

DPI Primefact

Wax Moth

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Plant Biosecurity and Product Integrity, Orange

Introduction

Wax moth is a pest of beekeeping, specifically of stored or unattended wax comb. Although there are 2 species of wax moth, greater wax moth (*Galleria mellonella*) and lesser wax moth (*Achroia grisella*), the two species commonly coexist.

Once the environmental conditions are favourable, adult wax moth activity will rise, with an ever-increasing population dependent on available food.

Damage

Wax moth lays large numbers of eggs, from which larvae emerge and eat the comb. In the process of eating combs, the larvae leave behind webbing, which is a classic sign of wax moth presence in combs (figure 1). Frames of eaten wax will appear patchy or disintegrated (figure 2).

In the process of spinning a cocoon, the larvae often chew into the wood of bee boxes and frames, causing permanent damage to the material.

Wax moth are not known to spread disease. They do however take advantage of a declining colony where there are not sufficient adult bees to prevent wax moth activity and damage. Inactive hives (deadouts, hives/combs in storage) are the most vulnerable to wax moth; old brood combs and those containing stored pollen are the most attractive frames for wax moths to attack.



Figure 1 Infested frames become covered in pale webbing and empty cocoons (NSW DPI).



Figure 2 Frame of wax eaten by wax moth larvae (Mark Page, NSW DPI)

Spread

Wax moths fly at night between hives or into nearby unsealed storage areas. Wax moth is spread to new apiaries via infested hive material.

Description and life cycle

Greater wax moth adults are 13 – 19 mm in length, and grey in colour. Lesser wax moth adults are 10 – 13 mm in length and also grey in colour. Both species keep their wings closed over their bodies. Larval stage of both species can be confused with small hive beetle larvae. The main difference is the hard cocoons and webbing left behind by wax moth larvae.

Like most moth species wax moths are nocturnal and more active during the night than during the day. If combs are kept in a darkened room, the moths may be continuously active.

The whole life cycle and extent of population expansion depends on two factors: a suitable temperature range and adequate food. Adult moths are attracted to old brood combs – more so than to any other material. The larva growth rate is also greater on old brood combs. Wax moth reared on old brood combs tend to be bigger, have a higher egg-laying capacity and live longer.

The number of eggs laid by an individual female can vary from 300 to more than 1000. Egg laying can commence immediately after mating. The egg laying rate is at its highest in the first day after mating, diminishing over the next 4–5 days. The number of days an egg takes to hatch varies from 5 to 35, depending on temperature.

Larvae

The larval stage may only take 20 days when food and temperature are ideal but may take up to five months under cooler conditions.

Pupae

The pupae may develop and hatch within eight days during warm conditions and may take two months in cooler conditions.

Adults

The life span of adult moths is generally three weeks, and females can start laying after 4–5 days. Males have been known to live twice as long as females. Females may weigh 50% more than males, probably due to their need to lay volumes of eggs soon after emerging from the pupal stage.

The male emits the mating pheromone, attracting the females. This is unusual, as with many other moth and butterfly species the female attracts the males.

Temperature

Warm and cool temperatures will influence each stage of the life cycle. Temperatures below 5°C can make larvae completely dormant. Developmental activity is reduced between 8°C and 18°C. Eggs are not able to hatch at temperatures below 18°C or above 38°C.

At 38°C, the number of egg-laying females is reduced, and the number of eggs laid at this temperature is reduced to approximately 30 eggs per female, down from 875 at 28°C. Maximum



Figure 3 Greater wax moth adult

egg laying rates, growth rates and general activity of all stages of development appear to occur between 28°C and 30°C.

Control methods

It can be assumed that wax moth will never be eliminated from an apiary or storage shed.

During warm weather (25 to 35°C), remove supers of combs from hives that are not being covered by bees. The presence of adult bees will, in most cases, prevent any damage from wax moths, though wax moth larvae can occasionally be found in an active, healthy colony. It is not uncommon to find wax moth larvae burrowing just under the capping of the brood, although there is rarely more than one or two in the whole brood nest chamber. If a colony does decline in population, it is not uncommon during hot weather for wax moth larvae to destroy all the unoccupied combs very quickly.

