12mm long and have a golden-brown head with a black band behind. The rest of the body is pale green (sometimes cream) with distinctive pink stripes running along its length.

Damage

Etiella grubs feed on the seeds within pods. The damaged seeds have jagged edges similar to native budworm damage but are distinguished by the presence of webbing associated with large larvae. Etiella can be a major pest of lentils but is generally less important in lupins and peas.

Life Cycle

Adult females lay about 200 eggs. These are 0.5mm in diameter and are difficult to see with the naked eye. They are initially cream-translucent and turn pink-orange just prior to the larva hatching. In lentils eggs are commonly laid under or around the calyx and hatch in four to seven days in normal spring weather.

The egg hatches into a small larva, which chews into the lentil pod and feeds on the seed usually remaining in the pod until the seed has been eaten. Entry holes are only 0.2mm in diameter and difficult to see. After eating its first pod, the larva enters further pods, often leaving some seeds uneaten. The fourth and fifth larval stages are too large to enter pods but often web several pods together and continue feeding on the seeds within them.

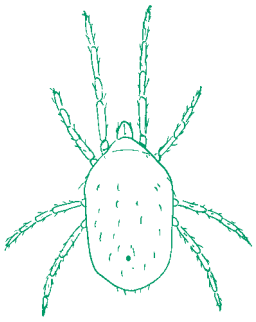
Control

The pest can only be controlled by spraying the moths before they lay eggs. Light traps rather than sweep netting is more effective for early warning. Spraying is not effective against the grubs feeding inside the pods because they are not exposed to sprays. Spraying for pea weevil and native budworm may give some etiella control.

BLUE OAT MITE

Penthaleus major

Attacks all pulses



Description

Has a purple or greenish-blue body with pinkish-red legs compared with a black body and bright red legs for red legged earthmite. Also blue oat mite have a red dot (which can exude small droplets of fluid) near the back of their body.

Damage

Mainly a pest of germinating legumes. Mites are most prevalent on sandy soils. Their feeding causes leaves to first turn silvery, then brown and shrivelled, so that plants look scorched. Heavy infestation can kill young seedlings.

Life Cycle

Prolonged plant growth during long, wet springs favours the production of oversummering eggs. Autumn rains trigger hatching in three to nine days. False breaks in the season can cause large losses in mite numbers. Mites take 20 to 25 days from hatching to mature and start laying eggs.

Control

Damaging infestations may be prevented by clean cultivation especially during autumn and early winter. Control of favored host weeds such as capeweed will also help to keep numbers down. If mites build up to damaging numbers as crops germinate they are worth spraying - (*See Page 6:11)* for control details. Some insecticides sprayed onto bare earth after seeding give good control. Spraying in spring (according to the TIME-RITE® program) will reduce numbers for the following year.

BROWN PASTURE LOOPER

Ciampa arietaria

Attacks lupins

Description *(See Plate 69)*

Young larvae walk with a looping motion and can remain motionless to appear part of the plant whereas older larvae crawl. The loopers are light grey or brown with a darker stripe sandwiched between two thin yellow lines along their backs.

Moths of this species are often seen fluttering around lights in autumn. They are grey, about 20mm long, with delicate rounded wings. The cream colored eggs are usually laid in groups or “rafts” on dry grass stalks.

Damage

Large numbers of brown loopers can reduce plant numbers. They also reduce yield by eating the leaves. The edges of lupin crops are usually affected first as larvae move in from surrounding pastures, especially those containing capeweed, a favourite host plant.

Life Cycle

There is usually only one generation a year. Eggs are laid in autumn. Larvae are very small when the crop emerges. These grow to full size in two months, then pupate in the soil until the next year.

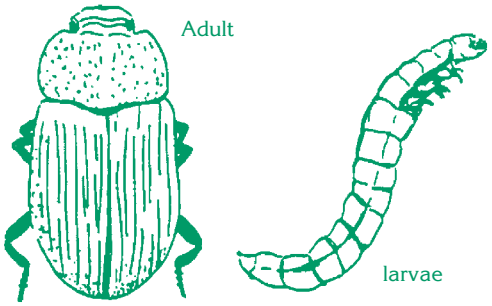
Control

Treat only if loopers are damaging lupin plants. (*See Page 6 : 11)* for spray details.

Other insects that may occur in grain legumes.

