

Notes on Apple Ermine Moth (*Yponomeuta malinellus*)

Revised August 2026 Compiled by Peter Laws



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About these notes

Other than the splendid “A Colour Atlas of Fruit Pests”, Alford (1984) page 134, textbooks on orchard pests often have little information on this species, so this note is a survey of internet sources - where conflicting advice and errors abound. The discussion here is from the point of view of practical orcharding in the UK and interpreted using direct observation where possible.

Introduction

Apple Ermine Moth is prevalent in Southern England and the Midlands. It can defoliate apple and crab apple trees. Although trees generally recover quickly, severe cases can weaken the trees and infestations may recur year after year. In severe cases, fruitlets can stop growing and drop prematurely.

The RHS advice (generic advice for small Ermine Moths, of which there are several closely related species)

- Where possible tolerate populations of these caterpillars, as butterflies and moths are an important part of the garden ecosystem and damage to plants is usually only short term.
- Encourage predators and other natural enemies in the garden such as birds, hedgehogs, and ground beetles.
- Check plants regularly from spring for the presence of larvae and remove by hand where practical. The gregarious nature of these caterpillars means it is sometimes possible to prune out affected shoots.

Not surprisingly, this approach is echoed by butterfly conservation websites which appear unconcerned by fruit production from thriving trees. Whether the RHS advice is acceptable may depend on your fruit trees and their ecosystem, and your own views. It is not evident that hedgehogs predate Apple Ermine Moth at any life stage !

If you have otherwise healthy trees and a flourishing population of natural predators, it seems a laudable approach. Infestations will naturally wax and wane with pest and predator balance over the seasons.

However if attractive “visual appearance” is important, or you have stressed or young valuable trees, or there is a lack of natural predators due to depleted biodiversity ecosystem such as closely mown grass or weed suppression, these factors might prompt an interventionist approach. Apple Ermine Moth is not a threat where broad-spectrum insecticides are used regularly but could be a persistent pest in orchards where insecticides are not used, for example where codling moth is just controlled by mating disruption.

The first symptom of an infestation is often silken webbing enclosing clusters of leaves which turn russet brown and skeletal as they are consumed by wriggling populations of caterpillars inside the tents.

Life cycle

Intervention success depends on understanding the life cycle.

The Apple Ermine Moth completes exactly **one generation per year**. Its life cycle centres on a destructive spring larval (caterpillar) phase, then a short adult moth stage, followed by an extended, highly resilient overwintering stage.

1. Egg stage and overwintering (late summer to early spring)

- **Egg laying (July – September):** Female moths lay clusters of 10 to 80 eggs in overlapping rows on the bark, close to buds or twig junctions of young apple tree branches from July into September.
- **Egg colour transformation:** Freshly laid eggs are light yellow. Within two weeks, they turn bright red and eventually fade into a brownish-grey protective shield (hibernaculum) that camouflages with tree bark.
- **Hatching:** Crucially, the tiny first-instar larvae hatch from the eggs after just 8 to 15 days in early autumn. However, they do not leave the area. Instead, they enter diapause and spend up to 300 days overwintering directly underneath the old, hardened egg shield to survive freezing winter temperatures. The larvae sometimes feed on bark under the egg mass.

2. Larval stage and leaf mining (mid-spring)

The larva is a caterpillar varying from grey to dark green or cream in color, with dark spots along its sides. It develops through five instars and when mature is about 3/4 inch long. The caterpillars feed within a communal web.

- **Emergence (April):** At bud break, the tiny young caterpillars emerge from beneath their winter shields and move straight to developing leaves.
- **Leaf mining:** For the first 10 to 12 days, the small larvae burrow inside the tissue of the apple leaves, acting as leaf miners.
- **Exiting the mines:** After their first moult, the caterpillars leave the inside of the leaf to feed openly on the surface.

