Wax Moth Control and Containment by Glyn Davies Revised Nov 2010

For two reasons the traditional view of the wax moth and its treatment has been modified in recent years.

The first is that a better understanding now exists of the moth and its niche in a healthy, balanced ecology of which *Apis mellifera* is part. Secondly, there is now much greater caution regarding the use of curative substances and preventative treatments that could find their way into human or wildlife food chains.

The long established and familiar moth is the small or Lesser Wax Moth (*Achroia grisella*). This is commonly seen running for cover when the roof of the hive is first moved particularly if an overall feeder, such as a Miller, is in position and has been empty for some time. The usual reaction is to attempt to squash the invader before it runs out of sight. Now there is an increasing view that up to a point, the larvae of these moths can remove wax debris within the hive and will certainly demolish combs in abandoned hives and at the same time remove sources of disease especially brood disease.

Also in recent years, there have been regular migrations of the Greater Wax Moth (*Galleria mellonella*) from continental Europe. This moth now appears to be well established in southern counties of UK. The beneficial effects of this moth are the same as the Lesser species. However, the larger size of its larva, 2.2cm compared to 1cm, means that its potential for serious damage to healthy combs is much greater. Moreover, the strongly silk-lined tunnels that it forms as it burrows through combs, feeding as it goes on discarded bee larva skins and cocoons, make it resistant to attack by house bees. In addition this large larva will carve an unsightly boat-shaped cavity on the woodwork inside your hive in which to pupate and make its own cocoon. The larvae occasionally chew the cappings from sealed worker brood exposing the bee pupae. This phenomenon is known as "Bald brood" and can be a clear indication of the presence of wax moth in problem numbers. The worker house bees will also chew the top of a burrow containing a GMW larva but are unable to break through the silk lining. The trail is clearly visible and shows the observant beekeeper exactly where the larvae is hiding.
The purpose of this leaflet is to help beekeepers control the wax moths so that their beneficial aspects can be used to advantage without suffering from the problems which can accrue if the moths are permitted to breed to excess.

Greater Wax Moth
Female larger, pointed head, large antennae

CONTROL SYSTEMS

Good Hygiene and Husbandry
This is a commonsense system. It is the cheapest and an organically acceptable system but nevertheless many points are frequently disregarded and give rise to wax moth problems.
Guidelines

- Floors to be kept clean especially after the winter when a considerable amount of wax debris falls as bees consume their stores. Especially clean out corners and joints.
- Combs and equipment to be kept free of brace and burr comb.
- Keep the apiary free of discarded comb.
- Store old combs and cappings only briefly before melting down and remove the debris from the base of rendered wax blocks if not separated during the process.
- Colonies should be strong enough to look after their accommodation. Weak or small colonies should not be housed in large boxes full of combs: use Nucleus boxes or Dummy frames. Healthy, prosperous bees are the most efficient means of controlling wax moth within hives. The beekeeper has to support the bees in their campaign of extermination. Drawn combs should be given access to bees every year if wax moths are likely to be a problem; this in preference to allowing bees to fill a super twice for instance.
- Stored boxes of combs such as supers should be in a light place with good ventilation and access for spiders but not rodents! Old queen excluders are ideal as a base for the stack. This will not exclude adult moths of course but few will be flying in the cooler months and they are deterred by light and cool air. The greater danger to the combs is from moth eggs already present in the boxes. Low temperatures and good ventilation should inhibit their development. Some beekeepers find it beneficial to separate each box with a sheet of newspaper which seems to prevent larvae migrating from one box to another.
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Use of winter frosts
Both wax moths and especially the Greater Wax Moth are living in the UK at the climatic limit of their normal habitat range. Frost will kill all stages of the life cycle including eggs in severe weather. Stored combs are extremely vulnerable in tropical areas but

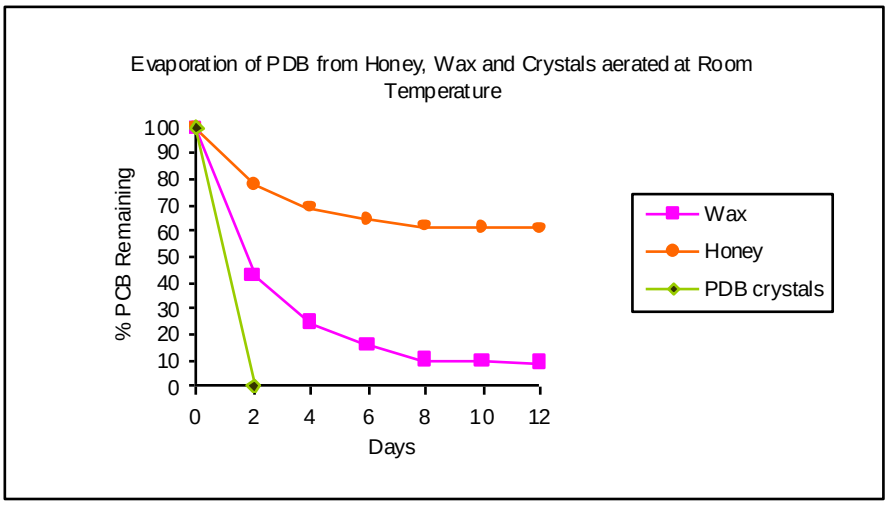
overnight storage in a freezer will protect for a while if this facility is available. Perhaps it would be possible on a cooperative basis. Some beekeepers believe that supers stored wet, i.e. with the residue of honey after extracting still present, inhibit wax moth.