FALSE WIREWORM

Gonocephalum misellum (possibly)



Description *(See Plates 6:A & 6:B)*

Larvae are up to 1 cm long, grey in color with 6 legs at the front end. The life cycle is not fully understood. Larvae seem to be present throughout most of the growing season. It is therefore probable that there is only one generation per year with the adult stage being present during the summer.

It is possible that this false wireworm is the grey tenebrionid, *Gonocephalum misellum,* but this has never been conclusively proven.

Damage

In many situations (pastures etc), false wireworm is not considered to be a problem. Generally it is thought to feed on organic matter. However, in some cropping situations, they may have been responsible for damage to young seedling crops (grain legumes and canola). Feeding damage occurs at or just under the soil surface .

LOOPER CATERPILLAR

Chrysodiexis sp

Description *(See Plate 6:F)*

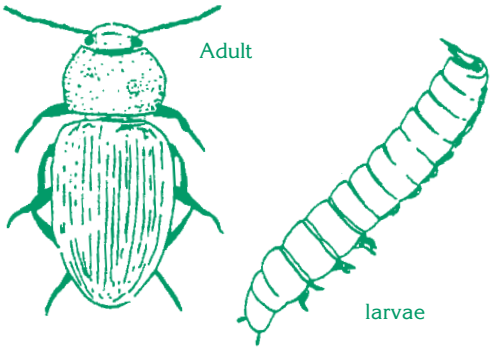
This caterpillar is a true looper with only two pairs of prolegs on the body. It is a lime green in color with pale white stripes running the length of the body. The body tapers in size from the tail end to the head end. Larvae (caterpillars) may grow up to 40 mm long.

Damage

The green looper caterpillar is sometimes quite common in grain legume crops during the spring. It does not do any major damage to grain legumes. It is therefore important **not to confuse** this caterpillar with other pests such as native budworm.

BRONZE FIELD BEETLE

Adelium brevicorne



Description *(See Plates 6:C & 6:D)*

This larvae grows up to 10 - 12 mm in length. It is black with 6 legs at the front of the body and two pointed structures on the tail.

Adults are shiny black and present, late in the year and over summer.

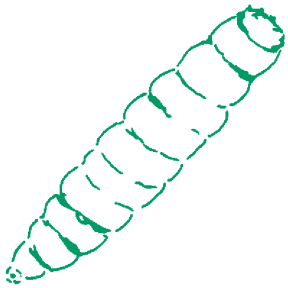
Damage

The larval stage has been implicated in causing damage to young seedlings.

The adults often occur in large numbers in the late spring and accumulate under hay bales, particularly if they are left in the paddock for an extended period. If handled the adults produce an unpleasant odour.

ONION SEEDLING MAGGOT

Delia platura



Description *(See Plate 6:E)*

The onion seedling maggot is similar in form to the common blowfly larvae. It is a legless, white to creamy colored grub, pointed at the head end and up to 6 mm in length.

Damage

Occasionally this maggot can cause damage to seedling grain legumes, particularly lupins. The maggot attacks the stems just under the soil surface. In some situations, it is possible that this insect may be a secondary pest coming after pathogens have attacked the plant creating attractive feeding sites for this maggot.

Damage may appear similar to root rot until split open to show the maggot.

WHITE SNAILS

Description

There are two species - vineyard or common white snail *(Cernuella virgata)* and white Italian snail *(Theba pisana)*. Both species have similar shapes - white coiled shells up to 20mm in diameter, which may have brown bands around the spiral. The common white snail has a open umbilicus *(See Plates 6:G, 6:H, 6:I & 6:J)* whereas the umbilicus of the Italian snail is partly closed.

Damage

Damage caused by snails is mainly at crop establishment and at harvest. Both common white and Italian snails may feed on young crops and bare out substantial areas which then need re-sowing. In late spring, snails climb plants and contaminate the grain at harvest. The contaminated grain may be downgraded or rejected and live snails in grain pose a threat to exports. Crushed snails clog up machinery causing delays during harvest.

Life Cycle

White snails are dormant in summer, becoming active following rain in autumn. It is estimated that each snail can lay up to 400 eggs each year. Young snails hatch about two weeks after egg laying. They feed and grow through the winter and spring and then climb fence posts or plants in late spring, where they go into summer dormancy. Snails live for one to two years. Snails move only short distances. They are spread longer distances in hay, grain, machinery, or vehicles.