3. Communal tents and defoliation (May – June)

- **Building silk webbing:** As they grow, the larvae group together and spin intricate, dense white silk tents around leaves and shoots. These webbing nests can expand up to 3 inches across.
- **Gregarious feeding:** Dozens to hundreds of caterpillars live communally inside each tent. The webbing keeps them humid and serves as a highly effective defensive shield against predatory birds and wasps.
- **Defoliation risk:** The larvae devour the leaves, stripping them down to the main veins. When one section is eaten, they move and expand the web. Blossom and young fruitlets within the webs may also be damaged. Severe infestations can completely defoliate entire garden trees or neglected orchard trees by June.
- **Appearance:** Fully grown larvae reach about 18 to 25 mm (0.75 inches) long. They feature a distinct greenish-yellow to creamy-grey body punctuated by two rows of prominent black spots running down their sides.

4. Pupation (June)

The pupae, which have white cocoons, hang in clusters within the web

- **Neat packing:** Once fully fed in June, the caterpillars prepare to transform inside their silk tents.
- **Cocoons:** They spin dense, white, spindle-shaped cocoons. Unlike many other species, they arrange themselves symmetrically, lining up in tightly packed, neat clusters or rows suspended within the webbing.
- **Duration:** The pupal transformation phase lasts roughly 10 to 14 days.

5. Adult stage and reproduction (Late June – August)

- **Emergence:** Adult moths emerge from their white cocoons starting in late June, with flight peaking through July and August.
- **Adult appearance:** The adult is a small, narrow moth with a 16 to 20 mm wingspan. It has striking, satiny-white forewings dotted with three irregular rows of small black spots (usually 12 to 16 total), giving it its "ermine" coat appearance. The hindwings are plain grey with fringed edges.
- **Mating:** Newly emerged adults feed on nectar for about a week to sexually mature. They mate in the tree crowns, and females soon deposit the new egg clusters onto the branches, restarting the 12-month cycle.

Seasonal summary table

Season	Active Stage	Behaviour / Impact
Autumn and winter	Eggs / 1st-instar larvae	Overwintering under a grey, flat, bark-like shield.
Early spring	Young larvae	Internal leaf mining just as tree buds break open.
Late spring (May–June)	Growing caterpillars	Gregarious feeding inside expanding, dense silk tents; causes defoliation.
Mid-summer (June)	Pupae	Spindle-shaped white cocoons packed tightly in rows within the tents.
Late summer (July–Aug)	Adult moths	Flight, nectar feeding, mating, and laying next year's egg batches.

Infestation spread

Apple Ermine Moth outbreaks generally start as localized events. The females lay their eggs directly onto the tree bark, which means that the first generation of caterpillars feed intensively on that particular tree before becoming adult moths. The flight capability of the moths is modest so they typically move only short distances, usually to nearby trees or adjacent areas in an orchard or garden. If you notice an infestation on one apple tree, it is often a sign that the outbreak is spreading incrementally, rather than a sudden long-range invasion.

Environmental factors play a significant role in how far these moths might travel. Warm and dry conditions can boost their activity levels and potentially extend their range slightly, while strong wind currents can aid occasional longer dispersal events. Under normal circumstances infestations are relatively localized.

In a broader ecological context, while the moths can expand their territory gradually if nearby host trees are abundant and environmental conditions favour survival, they are not known as aggressive long-distance dispersers. This makes management a more focused, area-specific endeavour. Targeting and treating affected trees can help prevent the gradual spread into neighbouring areas.

If you are managing an orchard or even a few apple trees in your garden, understanding these dynamics can help in planning effective interventions. Integrated pest management techniques, such as pruning infested branches, monitoring for egg masses, and encouraging natural predators, may offer sustainable ways to control outbreaks.

Managing an infestation

To manage an infestation of Apple Ermine Moth, you must tailor your action to the specific **active stage** currently visible on your trees.

Using a flame gun to burn the nests on the tree is not advisable. It causes severe, permanent fire damage to the tree's bark and cambium layer, which harms the tree far more than the caterpillars.

