



Light brown apple moth in orchards

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The light brown apple moth (Epiphyas postvittana) is native to Australia and the larvae feed on a wide range of plants including fruit crops, broad-leaved weeds, some vegetables and ornamentals. It is a serious pest of pome fruit, grapevines, and glasshouse and other crops.

In Victoria, light brown apple moth has 3-4 distinct generations a year.

Description and life cycle

The adult insect is a moth about 10 mm long when resting with the wings folded in a characteristic bell shape. Colouring is variable but they are generally yellowish-brown with darker brown markings on the forewings. The females often have a dark spot on the hind margin of the forewing.

The moths shelter among the foliage during the day and make short erratic flights if disturbed. Maximum flight activity occurs 2-3 hours after sunset, with a smaller peak 3-4 hours after sunrise. Flight is also affected by the phases of the moon, with peak activity shortly before and after new moon, and around full moon.

Females can lay up to 1500 eggs each but the average is about 300. Most of the eggs are laid between six and 10 days after moth emergence, depending on the temperature. Eggs are laid in masses on the upper surface of any smooth-leaved host plants. The eggs take from five to more than 30 days to hatch, depending on the temperature.

The growth of an insect increases as temperature increases until the optimum temperature for the particular insect is exceeded at which point the growth rate rapidly declines. There is also a lower developmental threshold which is the temperature below which no measurable growth occurs. The lower developmental threshold for light brown apple moth is 7°C.

Insect growth is measured in physiological time units called degree-days. A degree-day (°D) is essentially each degree of temperature by which the average temperature on a day exceeds the lower developmental threshold. For light brown apple moth a rough approximation can be obtained from the formula.

$$\text{Degree-days} = \frac{(\text{Max} + \text{Min})}{2} - 7$$

The newly hatched larvae (caterpillars) are very tiny, with a pale yellow-green body and a pale brown head. They wander actively over plant surfaces and may suspend themselves from a fine silken thread until they find a suitable feeding site. The young larvae prefer the underside of leaves and usually start to feed adjacent to a vein where they spin a protective cover of fine webbing. The larvae generally pass through six instars (growth stages) but, apart from increased size, their appearance is unchanged. As the larvae mature they feed between two leaves webbed together, a leaf webbed to a fruit, or in the centre of a cluster of fruits. When disturbed they wriggle violently and move further into shelter or drop to the ground. Fully grown larvae are from 10 to 15 mm long with a head width of about 1.4 mm.

The duration of the larval period takes about 450°D. The time taken to accumulate this varies depending on environmental factors but is usually 6-8 weeks although under ideal conditions it may be as short as three weeks. The mature larvae become pupae inside which they become transformed to adult moths. Pupation takes place within the feeding shelter. Newly formed pupae are soft and green but harden and change colour to brown with age. The pupal stage lasts 132°D (1-4 weeks depending on temperature).

Damage

Although larvae can occasionally damage leaves severely, this damage is rarely important economically except on ornamentals. Feeding damage to fruit may, however, reach economically important levels.

The larvae cause superficial injury to the fruit surface by removal of skin and the outermost layers of fruit tissue. Damage can be extensive and one larva entrenched in the centre of a fruit cluster can damage the whole cluster. Grapes may be severely damaged by the larvae feeding among the berries, fouling them with webbing and allowing entry of moulds.

Control

Insecticidal

Light brown apple moth larvae have a habit of feeding in protected situations. Sprays must be applied thoroughly and with equipment that allows maximum penetration of

sprays into those areas. Much damage can be prevented by proper thinning of fruit crops, since damage is most severe where large clusters of fruit are allowed to remain. Proper thinning also allows better penetration of spray.

Good early-season control is essential. Pheromone traps for light brown apple moth are commercially available. Lure pots containing a port wine/water mixture can be used to monitor flight periods of the adult moth but are often difficult to interpret. The size of the overwintered population can be estimated by checking broad-leaved weeds such as capeweed in the orchard during late winter/early spring. If light brown apple moth larvae and pupae are readily found, an early spray may be advisable. For pome or stone fruit orchards this would be applied at late petal or shuck fall respectively.

Many of the chemicals used for control of codling moth give adequate control of light brown apple moth. Growers using pheromone traps to monitor codling moth may be able to reduce the number of sprays required to control codling moth. If light brown apple moth has been a problem, however, they may need to substitute a specific light brown apple moth spray into their spray program.

For further information on chemical control of light brown apple moth see the current edition of the Orchard Pest and Disease Handbook available from district offices of Agriculture, Victoria.

Biological

Before the use of broad spectrum insecticides, light brown apple moth populations were controlled to some degree by beneficial insects. Although the populations of beneficial insects are reduced, they have not been eliminated and are able to exert some influence after spraying stops for the season.