Control

Best control is by stubble management on hot days or burning and followed by baiting in autumn before egg laying. Stubble management such as rolling, harrowing or dragging a cable on hot days reduces snail numbers by knocking snails to the ground where they can die in the heat. Air temperature needs to be over 35°C. Some snails may also be crushed by rollers.

Burning in autumn can reduce snail numbers by up to 95%. This means having sufficient material in the paddock for a hot and even burn. Partial burning is less effective in controlling snail numbers. Burning should not be used as a control where paddocks are at risk of wind or water erosion.

Baiting at the right time in autumn will reduce egg laying and so reduce the snail population. Bait when snails have commenced activity following rain. Where controls have reduced snail numbers across paddocks, fenceline baiting can be vital to prevent re-infestation of the paddock. Baiting may be necessary to reduce damage to young crops. Bait should not be spread within two months of harvest to avoid contamination of grain with bait.

Three bait types are available for snail control, methiocarb, metaldehyde and iron chelates. No significant differences in kill have been observed between the three active ingredients.

For all bait pellets currently available the standard rate for snail control in cereal, pulse and oilseed crops is 5kg of bait per hectare. Research has identified that if there are more than 80 white snails (over 7mm in diameter) per square metre this rate should be increased to 8 to 10kg/ha. For conical snails, repeat applications of the 5kg/ha rate are probably more efficient than a one-off application of 10kg/ha.

Windrowing can reduce the number of white snails harvested as the snails are knocked from the crops during windrowing. When they reclimb the plants, many are on the stalks between the windrows rather than in the windrow.

Pages 9:4 and 9:5 have hints on modifications for harvesters to help reduce the snail problem at harvest.

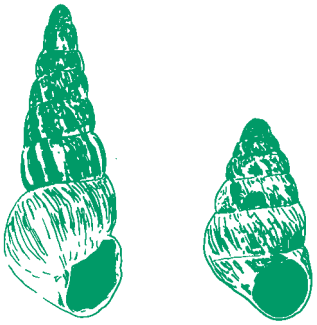
There are no biological controls available for white snails. Grain can be cleaned on farm through seed cleaning equipment where snail contamination is so high that grain will be downgraded or rejected.

For full details consult the manual titled “Bash ‘Em, Burn ‘Em, Bait ‘Em: Integrated snail management in crops and pastures”, available from the TOPCROP Resource Centre 1800 652 483 and from GRDC GroundCover Direct www.grdc.com.au.

Recommended bait application rates for cereals, pulses and oilseeds:

Snail	Snails over 7mm/sq. metre	Bait required kg/ha
White Snails	5 to 80 (Pulses & Canola)	5
	20 to 80 (Cereals)	5
	Over 80 (all crops)	8 to 10
Conical Snails	No threshold established	5

POINTED OR CONICAL SNAILS



Description

There are two species - conical snails *(Cochlicella acuta)* and small conical snails *(Cochlicella barbara)*. Conical snails are also known as pointed snails. Mature conical snails have shells 12 to 18mm long whereas the shells on the small conical snails are 8 to 10mm long. The ratio of shell length to base diameter is always greater than two for conical snails and less than two for small conical snails. *(See Plates 6:K & 6:L)*

Damage

Conical snails contaminate grain at harvest, especially cereals and canola. They feed mostly on decaying plant material but can damage cereal and canola seedlings. The small conical snail feeds on growing plants and can contaminate grain. Lucerne is a favourite plant.

Life Cycle

Conical snails have a similar life cycle to white snails. Conical snails may over-summer under stones as well as up on posts and plants. Small conical snails over-summer on the ground in the leaf litter.

Control

Control measures for conical snails are the same as those used on white snails but are generally less effective as these snails shelter in cracks in the ground or under stones.

Dragging harrows or a cable before burning improves the control by exposing more snails to burning.

A biological program is in place for the control of the conical snail, *C. acuta*. A parasitic fly, *Sarcophaga penicillata*, has been released on the Yorke Peninsula and its establishment and success is being measured by SARDI Entomology.

SLUGS

Description

The most common species in southern Australia is thought to be the reticulated or field slug, *Deroceras reticulatum*. Usually grey in color the adult slugs range from about two to four centimetres long.

The black keeled slug, *Milax gagates* has also been found in canola and wheat paddocks. This slug is uniform black to grey and four to five centimetres long.

Damage

Slugs have caused major damage in emerging canola, pulse and wheat crops especially in high rainfall areas but have also caused damage in lower rainfall areas in wetter years.