Because the larvae protect themselves inside dense waterproof webbing, standard contact sprays are rarely effective. On the internet, some of the spraying advocated is contrary to best practice.

Jim Arbury, RHS Fruit Specialist says: *“I do have some comments on sprays. Acetamiprid has no approval for control of caterpillars or for use on apples. It is also a neonicotinoid so best avoided. Lambda-cyhalothrin currently has no approval for apples although I think that it did have in the past. Bacillus thuringiensis only has approval as a professional product and is not approved for amateur use. Neem oil has no approval as an insecticide. Both Bacillus thuringiensis and Neem oil are widely available online however”.*

Egg removal

Apple Ermine Moth eggs are laid on the bark of apple trees in flat, protective clusters (egg masses) roughly 1.2 cm (½ inch) across. They function as a dynamic camouflage system, drastically changing colour over time to blend into the tree

- Freshly laid egg masses are light yellow. They change to bright red within about two weeks, then fade to grey, which is difficult to see on apple tree bark.
- In autumn or winter, inspect the bark of young twigs for the flat, brownish-grey egg shields. Gently scrape them off using a dull knife to prevent next spring's generation.
- Prune your apple trees annually during their dormant phase between November and early March. Pay special attention to removing any growth where tents were active, as females lay egg masses on the bark. Burn or destroy all the offcuts.



Before tent formation

If the infestation was widespread in the previous season, apply targeted treatments that penetrate or coat the leaves before the larvae web them up completely. **Caution - see RHS guidance on page 4.**

- **Apply Bt** (*Bacillus thuringiensis* var. *kurstaki*): This is a naturally occurring soil bacterium that targets chewing caterpillars without harming bees, birds, or humans. It gives good control if applied to actively feeding caterpillars in April and May.

Apply on a dry day as soon as tents begin forming or when caterpillars are small. Spray thoroughly, ensuring the liquid saturates the foliage directly adjacent to the tents. The caterpillars must consume the treated leaves for the bacterium to paralyze their digestive systems.

- **Horticultural Oil / Neem Oil:** Spraying a 2% dilution of horticultural oil or neem oil during the winter dormant season (or early spring bud break) can suffocate the overwintering larvae trapped under their egg shields.

Tent removal (best for small trees and low nests)



Close-up of black-spotted larvae



Communal silk tent on apple tree

If you can safely reach the branches, manual destruction is the fastest and most eco-friendly method on young small, valuable trees. This is easiest and cheapest for semi-dwarf trees.

- Squash the tents manually with a swift action if you are not squeamish. Have hand-wipes or use rubber gloves if necessary. Intercept escaping caterpillars by holding a small tray or plate under the tents to catch escapees and then also squash them.
- Ensure you are dealing with Apple Ermine Moth. (You must be sure you do not attempt this with the hairier and dangerous Oak Processionary Moth, although this would not be expected on apple trees)

- Alternatively, prune out tents using sharp secateurs to cut out the branches or twigs containing the silk tents, ensuring minimum vibration, and immediately drop the clipped nests into a bucket of soapy water to drown the caterpillars. Do not place in a compost heap. Alternatively, safely burn them or seal them in a secure bag to kill the larvae.
- Use water jetting - see later discussion in Appendix 2
- Once the leaves have turned brown and skeletal, the caterpillars will have already moved on.

Cocoon removal

If you see white cocoons lined up inside the tents, the caterpillars have already pupated.

It is worth removing the cocoons if you can find and safely reach them. The caterpillars usually leave their earlier brown nest with its frass and move to a new cluster of green leaves, less easy to find and which is not eaten by the pupae which are cocooned, and so the leaf cluster stays green.



