PRIMARY INDUSTRIES AND RESOURCES SA

And the South Australian Research and Development Institute

FACT SHEET

Wingless grasshopper

The wingless grasshopper (*Phaulacridium vittatum)* is native to Australia, and occurs in a more or less continuous belt through southern Australia, including southern Queensland, NSW, Victoria, Tasmania, SA and southern WA. In SA it is found mainly in the higher rainfall areas of lower Eyre Peninsula, lower Yorke Peninsula, from Melrose to the southern Adelaide Hills, Kangaroo Island and the Upper and Lower South East (Figure 1).

The pest status of wingless grasshoppers is associated with land clearance and intensification of grazing. The replacement of high, dense native grassland and scrubland with grazed pastures containing leafed weeds and pasture legumes has favoured their increase.

In some districts of SA, wingless grasshopper outbreaks appear to occur in cycles lasting six or more years. The cause of these cycles is not known, but it is possible that they are started by a succession of seasons which favour survival of the grasshopper. Dry springs are unfavourable for natural enemies, patchy pasture growth in early summer may favour grasshopper survival, and bare ground in summer favours egg laying.

At their peak, wingless grasshopper numbers may exceed 30 adults per square metre or 300,000 per hectare. The biomass of this density of grasshoppers is equivalent to nearly one sheep per hectare.

Description

The wingless grasshopper is almost 2 cm long when mature. It is generally brown with orange hind legs and often has two light-coloured bands on top of the thorax. The abdomen is slightly turned up at the tip (Figure 3).

Whilst most wingless grasshoppers have only small non-functional wings, some develop functional wings and make short flights.

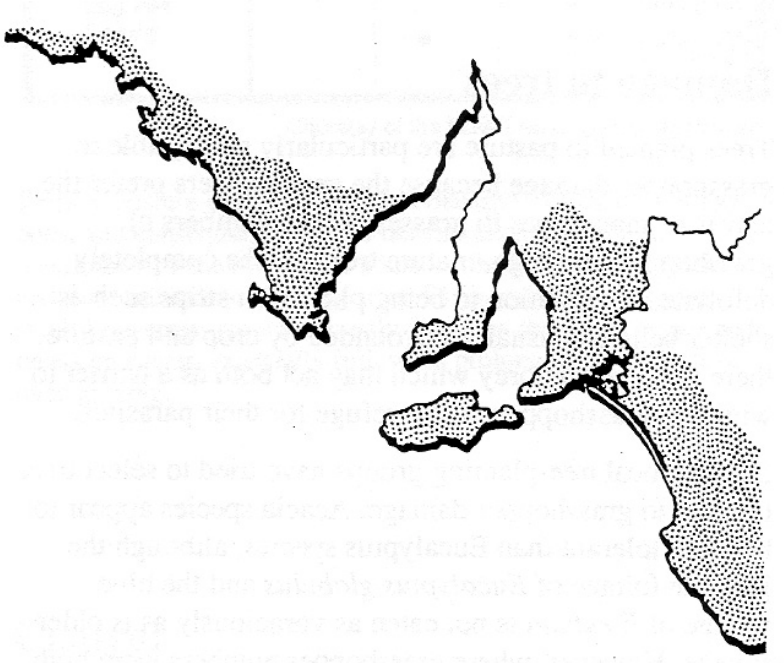


Figure 1. Occurrence of pest in areas where crops are grown in South Australia.

Damage to crops and pastures

Most damage is caused during midsummer and autumn by adult grasshoppers feeding on green summer-growing crops.

Lucerne stands can be stripped, and as a consequence hay and seed production and grazing are reduced.

Sunflowers, sweetcorn, potatoes and similar summer-growing crops and irrigated pasture can be damaged.

Grapevines are also susceptible and can be defoliated unless the pest is controlled. Mature vines usually recover, but new plantings can be permanently damaged.

New pine plantations are susceptible to attack.

The insects can also damage commercial vegetable plantings and household gardens, and can defoliate fruit trees, and ornamentals.

Should the season break early in autumn, emerging annual pasture grasses and legumes can be damaged.