Damage is usually greater in cracking clays.

Life Cycle

Slugs are hermaphrodites (individuals are both male and female). Each individual can lay about 100 eggs.

Moisture is essential for slug survival and they may move down the soil to depths of 20cm or more in dry periods and reappear when conditions improve.

Control

Cultivation and burning stubble will reduce slug populations.

Rolling the soil after seeding can also reduce slug damage.

Bait after seeding if crop damage from slugs is expected. Buried bait is less effective than bait on the soil surface.

The most effective bait is metaldehyde. This damages the mucus producing cells and is therefore less affected by cold and wet conditions. Rates of up to 10kg/ha may be necessary.

Baiting will generally only kill 50 per cent of the slug population at any one time.

Insecticides

Suggested Rate for South Australia 2008

Not all products are registered for the uses indicated.

Refer to label for registration status and treatment details.

Chemical	bifenthrin	dimethoate	omethoate	methidathion	chlorpyrifos	pirimicarb	alphacypermethrin	alphacypermethrin	cypermethrin	cypermethrin	gamma-cyhalothrin	lambdacyhalothrin	deltamethrin	deltamethrin	esfenvalerate	beta-cyfluthrin	beta-cyfluthrin	endosulfan	
INSECTS / **Other Trade Names**	Talstar, Venom (ml/ha)	Various (ml/ha)	Le-mat 290 SL (ml/ha)	Supracide (ml/ha)	Lorsban 500 EC Strike-Out (ml/ha)	Pirimor WG (g/ha)	Alpha-Scud Elite Fastac Duo Dominex 100EC (ml/ha)	Alpha-Scud ULV Dominex ULV (L/ha)	Scud Sonic 200EC (ml/ha)	Cymbush 40ULV (L/ha) Scud 40 ULV Sonic 40 ULV	Trojan (ml/ha)	Karate Zeon (ml/ha)	Decis forte ULV (L/ha)	Ballistic Elite Decis Options (ml/ha)	Sumi-Alpha Flex (ml/ha)	Bulldock Duo Bulldock 25 EC (ml/ha)	Bulldock 8 UL (L/ha)	Thiodan (L/ha)	**COMMENTS**
Red Legged Earthmite	50-100	75-100	100	90	140	-	50	-	-	-	8	9	-	-	-	200	-	0.5-1L	Use after sowing on bare earth or treat at crop emergence if earthmite common.
Blue Oat Mite	100	•	100	90G	140	-	50	-	-	-	-	-	-	-	-	200	-	0.5-1L	Use after sowing on bare earth or treat at crop emergence if earthmite common.
Lucerne Flea	-	55-85	100	90	70	-	-	-	-	-	-	-	-	-	-	-	-	-	Early treatment essential to prevent damage.
Cowpea Aphid	-	350-650	200	1000	350G	250	-	-	-	-	-	-	-	-	-	-	-	-	Treat if infected plants are common in crop but before plants are badly damaged.
Bluegreen Aphid	-	250-375	100-200	750	200-300	100-150	-	-	-	-	-	-	-	-	-	-	-	-	Treat when numbers are sufficient to cause damage. Higher rate in dense crops.
Pea Weevil	-	-	-	-	-	-	160-200	1.25	200	1.0	20	24-36	1.5-2.5	300-500	-	400	1.25	-	Control weevil before it lays eggs on pods.
Native Budworm	-	-	-	-	•	-	200-300	1.0-1.9	200-250	1.0-1.25	20-30	24-36	1.25-2.5	200-500	130-330	400-500	0.625 -1.25	-	Higher rates for larger larvae. See overleaf.
Brown Pasture Looper	50-100	-	-	-	700	-	50	-	•	•	10	12	•	•	35-70	•	•	-	Treat only if damaging the crop.
Cutworm	-	-	-	-	700	-	75	0.47	75	-	10-15G	12-18	1.0	200	70	200-400	0.625 -1.25	-	
Etiella	-	-	-	-	-	-	SC	SC	SC	SC	-	-	2.5	500	130-300	-	-	-	Spray to control moths or before larvae have bored into pods. SC = Some control.
Withholding period (days)																			
Harvest	-	7	1	42	NS	42	24 Lu 28 P	28 Lu, P	28 P	28 P	7 B, C, L,P, V 14 Lu	7 B, C, P, V 14 Lu	7	7	14	7 P 14 Lu	7 P 14 Lu	28	
Grazing	28	1	1	7	2	42	21 C 28 B, Lu, P	NS	NS	NS	7 B, C, L, P, V 14 Lu	7 B, C, P, V 14 Lu	NS	NS	7	NS	NS	-*	

B = beans C = chickpeas L = lentils Lu = lupins P = peas V = vetch NS = not specified

* Endosulfan not permitted post-emergence in pulses. Grazing withholding period for pastures is 28 days.

