



Native budworm

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Importance

The native budworm (*Helicoverpa punctigera* or, as it was known, *Heliiothis punctigera*) is native to Australia and is distributed, particularly during spring, throughout much of the central and southern regions of the country. It is the major pest of all grain legumes, although pea weevil is equally important in field peas. It also attacks most oilseed crops, some vegetables, particularly tomato and sweet corn, and various pasture species such as clover and lucerne. In terms of production losses, field peas, chick peas, faba beans, tomatoes and lucerne are probably the most important hosts.

Description

Eggs

Budworm eggs can be found singly on the growing tips and buds of plants. They are small (about 0.5 mm in diameter) but quite visible to the naked eye after close inspection of the plant. They are white when first laid but they change colour to yellow and brown as they get closer to hatching.

Larvae and pupae

The newly hatched caterpillars (larvae) are very small and are often easily missed when inspecting a crop. When first hatched, they are about 1.5 mm long with dark brown heads and white bodies. During full development they will pass through six or seven growth stages or instars, until they are 35 to 40 mm long (Figure 1). When fully grown, their colour ranges from green, yellow, buff, red or brown to almost black, with a broad yellow-white stripe down each side of the body and a dark stripe down the centre of the back. The skin of the caterpillars appears rough to touch, due to long, dark hairs on prominent bumps on the body surface (Figure 2).

Pupae are cigar-shaped, 12 to 22 mm long, and during development change in colour from a yellow-orange to a shiny dark brown.

Adult

Adult moths are medium-sized (wingspan 30 - 40 mm) and stout bodied. The forewings are buff-olive to red-brown with numerous dark spots and blotches. The hind wings are pale gray with dark veins and a dark band along the

lower edge. Moths are usually active during the evening and night.

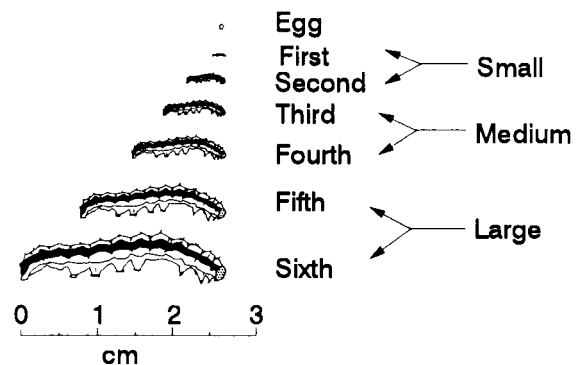


Figure 1. Approximate instar sizes of the budworm

Distinguishing native budworm from other caterpillars

Before deciding control, it is important to be sure that the caterpillars are native budworm. For example:

- Corn earworm (*Helicoverpa armigera*) has a very similar appearance to native budworm, but rarely occurs in significant numbers in Victorian grain legume or oilseed crops. It is nonetheless an important pest when it does occur in large numbers as it may be resistant to many of the commonly used insecticides. The most obvious distinguishing features are two small dark patches on the segments above the true legs.
- Tobacco looper (*Chrysodiexis argentifera*) is a smooth-bodied, green caterpillar with two white stripes down its back, and only two sets of abdominal prolegs (see Figure 2). It occasionally occurs in grain legumes and is not a pest as it only eats leaves.
- Cabbage moth larvae, *Plutella xylostella*, are frequently mis-identified as budworm. These are most easily distinguished from budworm by the absence of stripes, and their vigorous wiggling movement when touched. They mostly feed from cruciferous weeds (radish, etc) in a crop and are irrelevant to grain legumes.

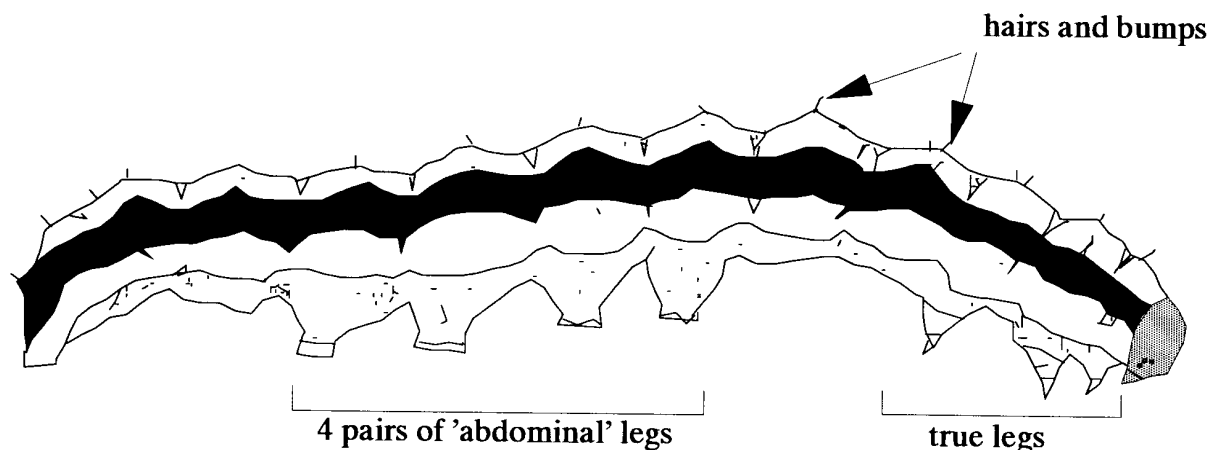


Figure 2. Distinguishable features of native budworm larva

Biology

Adult moths

A notable feature of this pest is its capacity to migrate at high altitudes over large distances (100-1000 km) each night. The moths fly from areas where conditions do not favour another generation to where there are abundant food plants for further breeding. Recent research has shown that the species will breed rapidly on flowering plants in the arid inland (desert) regions of Queensland, South Australia, Western Australia and New South Wales during winter, provided there has been adequate winter rain. Once the new generation of moths have emerged from these breeding grounds, they fly up into the warm northerly or northwesterly winds and migrate to the southern and eastern cropping regions during early spring. Hence, the moths that we encounter in our crops during early spring almost certainly have their origins from somewhere in the inland of Australia.

