

Box Tree Moth & Caterpillar

An EBTS Guide



What to do



Mid-March

The caterpillars will have been dormant through the winter wrapped between leaves. When the days get warmer and brighter they wake up and start to feed.

Check your box plants looking for eaten leaves, cobwebbing and little green frass balls.

The most effective and safe treatment to deal with the caterpillars is a *Bacillus thuringiensis* (Bt) based spray. This only kills caterpillars and doesn't harm bees and other garden beneficials.

Although Bt products such as XenTari, Dipel and Bruco are easily available online, they are not currently registered for domestic use in the UK.



May

Box tree moths will start to be seen in early to mid May depending on how warm the spring has been.

Hang a pheromone trap at the start of May, fitted with a full season lure.

These lures smell of female box tree moth and attract the males into the funnel trap which indicates when moths are active.



June to October

There can be one or two more rounds of moths depending on how warm it is during this period. You will need to use an appropriate spray to control the caterpillars.

It is particularly important to spray the last batch of caterpillars in September/October as these are the ones that will overwinter hidden between leaves.

If you eliminate these your beautiful green spring box leaves will not get eaten.



Full season lures last 35 weeks
available from
www.greengardener.co.uk

Please register your trap, moths caught and any
caterpillar sightings online

www.ebts.org/bmctracker



Caterpillar Control Methods

Biological Insecticide

Most reports consider ***Bacillus thuringiensis*** (Bt) to be the best option for killing box tree caterpillars as it stops them eating within an hour of ingesting a treated leaf and is harmless to humans, birds, fish, and other beneficial wildlife including bees.

XenTari, Dipel & Bruco are based on the Bt bacterium which contains protein endotoxin crystals and living spores. There are fifty subspecies, the most commonly used for caterpillars are subsp. *kurstaki* (in Dipel & Bruco) & *aizawai* (in XenTari). When the targeted caterpillar eats a treated leaf, the toxins dissolve in the high pH of the pest's stomach, causing holes in the lining which allow the spores into the gut. These then germinate causing the death of the caterpillar within a couple of days.

Bt doesn't stay active on leaves for more than ten days as it breaks down under UV light and washes off in the rain.

Nematodes

These are small worms that are supplied as a powder that is mixed with water and applied with a watering can or hose attachment and repeated twice at 7 day intervals. As soon as an infestation is found, the nematodes need to be sprayed directly on to the caterpillars. They kill by entering through natural openings in the bodies of the caterpillars and producing bacteria that disrupt their digestive system. Next they reproduce in the dead caterpillars spreading to others until they have nothing left to eat, at which point they die. However, they also die if the surroundings aren't moist or the temperature drops below 12c.

As nematodes are a live product (such as **Nemasys Fruit & Veg Protection by BASF**), they can only be stored for a maximum of 4 weeks and must be kept in a refrigerator during this time. They can be effective if applied correctly and at the right time.

Chemical Insecticides

These wide spectrum insecticides stay active for longer, 3-4 weeks, but are not safe with bees & other garden beneficals and are not always very effective at stopping the caterpillars eating. Professionals can use some products at higher dosage rates.

Pyrethrum based products such as...

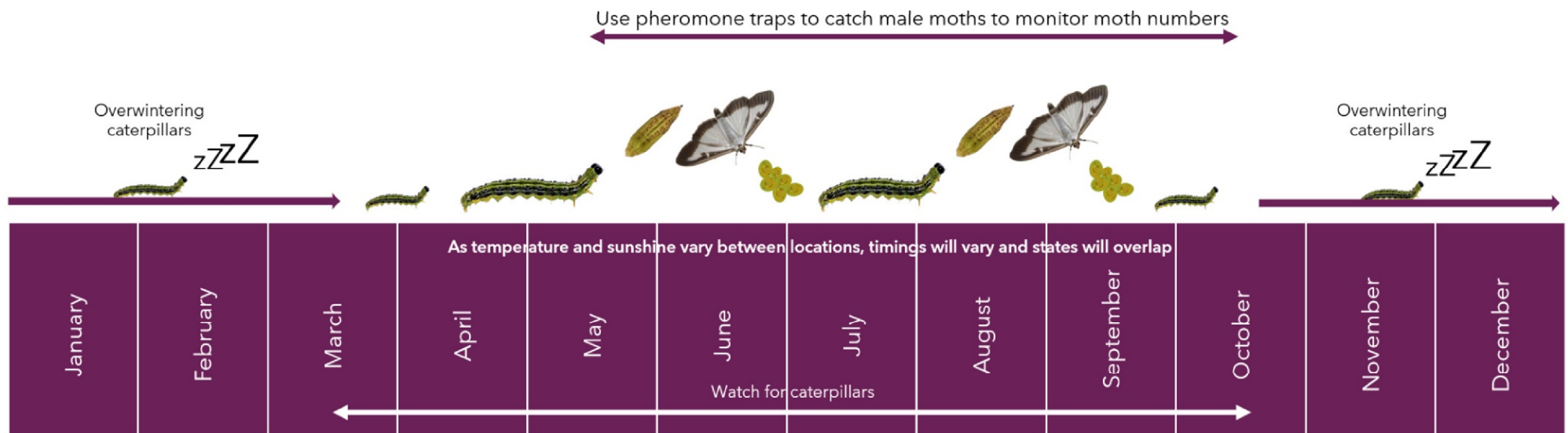
- Py Spray Garden Insect Killer
- Bug Clear Gun for Fruit and Veg
- Defenders Bug Killer
- Ecofective Bug Killer
- Growing Success Fruit & Veg Bug Killer
- Growing Success Shrub & Flower Bug killer

Deltamethrin based products such as...