- Indicates no or unreliable control. • Insufficient Information.

See overleaf for notes on insecticides

Comments on Insecticides

NOTE: These recommendations are for South Australia. Registrations may differ in other states.

For more details check the label

INSECTICIDE AND TRADE NAMES	REMARKS
BIFENTHRIN Talstar® 100 EC, Venom	Apply as a bare earth spray only. Not affected by rainfall. Use the higher rate for longer residual.
DIMETHOATE Perfekthion®, Roxion®, Saboteur®	Apply to emerged crop, not to bare ground. Has contact and systemic activity. Rain within 24 hours may reduce effectiveness. Can also be used as a seed treatment at 150ml in 1L water/100kg seed, but not mixed with rhizobia.
OMETHOATE Le-mat® 290 SL	Spray crop 2-5 weeks after opening rains and before serious damage occurs. Rainfast in 1 hour. Application in spring (according to TIMERITE®) will reduce red legged earthmite the following year.
METHIDATHION Supracide®	For best results on red legged earthmite and lucerne flea spray when at least 2-5cm of crop growth. Avoid spraying if pests are sheltering. DO NOT spray if rain is imminent.
CHLORPYRIFOS Lorsban®, Strike-Out®	Active against a wide range of insect pests. Not systemic. Rainfast within 4 hours. Toxic to fish.
PIRIMICARB Pirimor®	Rainfast within 4 hours. Lower toxicity to bees.
ALPHACYPERMETHRIN AlphaScud Elite, Dominex®, Fastac®	Best results if sprayed at egg hatching of native budworm. Apply when damaging numbers first appear on the crop. Use higher rate if native budworm larvae are longer than 10mm. Use higher rate if native budworm are longer than 20mm for Fastac®. Can be used post emergence for red legged earthmite control in field peas.
BETACYFLUTHRIN Bulldock®, Bulldock® Duo	Use higher rate if native budworm larvae are longer than 10mm. Bulldock® Duo can also be mixed with mineral oil and applied at ULV rates.
CYPERMETHRIN Cymbush®, Scud®, Sonic®	Use higher rate if native budworm larvae are longer than 10mm. Control of larvae longer than 20mm is unreliable at this rate.
DELTAMETHRIN Ballistic®, Decis®	Apply as soon as infestation occurs. Use lower rates only when infestation is low and most larvae are less than 5mm long. Longer larvae not readily controlled. Use higher rate for pea weevil under high infestation and for chickpeas, faba beans and lentils.
LAMBDACYHALOTHRIN Karate® Zeon	For control of native budworm apply at hatching or soon after when the larvae are small. Use the higher rate if larvae are longer than 10mm or if the crop is dense.
ESFENVALERATE Sumi-Alpha Flex®	Use 130ml/ha for larvae less than 10mm, 200ml/ha if 10-20mm long and 330ml/ha if over 20mm long.
ENDOSULFAN Thiodan®	For red legged earthmite use 0.5L/ha for broad area spraying of bare earth after sowing. Use 1.0L/ha for perimeter spray to prevent reinvasion. Do not use post emergence on any crop.
GAMMACYHALOTHRIN Trojan®	For native budworm use higher rate if larvae are longer than 10mm or if crop is dense. Rainfast within 30 minutes. S5 poison schedule.

Red legged earthmite

Plate 38
Close up.

Plate 39
Their feeding causes leaves to first turn silvery . . .

Plate 40
. . . then brown and shrivelled, so that the plants look scorched. The brown should not be confused with disease.

Lucerne flea

Plate 41
Lucerne flea with eggs.