The economic damage of moderately high populations of wingless grasshoppers (20 to 30 adults per square metre) to dryland pastures is probably no greater than the effect of one sheep grazing per hectare.

Wingless grasshoppers select green pasture plants in preference to dry herbage. Clovers, medics and weeds such as dock are preferred to grasses. In dryland pastures containing lucerne it is possible that grasshoppers may retard growth by selectively eating the growing points. However, defoliation of lucerne and other pasture plants in low-value pastures probably does not warrant treatment in most years.

Damage to trees

Trees planted in pasture are particularly susceptible to grasshopper damage because the grasshoppers prefer the leaves of many trees to grasses. When numbers of grasshoppers are high, mature trees can be completely defoliated. In addition to being planted in strips such as shelter belts and usually surrounded by crop and pasture, there is no understorey which may act both as a barrier to wingless grasshoppers and a refuge for their parasites (Figure 2).

Several local tree-planting groups have tried to select trees tolerant to grasshopper damage. Acacia species appear to be more tolerant than Eucalyptus species, although the juvenile foliage of *Eucalyptus globulus* and the blue foliage of *E.rubida* is not eaten as voraciously as is older foliage. However, where grasshopper numbers were high, it was not possible to establish any of a wide range of native tree species. Established eucalypts can regenerate after one or two years defoliation but are killed by prolonged grasshopper feeding if this is associated with environmental stress such as waterlogging.

A number of strategies should be used to manage damage to young farm trees. Reduce grasshopper numbers in the surrounding pastures by spraying nymphs in their hatching area before they move to the trees. When grasshoppers start to move, barriers of bait may be used to protect rows of trees. Try to avoid spraying foliage with broad spectrum insecticides as this may lead to an increase in scale insects. Since the movement of wingless grasshoppers is restricted by dense foliage, planting guard rows of cereals along the edges of the patch of trees may offer some protection. Wingless grasshoppers may be excluded from young trees by tree guards made of fertiliser bags or similar material.

Figure 2. Wingless grasshopper damage to shelterbelt eucalyptus at Wattle Range, near Penola.

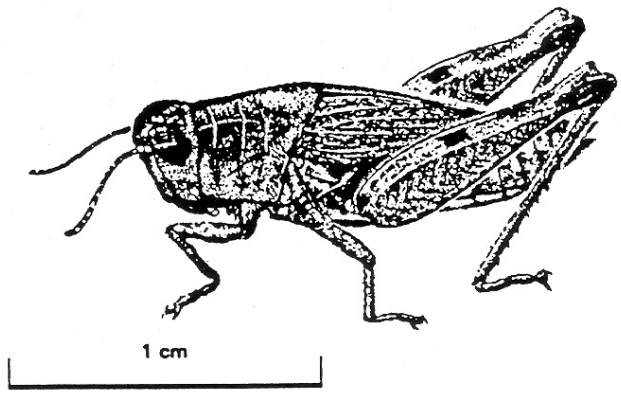


Figure 3. Adult female wingless grasshopper: The body length of the female is from 1.2 to 1.8 cm, but the male is smaller. The wings are short and non-functional, though all populations have some forms with long, fully functional wings. Body colour is grey-brown, generally pale on the upper surface and dark on the sides, sometimes with a white lateral body stripe. There is a chevron-shaped black marking on the hind leg.

Life cycle

In SA, wingless grasshoppers have one generation a year. Eggs hatch mostly in October but the emergence period may be extended where local topography is variable.

Wingless grasshoppers pass through five nymphal stages before reaching adulthood (Figure 5). The first-stage nymphs can be found in late October, and between then and December a number of immature growth stages may be present in pastures. The immature stages do not move very far from where they emerge. Thus before about January, wingless grasshoppers are usually found in isolated patches, often on slopes. There is usually an abundance of green prostrate and rosette-forming plants on which the young hoppers feed. High mortality of young hoppers often occurs if suitable food is scarce or if tall grasses are present on their emergence site.

By late December wingless grasshoppers become conspicuous in pastures. Pastures have started to dry off and stock have often grazed the grasses low, exposing the remaining green weeds, on which the grasshoppers congregate. The immature hoppers are starting to develop into adults. Hoppers will eat dry vegetation, but females require green feed to produce eggs.