Wax Moth Cocoons
Penn State Univ.

PDB Paradichlorobenzene

This chemical is cheap but not readily available having been withdrawn from general sale. It is potentially hazardous and **should not be used**. It will kill adult and larval stages but is not particularly effective on eggs and pupae. PDB vapour will taint honey and some will remain permanently as a residue making it illegal to sell. PDB will also remain as a residue in wax. Beekeepers should avoid working in an enclosed space with PDB vapour present.

Method of Use A stack of about 5 boxes to be treated is placed on an impermeable baseboard. Approximately 1-tablespoon equivalent of crystals is placed on a sheet of paper on the top bars of the top box. A firm lid is placed on top to make a good seal and the heavy vapour will penetrate down through the boxes, killing as it goes. The combs and boxes must be well aired before returning them to the bees. To be really effective there should always be solid PDB crystals present as when all the vapour has gone moth eggs can hatch and damage will recommence. One batch of crystals may not be sufficient to last a winter. Unfortunately, the lingering residues of prolonged exposure of combs to PDB are well known and well illustrated by the following graph taken, with permission, from the work of Charrière and Imdorf. **Clearly PDB must not be used on supers containing honey.**



Acetic Acid

80% Acetic Acid, which can be used routinely as a comb disinfectant for many pathogens will control Wax moth to a degree. There is some uncertainty regarding the susceptibility of wax moth eggs and pupae especially of the Greater Wax moth. Much will depend on factors such as the strength of the acetic acid, the volumes used in relation to the number of boxes treated, whether the boxes are efficiently sealed, and the length of time that the combs are exposed to the vapours. Most textbooks give detailed instructions on how to carry out these procedures. The necessary 80% Acetic acid is a dangerous and highly corrosive substance presenting the beekeeper with problems in its use and storage. It must also be remembered that metal hive components such as nails, runners, and metal ends can be seriously corroded by the fumes so prolonged exposure is not recommended. A balanced judgement should be made about whether combs may be better destroyed totally and replaced than treated with acetic acid which could turn out a be a false economy.

Greater Wax Moth larva

Silk galleries from wax moth larvae

Certan™

It has been known for some time that the bacterium *Bacillus thuringiensis* is a specific pathogen of the larval form of moths and butterflies. (Lepidoptera) . It kills the caterpillars once they are infected. "Certan™" is the proprietary brand name of a live culture of the bacterium. The culture is appropriately diluted with water and sprayed onto combs. Control is effective and self-perpetuating while there are larvae hatching and available to be infected. Winter kills off the wax moth larvae and also the bacterium. This treatment has an appeal as a biological control; however it should not take the place of hygienic management. Clean hives and clean equipment together with regularly changed combs should not make wax moth a problem. Varroa floors under a bee-proof mesh have proved to be rich breeding grounds for Wax Moth and should only be in place when actually monitoring for the presence of mites. This clearly demonstrates the control exerted by bees themselves. Floors sprayed with Certan™ monthly during the active season have shown no sign of wax moth.

Trichogramma

Trichogramma sp. is a tiny parasitic wasp that lays it's own egg inside the egg of various moth species. Tests conducted in Germany in 1996 showed that successful control of wax moth in combs was possible. The wasp is now available commercially. Further details can be found at *www.beeman.dircon.co.uk/waxmoth.htm* Although there is little accumulated experience with this system, it seems to be a very acceptable system of biological control with no problems of residues or harm to bees.

References

De Bruyn, Clive *Practical beekeeping* Crowood Press 1997
Charriere and Imdorf *Protection of honeycombs from moth damage* Swiss Bee Research Centre 1997
Brown, Ron *Beekeeping - A Seasonal Guide* Batsford 1985
Kinross, John (Ed) *Beekeeping in a Nutshell No. 20* Protection of Honeycombs from Wax Moth Damage.
Shumanuki et al *Chap25 The Hive & the Honey Bee* Dadant 1992

Bald Brood; Capping trail; bee attacking GMW larva

Photo: R Ball

Buried GMW silk covered tunnel
Photo G Collins