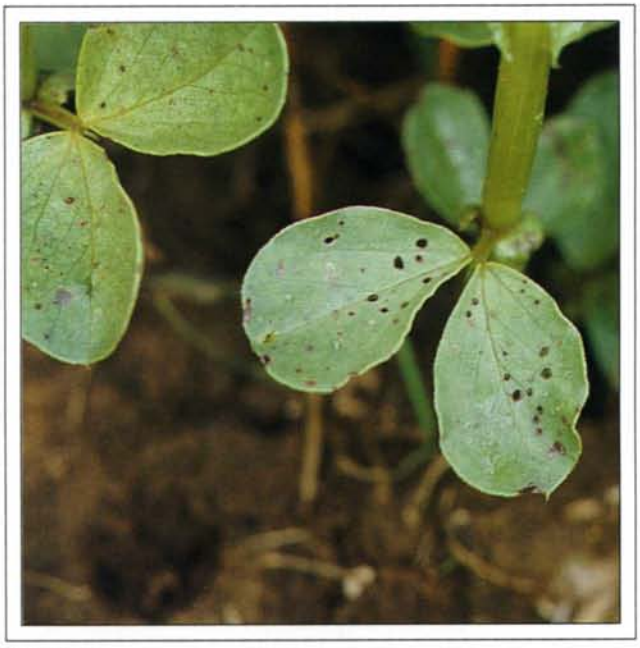


Plate 42
Lucerne flea make window-pane like holes in the leaves.

Plate 43
In severe cases young crops can be killed. This lucerne leaf shows how severe damage can be.

Cowpea aphid

Plate 44

Aphids can rapidly increase in number during the spring. Large infestations like this suck the sap from the plant causing it to wilt.

Plate 45

Note the different aphid ages — young to old. The older aphids are shiny black. The white cast is a skin, shed as the aphid grows.

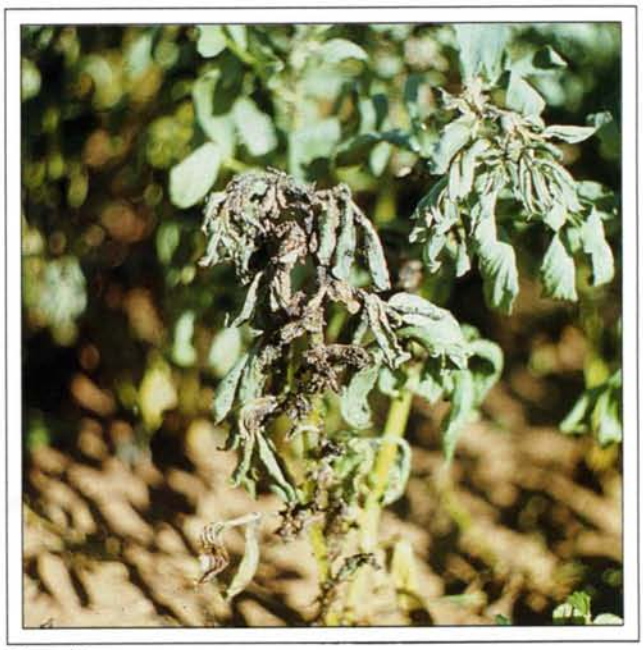


Plate 46

Severe wilting of isolated plants will occur.

Native budworm life cycle

Plate 52

Native budworms are irregular feeders, leaving seed with jagged edges (left). Pea weevil always emerge through a round hole (right).

Plate 51

Older larvae prefer feeding on pods and the seed inside. Younger larvae prefer to feed on foliage.

Plate 50

In the spring, eggs hatch in one to two weeks and larva feed for four to six weeks. This shows all stages from egg to fully grown larvae. Insecticides are more effective on smaller larvae.

Plate 47

Native budworm (heliothis) moths, showing male ♂ and female ♀. Note the buff colouring.

Plate 48

There can be several generations of native budworm each year.

Females lay around 1000 round, white eggs.

Plate 49

Eggs although tiny can be seen with the naked eye as shown on this faba bean leaf.