As the availability of green feed declines, wingless grasshoppers become more mobile. Movement of the hoppers is random and the distance moved is probably about several hundred metres. Winged forms move greater distances. Hoppers tend to congregate in relatively favourable areas, especially crops.

Adults start to lay eggs by late January, and egg laying may continue until March or April. Eggs are usually laid on sandy rises with sparse vegetation (Figure 6). Pods, each containing 10 to 16 eggs, are deposited up to 2 cm below the soil surface (Figure 4). Adult mortality increases by the end of summer, and by winter only the eggs in the soil remain to start a new generation.

Eggs are dormant during winter and their development does not begin until spring.

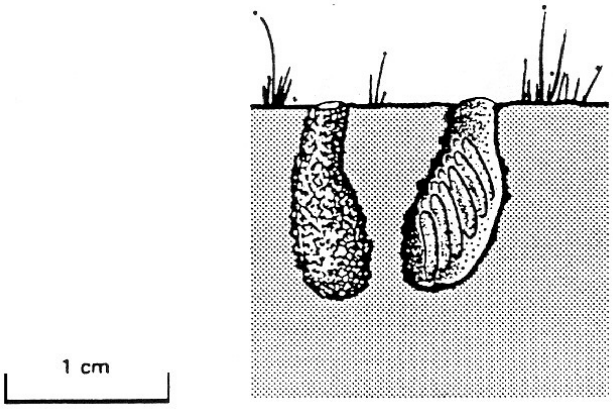


Figure 4. Egg pods: The wingless grasshopper egg pod, 1.5 – 2.0 cm long tear-shaped and covered with soil. It usually contains 10 to 16 eggs, each 4.5 mm long.

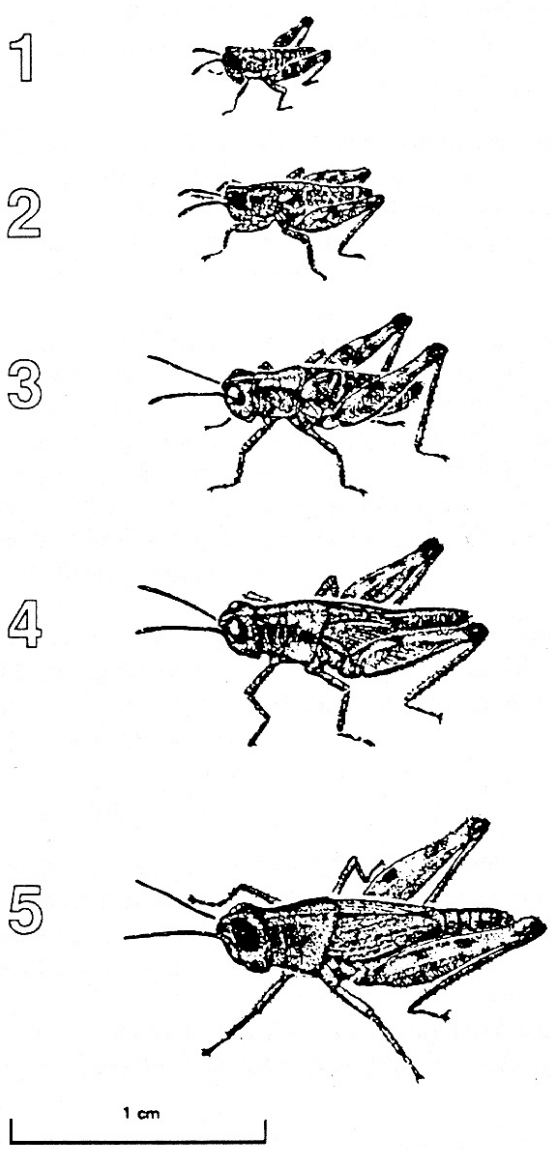
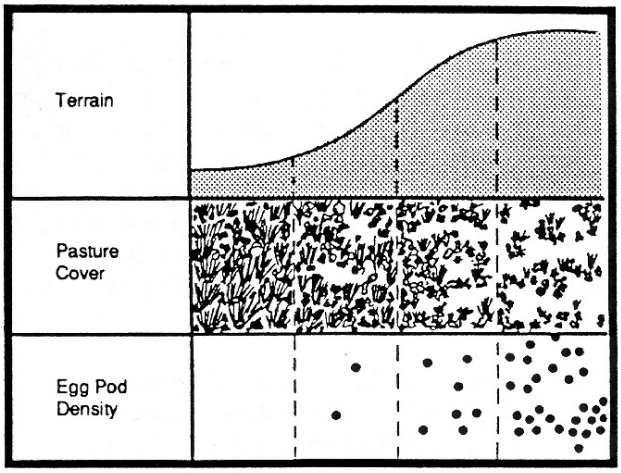