All treated equipment should then be sealed to restrict reinfestation whilst in storage, and checked regularly for new moth activity.

General storage advice

Storage of drawn frames should allow light and air movement, in a bee and vermin proof storage area.

Temperature control

The use of cool rooms to slow or prevent the life cycle of wax moths is becoming increasingly common in large-scale beekeeping operations. This is a clean and residue-free method of preventing wax moth damage to combs.

A temperature of -7°C can kill all stages of wax moth within 4–5 hours. Smaller numbers of frames can be stored in a domestic freezer. Larger boxes of combs can be placed in an insulated room for freezing, though should be kept there long enough to allow the extreme cold temperature to penetrate all the material. A cool room temperature of 4°C will suspend all development of the wax moth cycle, and may kill various stages of the moth's life cycle.

Very hot temperatures have also been found to aid the control of wax moths. At a temperature of 38°C, the reproduction and egg laying of adults is significantly lower than at 28°C. A temperature of 46°C is lethal to wax moth development. Holding combs at 46°C for 1–3 hours will kill all stages of wax moth. It must be remembered that beeswax will start collapsing at 55°C and melts at 62° to 63°C.

Phosphine

Always refer to the label directions for use and read the instructions for full details of how to use the product.

Phosphine is a toxic gas used to control insect pests in stored grains, and wax moth in stored beehives, supers and equipment. Pellets containing aluminium phosphide are exposed to moist air; the moisture in the air reacts with the pellets and produces the highly toxic phosphine gas. The gas is colourless, has a distinctive odour and is flammable. Not only does it kill all stages of the wax moth, it is also toxic to all other insects (including bees), mammals and humans. Fumitoxin® fumigant coated insecticide tablets from Nufarm is registered for wax moth control.

The gas will penetrate wood and combs and kill all stages of the wax moth. It will not, however, prevent the reinfestation of combs. Before the combs are placed back on a colony, any residue gas should be allowed to dissipate, by thoroughly airing for not less than 48 hours.

Safety

A risk assessment should be conducted for the location in which the fumigation is to take place. The premises should not be attached to or be part of a building in which people will be present during the fumigation process. Aluminium phosphide tablets should be transported in an open environment, not in an enclosed space (such as a motor vehicle interior).

Very Dangerous

This product can kill if swallowed. It releases dangerous phosphine gas slowly in moist air and immediately if wet. Do not inhale the vapour, as it can kill if inhaled. Avoid contact with eyes and skin. Do not inhale dust. Open the container in the open air. Keep it away from water and liquids. Keep it away from naked flames, as it forms toxic gas. Wear elbow-length PVC gloves when opening the container and using the product. If dispensing by hand, wear a full-face respirator with combined dust and gas cartridge (canister) or supplied air respirator. Wash your hands after use.

Insect zapper

Electronic insect control devices designed for commercial use will kill large numbers of adult moths. These devices will also kill any other insect that comes into contact with the zapper power grids. The purple/blue light attracts adult insects, and they are electrocuted.

Zappers vary in their ability to attract and kill insects; a 15 watt lamp should be sufficient to cover the average comb storage area. Higher voltage grids of 5000–6000 volts are more effective if the number of insects that are coming into contact with the grid is considerable. These units are cheap to run but require regular cleaning of the tray under the zapper. They may also need complete cleaning once or twice a year if excessive numbers of bees are being killed by the device.

The downside is that these devices only kill adult wax moth, and not the larvae; thus, any adult moth that lays eggs in stored combs must go through its full developmental stages before emerging as an adult, which may or may not be attracted to the insect zapper before it mates and lays eggs.

The devices can be useful in monitoring the presence and numbers of adult moths. If adults are detected in any number, other control measures can then be implemented.

General warning

Commercial preparations available in supermarkets for general moth control are not suitable for wax moth control. Chemical residues have been found in honey and beeswax as a result of the use of such preparations.

Do not use products not registered for the control of wax moth.

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Figures 1 & 2 courtesy of NSW DPI

Figure 3 courtesy of Mark Dreiling, Bugwood.org

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