Pea weevil life cycle

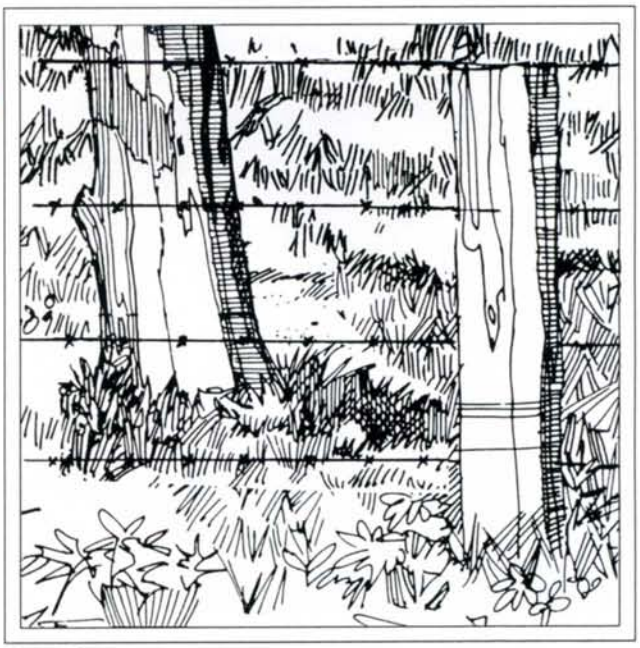


Plate 58

Pea weevil shelter during the winter in sheds, trees or wooden fence posts.

Plate 57

New pea weevil adult emerging from a mature pea.

Plate 56

A fully developed larva of pea weevil in a mature pea. Around 20% of the seed weight is consumed by the larva.

Plate 53

Pea weevil adults are attracted to pea crops when they are flowering.

Plate 54

After feeding on pollen for 5 to 15 days, the females lay eggs on pea pods. The eggs can be seen with the naked eye.

Plate 55

Close up of pea weevil eggs. Note the colour and shape.

Plate 59

Native budworm damage to soursob flowers is an early warning sign to egglaying in grain legume crops.

Plate 60

Native budworm eggs can also be found on soursob flowers.

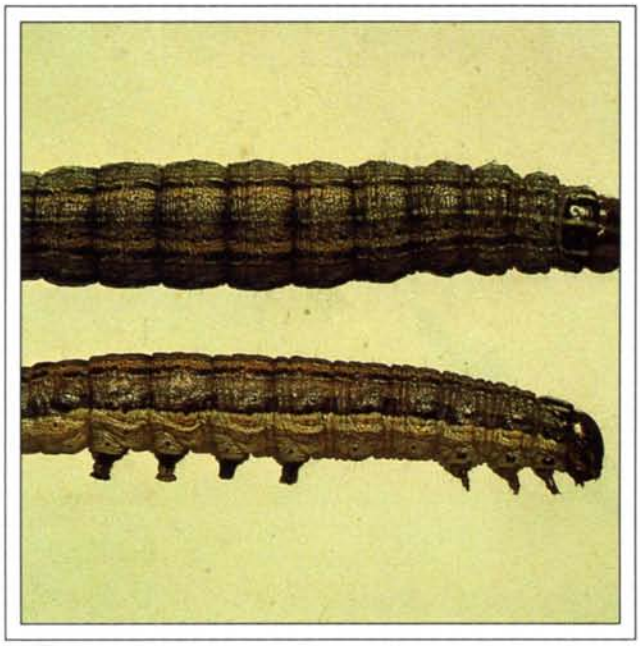


Plate 61

Southern Armyworm (Barley grub) may be found on cereals in a grain legume crop, however they rarely damage legumes. Southern Armyworm can be confused with native budworm at first glance.

Plate 62

Pink or brown cutworm is a rare pest of germinating grain legume crops.

Blue green aphid

Plate 63
Blue green aphid . . . close up.

Plate 64
Note the young and older aphids. The brown aphids are dead blue green aphids which have been parasitised by wasps.

Plate 65
. . . on lupins.

Plate 66

Etiella moth. Note the long thin body and "turned up nose".

Plate 67

Etiella damage in mature peas. Note the webbing. This is a characteristic of this insect. Also note the entry hole in the side of the pod.

Plate 68

Etiella damage in lupins.

Plate 69

Brown pasture looper. The larvae of this insect may be found in grain legume crops. It rarely causes damage.

Minor insects occurring in Grain Legumes.

Plate 6:A
False Wireworm (Gonocephalum misellum) adult.

Plate 6:B
False Wireworm (Gonocephalum misellum) larvae.

Plate 6:C
Bronzed Field beetle (Adelium brevicorne) adult.

Plate 6:D
Bronzed Field beetle (Adelium brevicorne) larvae.

Plate 6:E
Onion seedling maggot (Delia platura)

Plate 6:F
Vegetable looper (Chrysodiexis argentifera)

White Snails

Plate 6:G
Vineyard or common white snail.

Plate 6:H
Vineyard or common white snail.

Plate 6:I
White Italian snail.

Plate 6:J
White Italian snail.

Conical Snails

Plate 6:K
Pointed snail.

Plate 6:L
Small pointed snail.