Figure 5. Growth stages: A hopper undergoes five growth changes (instars) before becoming an adult. On hatching, first instar hoppers are pale pink but within hours darken to black. Later instars are grey-brown. In second instar hoppers the thorax is not clearly differentiated from the abdomen. Third instar hoppers have a distinct thorax and small, downward pointing buds are discernible. Fourth and fifth instars have fleshy, upward pointing wings. The behaviour of each instar is different as is susceptibility to bio-control agents and insecticides. It is therefore important to know the instar composition of the population you are dealing with.



Courtesy of the NSW Department of Agriculture

Figure 6. Terrain, pasture cover and egg pod density: The density of egg pods, and consequently hopper density after hatching, is determined by the number of adults of the previous generation and the availability of laying sites. Favoured laying sites are small bare areas, most frequently found on the upper slopes and crests on ridges, especially following prolonged dry periods or over-grazing.

Control

Cultural control

Cultural control is difficult with normal grazing practices. Producing dense grassy pasture without bare areas where grasshoppers can lay eggs may keep numbers in check.

Biological control

Several species of parasitic flies and at least one species of a large parasitic nematode have been recorded in SA. Birds such as crows, magpies and ibis prey on wingless grasshoppers and guinea fowls may also be useful in gardens. A natural disease caused by an amoeba pathogenic to insects, *Malameba locustae*, is transmitted by cannibalistic feeding in adults. An unsuccessful attempt was made in 1980 to introduce an exotic protozoan disease, *Nosema locustae*, into wingless grasshopper populations in SA.

Chemical control

Apply sprays after all the eggs in the ground have hatched, but before egg laying. The optimum period for spraying is usually November to mid-January. Careful searching for nymphs should reveal their hatching areas and sprays should be applied with a boomspray before the hopper stage. Spraying large areas for adult wingless grasshoppers probably cannot be economically justified.

Protection of crops against invading wingless grasshoppers may require frequent spraying of the crop. Barrier spraying the pasture surrounding a crop for a width of 20 to 40 m (one or two boom widths) has been found effective in protecting irrigated lucerne crops.

Baiting

Wingless grasshoppers will eat flaky wheat bran and the bait formed when this is mixed with an insecticide is more selective than spraying. The bait can be mixed in a large plastic bag, rubbish bin or a cement mixer. Spray 50 ml of maldison (500 g/L) or 25 ml ULV maldison into each kg of bran with a hand sprayer while mixing thoroughly. Use the chemical neat; do not add water. Store in a sealed bag overnight before application; bagged bran is effective for up to 12 months if stored in a cool place.

The bait is best applied in a band about 2 m wide to bare ground; it is not very effective in dense pasture. Bait applied to a cultivated strip either side of tree rows or household gardens should provide an effective barrier to wingless grasshoppers.

Baits are effective from mid-December onwards, and may need to be applied up to three times per season.

Bait may be applied by hand (use gloves and protective clothing), by super spreader, by a simply modified blower-mister or by aircraft. Apply at the rate of 3 to 5 kg/ha.

For chemicals registered for use against wingless grasshoppers in South Australia consult the following CDROM: InFinder AgriVet Information Service (updated every four months)

Available from:

Farm Chemicals Program
Primary Industries and Resources SA
GPO Box 1671
ADELAIDE SA 5001

Ph: 08 8226 0405

Last update: December 1999

Agdex: 622

Author:
Peter Bailey, Senior Entomologist, South Australian Research & Development Institute.