- Bayer PROVADO Ultimate Bug Killer
- Bayer Sprayday Greenfly Killer

Lambda-cyhalothrin products such as...

- Westland Resolva Bug Killer



Common variant

Melanic variant



Caterpillars/Larvae

Greenish yellow in colour, developing black heads and dark & light strips with spots along their length. Growth is dependent on temperature, taking 3-4 weeks to become fully grown at 4cm long and then living a further 2 weeks.

Temperature threshold for growth >8.4c

Can survive to -30c overwinter wrapped between leaves.

Pupae

Are cocooned in white webbing spun around leaves and are between 1.5-2.0cm long.

The process of turning from caterpillar to moth takes about a week.

Temperature threshold for this state >11.5c

Moths

Have a wing span of about 4cm and either have a thick dark brown border around a white coloured wing with distinctive dots halfway down the leading edge of the wings (common variant) or less commonly the wings are almost entirely brown with white dots (melanic variant).

During their lives they can fly up to 10km and they start laying eggs 2-3 days after they first start flying.

Eggs

Each female can lay up to 700 eggs of 0.8-1.0mm diameter which are laid in groups of 5-30 on the underside of leaves and look like fried eggs. These are coloured greenish yellow at first with black dots appearing as the larval head capsule is formed.

Temperature threshold for egg development >10.9c

When & how did it get here?

Since 2007 box tree moth caterpillars have been devastating our boxwood hedging and topiary in domestic, commercial and historic gardens across Europe. However, the impact is not just in gardens; the caterpillar is decimating large areas of Europe's natural box woodlands. The Northern Caucasus as well as Bulgaria, Germany, NW Italy, Romania and southern France have all been badly affected. In the UK wild box is now under threat with small infestations reported at Box Hill, and most recently at another large area of box woodland in the Chilterns.

The severity of the infestations was demonstrated dramatically in Germany's Grenzarch-Whylen Nature Reserve which contains the country's largest box tree forest. Between 2009 and 2010, the caterpillars attacked all the box trees causing more than 90% de-foliation and 27% lost all their leaves. Although the population of moths then decreased, having eaten most of their food source, by 2012 the trees that had been fully defoliated died as their bark had also been eaten and thus exposed the trees to fungal infection. Observations show the eco-system in the forest is beginning to change with new ground cover taking the place of the box which will likely now only remain in smaller clumps.

The origin of the moth is recorded as North China, but it has spread a long way since 1859 when it was first identified and now covers large areas of the continent of Europe.

The consensus is that the wide scale spread is not caused by the flight of the moths, but by commercial movement of infected plants carrying undetected eggs or caterpillars. An example of this was the 2012 Sochi Winter Olympic Games, where Italian box was imported for planting



in the Olympic village, after which Russian experts found box tree moth/caterpillars in the site. Control measures failed, resulting in a rapid spread into the natural boxwood in the Caucasian Biosphere Reserve. It has since spread further across Georgia. Damage has also been observed on *Rubus* spp., *Ruscus colchicus*, *Ruscus fruticosus* and *Smilax excelsa*.

Cydalima perspectalis

Box Moth were first described by Francis Walker (1809-1874) in 1859 when he was working on the '*List of the specimens of lepidopterous insects in the collection of the British Museum*'.

Since its initial description and classification, it has been placed in a number of genera, including *Glyphodes perspectalis*, *Neoglyphodes perspectalis*, *Palpita perspectalis*, *Diaphania perspectalis* and since 2010 *Cydalima perspectalis* (Walker, 1859).



Francis Walker
(Wikipedia)

Prospects for the future?

Mating Disruption—a product from French company M2i was registered for use in the UK in 2022. This is available to professionals and when applied makes an area smell of female moths which means the males can't find females to fertilise which reduces the number of caterpillars and thus damage to plants.

Essential Oils & Plant Extracts – German research looked at the repellent effect of different concentrations of plant extracts & oils and their toxicity. The plant that was most effective was Elder *Sambucus nigra* followed by *Thymus vulgaris* which reduced egg laying significantly. However, when also looking at the toxicity of the treatment, with the *T. vulgaris* at 5% concentration only 7% of caterpillars survived.

Frass Vials – Hungarian research has found that female moths don't tend to lay eggs near active caterpillars. The frass from the caterpillar acted as a beacon to say the leaves would be eaten if the eggs were laid on them so they were avoided. Using this knowledge they extracted and produced a synthetic version of the 3 compounds in the frass that triggered a reaction in the moths. When used in a vial with a wick it reduced egg laying in laboratory trials by 75%.

Trichogramma – These are small wasps that lay their own eggs inside the egg of the box moth eggs and when they hatch they eat the box moth eggs. The distribution method is often a biodegradable cardboard carrier that is hooked on to a branch inside a box plant. If applied as soon as eggs have been laid and a minimum of two consecutive treatments are applied to the first set of eggs in the year it is possible to achieve 90% efficiency.

Unfortunately, trials of potential products based on essential oils and frass have been dropped and DEFRA turned down the application to import the wasps into the UK.



www.ebts.org/uk

info@ebts.org

Devoted to encouraging the appreciation cultivation
and knowledge of Boxwood & Topiary

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EBTS UK PO Box 256 Stroud GL5 5WZ

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