Moths live for two to four weeks; they rest during the day and become active after sunset, feeding on nectar from flowers and laying eggs on many types of plants (weeds and crops). They fly from plant to plant throughout the night, feeding and laying eggs. They are also capable of flying from paddock to paddock and even from one region to another.

Eggs

Female moths will begin laying eggs within three days of emergence, placing them singly on flower buds, young pods, foliage and stems. Each female can lay about 2000 eggs over several days. They hatch in 4-21 days, depending on temperature.

Caterpillars

After hatching, the larvae crawl around the plant feeding from plant surfaces particularly tender tissue

such as leaves, flowers or pods. They also produce fine silken threads which, with the aid of wind, may be used to distribute them from plant to plant. In some unusual situations, such as adversely hot conditions, the small larvae may burrow straight into pods and seeds. However, they mostly graze on plant surfaces until they grow to 8-12 mm in length, when pod burrowing becomes more common. The larvae complete their development in three to six weeks; closer to three weeks during warm weather.

Pupae

Fully grown larvae move off the plants and burrow in the soil from 20 to 150 mm in depth. They build chambers in which the pupae form. The pupal stage lasts about two weeks during spring, although late spring or summer pupae may enter a prolonged resting stage in the soil and not emerge until the following season.

Damage

The most notable damage by native budworm is on the pods and seeds. In most situations pod attack commences with medium-sized larvae entering them and eating all or part of the seed between pods. Small larvae tend not to enter pods, but "graze" on the pod and leaf surfaces. However, occasionally the small larvae may enter the pods, and remain inside for several days, particularly when conditions are hot and windy after egg hatch. These larvae remain protected from insecticides until they re-emerge. Hence crop monitoring should include pod inspections. Larvae will also attack growth points, but this is unlikely to cause major yield losses in grain legumes and oilseeds. Continual monitoring is warranted when high populations exist during early flowering.

Sampling and detection

- Crops should always be sampled thoroughly for insects before making a decision on spraying. Insecticide resellers and scouts are encouraged to

advise growers as to the importance of correct crop monitoring.

- Two sampling methods should be used to assess caterpillar numbers: i) measure numbers on the crop using a sweep net or a beating tray/sheet (a white sheet or tray slid under the vines and shaken to dislodge the caterpillars); ii) measure numbers inside the pod by splitting open some, say 20 to 40 pods.
- Sampling should commence at early podding. Take a minimum of 5 sets of 10 sweeps. A single sweep of a net should cover an arc of 180° from one side of the sweeper's body to the other. The net should pass through the crop with the net tilted such that the lower lip travels through the crop marginally before the upper lip.

Each set of sweeps should be performed in different representative areas of the crop. This will provide a more comprehensive estimate of budworm numbers throughout the crop, avoiding local variations in larval numbers. Local variations (or hot spots) are a common feature of budworm distribution. After completing the sets of sweeps, counts should be averaged to give an overall estimate of abundance.

Control

Natural control

Surprising levels of mortality of eggs and budworm caterpillars exist in most situations. The presence of large numbers of moths does not necessarily result in significant crop damage: well over 90% of all eggs and young larvae may die before causing any damage. Eggs and larvae will die if they are dislodged from the plant by wind or rain, or if they are attacked by predators (such as spiders, carabid beetles or predatory bugs), parasites (wasps and flies) or diseases.

The most important natural enemies appear to be the parasites: the tachinid flies, the larvae of which parasitise budworm, and the egg parasite *Trichogramma ivalae*, a

minute wasp. The extent of parasitism of the budworm eggs varies from year to year; in grain legumes we have measured it at as high as 60% and low as 5%. However this parasitoid has the capacity to reduce egg numbers by as much as 90%.

The decision to spray

- Spray when the caterpillar numbers are at or above the spray threshold. DPI currently recommends a spray threshold of 1 medium to large caterpillar (third instar or above, see Figure 1) per m² or about 5 per 10 net sweeps for field peas. This threshold has not been tested for all grain legumes, but should be approximately correct. Note that these methods do not detect caterpillars inside the pod.
- Be aware that there are usually a range for rates on the insecticide label to allow for varying conditions, such as size of caterpillar (see Figure 2). Read the label. The choice of rate should not be solely driven by the lowest price.
- Crops should always be inspected from 2 to 4 days after spraying, and no sooner than 2 days, to ensure the spray had killed enough caterpillars to prevent economic loss.
- In years of very high caterpillar numbers and excessive pod burrowing a higher rate or second spray should be considered. A second spray should only be applied if the spray threshold is exceeded and it should not be the norm.
- If a crop is inspected by a scout or other consultant, we recommend that the grower is made aware (preferably in writing) of the size of the infestation, the product to be sprayed, the product rate, the expected outcome of the spray and the need to reinspect the crop soon after spraying.

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