The egg parasite *Trichogramma funiculatum* (a wasp) is often active during autumn. Light brown apple moth larvae and pupae are killed by various parasitoids, predators, and diseases. Infection by a nuclear polyhedrosis virus has been known to decimate localised light brown apple moth populations. Spiders and earwigs (*Forficula auricularia*) are the most important predators.

Biological control agents such as trichogramma are now available from commercial insectaries. Mating disruption by flooding the orchard with LBAM pheromone is also available for commercial use.

With the use of monitoring and predictive models it may be possible to rationalise spray programs to make better use of biological control agents against light brown apple moth. Cultural practices such as removal of broad-leaved weeds from the orchard may also help to control light brown apple moth.

Illustrations

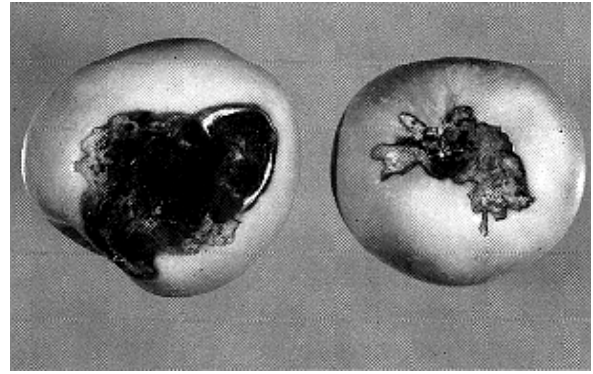


Figure 1. Damage caused in apples by light brown apple moth

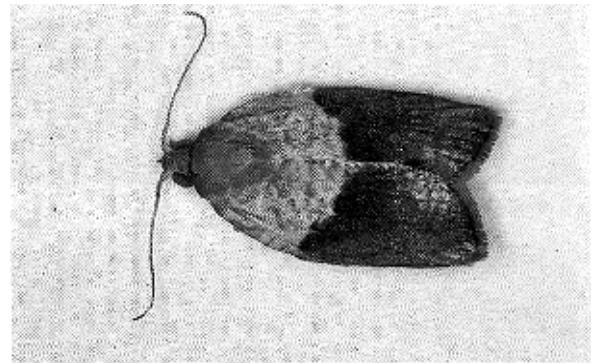


Figure 2. Light brown apple moth adult male

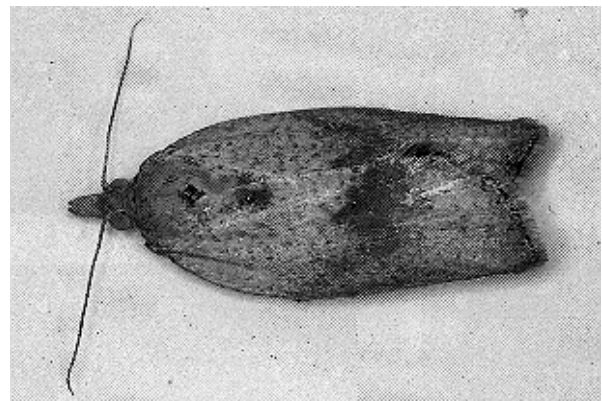


Figure 3. Light brown apple moth adult female

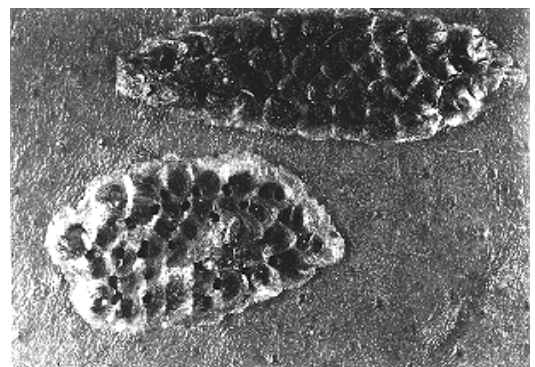


Figure 4. Light brown apple moth eggs (holes are due to hatched larvae)

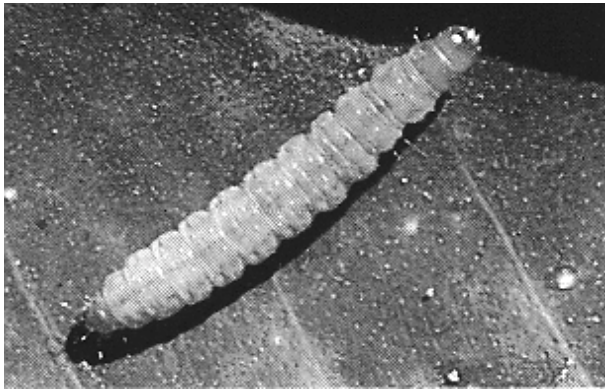


Figure 5. Light brown apple moth larva on leaf



Figure 6. Light brown apple moth pupae

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