

Wax Moth in the Apiary

*There are two types of wax moth, the Greater Wax Moth – *Galleria mellonella* – and the Lesser Wax Moth – *Achroia grisella*. Both species can destroy combs, although Greater Wax Moth is much more damaging. In the wild, wax moths perform a valuable role as they completely destroy combs when a colony dies out. The resultant frass that they produce is unlikely to harbour many bee diseases.*

Wax moths may be found in a live colony or in stored combs. The stored combs are generally at greater risk. The adult female moth lays her eggs preferably in drawn comb, rarely in foundation, usually finding a crevice around the edge of the frame. On hatching, the larvae, which are very active caterpillars, tunnel through the combs leaving silken webs over the surface of the comb. After a period of pupation, adult moths emerge, mate and continue the infestation cycle. In temperate regions the Greater Wax Moth overwinters as mature larvae and pupae in cocoons. The Lesser Wax Moth has been observed to overwinter in the egg or larval stages.

Within the hive

Generally strong colonies are less prone to attack, as the bees discourage them, but they can be found in active colonies, burrowing under the brood cappings.

Adults – may be seen when the roof or crown board is lifted. If possible catch them and kill them but they move very fast and their presence indicates that larvae may be present.

Larvae - may be in the sealed brood. Slightly damaged cappings can indicate the presence of larvae burrowing between cells. Uncap some cells under the distinctive white “runs” and you may find the larvae. Tap the frames with a hive tool and often the larvae will emerge. Pick them out with fine tweezers.

‘Bald brood’ can be caused by the bees uncapping cells where wax moth larvae have been.

Eggs are not visible but if larvae or adults have been seen take special care at the next inspection to check for larvae.

If larvae are found examine them carefully to distinguish them from the larvae of Small Hive Beetle. The latter look similar but have small spines on the back and three ‘legs’ underneath.

Hive Floors

Floors – whether open or solid can provide a haven for wax moth where they thrive in the debris that has dropped from the colony. If mesh floors are used over a solid floor, a long handled stainless steel scraper (obtainable from bee suppliers) may be a useful tool. This is designed to reach to the front of the floor when inserted at the back and allows debris to be removed. If open mesh floors are used take care not to leave the insert in for extended periods without removing and cleaning.

Apiary Hygiene

During hive inspections put all wax scrapings into a plastic box or tub and remove from the vicinity of the hive. Treat to prevent wax moth damage in storage. This could be done by quickly placing in a solar wax extractor.



Lesser Wax Moth

Protecting drawn comb from damage by Wax Moth

Frames of drawn comb, both for honey supers and for brood, are very valuable to the beekeeper especially the beginner, as they cannot be bought. The bees expend a great deal of energy in drawing wax and a good flow of nectar is required to get the bees to draw foundation. It is therefore important to prevent damage of combs by wax moths, especially when they are stored.

Wax moths can attack any stored combs but are attracted more to brood comb as they prefer the larval skins and pupal cases left in the brood comb as food. Empty super combs stored wet can be less attractive to wax moth as they are not keen on honey, but are messy to handle. Pupae of Greater Wax Moth can also damage the boxes (as larvae pupate they make burrows in the material). Mature larvae spin tough white cocoons, first gouging depressions in woodwork to attach the cocoons.

A treatment which was in common use and advised in older books but is no longer acceptable is the use of para dichloro benzene (PDB) crystals. This moth deterrent was extremely effective but the chemical can accumulate in the wax and possibly damage bee larvae and contaminate honey. This product should not be sold or used. Similarly, no household moth killer or moth balls should ever be used as they are all based on chemicals that are highly toxic to bees as well as moths and, as with PDB, can accumulate in wax and possibly contaminate honey – an example is naphthalene.

Treatment and avoidance

- Avoid equipment with hidden crevices e.g. frames with split top bars.
- Don't pack unused combs close together in boxes. Use normal spacing, otherwise they can soon become one solid mass of cocoons.
- Check parts that bees can't reach, e.g. varroa floors.
- Use a flame torch to destroy eggs in equipment (not on plastic) when not in use.
- Don't leave drawn combs lying around unprotected.
- Stacking boxes after treatment with newspaper between each box can help prevent any subsequent invasion by wax moths or restrict their movement between boxes.

Methods of protecting combs in store

1. Chilling and freezing.

If a large chest freezer is available the combs can be frozen and this prevents eggs hatching, kills caterpillars and prevents combs from being re-infested. Suitable for a relatively small number of frames. Frames need 24 hours at -18°C to destroy eggs and caterpillars.

- if enough freezer space is available leave in for the winter
- if not, after freezing, stack boxes with frames over a mesh floor or queen excluder with an air space underneath – cover the stack with mesh or another queen excluder and a roof and leave outside, but not stacked so high they are blown over by wind.
- in very cold weather any frosts will ensure no wax moth can survive.

Advantages – if a freezer is available, cheap and easy to use. Effective.

Disadvantage – as with other methods, once removed from the freezer, wax moth can invade again in mild weather.

2. Sulphur strips

Sulphur is widely used to sterilize brewing equipment and greenhouses. Strips and a metal holder are sold to use for bee equipment. Care must be taken not to inhale any of the fumes.

- stack boxes containing frames on secure base
- place an empty box on top
- seal the stack of boxes and either tape all joints or enclose in a large plastic sack or bin
- put sulphur strips in perforated metal container in top of the box
- light the strips and cover the top immediately
- seal top cover securely
- sulphur dioxide fumes are produced
- the fumes are heavier than air, sink and penetrate the stack of frames
- 2 strips are adequate for 6 boxes

Advantages – very effective. Strips are cheap, metal container costs more but lasts for years.

Disadvantage – toxic fumes. Wax moths can invade again when fumes dissipate.

3. *Bacillus thuringiensis*. B401, (formerly called Certan®) or Mellonex®

These are commercially available spore preparations of the bacterium *Bacillus thuringiensis* which invades and kills all caterpillars but has no reported effect on bees.

- shake the spore suspension well and use a hand sprayer
- spray each side of the combs with a fine mist of the suspension
- dry the frames and combs thoroughly
- stack in boxes and seal for storing

Advantages – very effective against caterpillars. Not toxic or dangerous to handle. Useful for small number of frames.

Disadvantage – no effect on eggs. Relatively time consuming since frames and combs must be dried thoroughly. Expensive for large numbers of combs. Spore suspension can clump and block the sprayer.

4. Acetic acid

Acetic acid is an excellent all round disinfectant for a wide range of pathogens and diseases. As with sulphur, care must be taken

not to inhale any of the fumes. Wear gloves and eye protection when using acetic acid. Make sure that 80% acid is used and **not** glacial acetic acid.

- remove any metal parts e.g. metal ends, runners/castellations or cover with a smear of petroleum jelly
- stack boxes and seal as for sulphur treatment
- place on a wooden or grass base, not concrete or metal
- 80% acetic acid is poured onto pads or into small plastic container
- use approximately 120ml/box
- seal the top carefully
- the fumes will sink and penetrate the combs
- do not leave for more than 2 weeks to avoid serious damage to metal parts

Advantages – highly effective against all stages of wax moth, nosema, chalk brood and other fungal spores. Cheap. Unused liquid stores well. Does not harm honey so can be used on brood frames from hives infected with nosema

Disadvantages – toxic fumes. Attacks metal so overexposure can damage the wires in the combs and nails in the frame. It also attacks concrete.

General points

None of these treatments can protect permanently from re-infestation as wax moths are common throughout the year, other than in really cold weather. The only exception is storing the frames in a freezer for the entire winter. Layers of newspaper can help but the stored frames must be inspected at intervals to ensure that there is not a fresh batch of caterpillars.

Do not store drawn combs in plastic bags as they are then prone to re-infestation or mould which is just as damaging.

Polystyrene mini-nucs

Greater Wax Moth will bore holes in polystyrene mini-nucs in a very short time. Place them in a freezer when you have finished with them.

This leaflet is one of a series intended to help beekeepers and non-beekeepers. If you believe the contents of this leaflet are relevant to you, please seek further advice from an experienced beekeeper or your tutor.

Information is updated regularly – please check with the BBKA web site at: www.bbka.org.uk – for the latest information.

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Note: The same information is published in our printed leaflet L020 available from the BBKA.

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