Cocoon removal is one of the most effective high-impact actions you can take because it directly prevents the next generation of moths from ever emerging. Every cocoon you destroy eliminates an adult moth. Unlike the fast-moving caterpillars, the pupae inside the cocoons are completely motionless and trapped. They cannot crawl away or drop to lower branches when you approach. As mentioned in their life cycle, Apple Ermine Moth caterpillars line up in tight, neat, parallel rows inside the silk tents to pupate. This means you can wipe out dozens of future moths in a single swipe or snip.

Chemical or organic sprays will not be effective against cocoons. The dense, white, spindle-shaped cocoon is highly waterproof and completely shields the transforming pupa inside from liquid treatments. Manual removal is your only option. To safely remove cocoons from high, mature trees, you must adapt your removal strategy to match your reach:

On reachable **lower branches**:

- Simply manually squash them, as suggested for the caterpillars.
- Alternatively use sharp pruning shears to cut out the twig or small branch section containing the nest of cocoons and drop the entire cluster immediately into a bucket of soapy water.

On **high branches** (out of reach):

- Use a telescopic pruning pole to snip the infested twigs from safety on the ground. Alternatively, you can use a high-pressure "fireman" hose nozzle to blast the cocoon clusters. Because the pupae are securely anchored to the silk, a strong jet will tear the entire web structure out of the high canopy and drop it to the ground.
- If you blast cocoons down, spread a plastic tarp beneath the tree before spraying, or rake up the fallen silk nests immediately after. If left on the damp ground, the pupae can still successfully hatch into adult moths and fly right back up into your tree.
- Moths will begin emerging from the cocoons after 10 to 14 days.

Targeting adult moths

Adult moths emerge from their white cocoons in late June or early July. They are **nocturnal flyers**, spending the daylight hours resting deeply hidden within the canopy of the apple tree.

Adult Apple Ermine Moths have a very short adult lifespan typically 1–2 weeks. In the UK they do have predators, but not many. Likely predators (inferred from UK moth ecology) are:

- Small insectivorous birds (e.g., tits, warblers, robins). These birds routinely take small day resting moths from foliage. Apple Ermine Moths rest openly on leaves and bark, making them easy prey (inference based on typical predation of small moths)
- Adult Ermine Moths are frequently photographed on foliage and bark where spiders hunt. (Inference based on habitat overlap).
- Small nocturnal moths are standard prey for UK bat species. Apple Ermine Moths fly at dusk/night in July–August. Inference based on general moth predation.



Adult moth behaviour

- Unlike many moth species that mate immediately upon emergence, adult Apple Ermine Moths must feed on nectar for 10 to 12 days before they are sexually mature.
- While many large, nocturnal moths are famously drawn to sweet, fermenting mixtures, Apple Ermine Moth respond very poorly to these.
- The ratio of males to females is thought to be 1:1 and both need to be controlled. The females would lay up to 10 - 60 eggs per batch and up to 150 in her lifetime on tree bark in the autumn.
- Once mature, receptive female moths rest on twigs and release a highly specialized, species-specific chemical perfume called a sex pheromone into the air.
- Air currents carry this pheromone downwind in a narrow plume. Male moths use their sensitive, specialized antennae to detect the scent, flying in a zig-zag pattern upwind to track down the motionless female.

The adult stage of the **Apple Ermine Moth** represents a good time to break the reproductive cycle. Because it is a single-generation pest, preventing adult mating between **July and September** helps to eliminate the caterpillar infestation next spring. However, on its own mating disruption will likely not provide sufficient control.

Mating disruption works by artificially flooding the orchard or garden air with a synthetic copy of the female moth's natural pheromone and is deployed in two ways:

Pheromone traps (best for isolation or monitoring)

For garden apple trees, hanging targeted sticky traps in the canopy from **mid-June through September** is the easiest monitoring/control method and should be hung at head-height on the windward side of your apple trees

- The traps consist of an open-sided, weatherproof triangular box containing a small synthetic pheromone pellet resting on a highly sticky floor.
- Male moths are completely fooled by the artificial scent. They fly straight into the trap looking for a mate, become permanently stuck to the bottom liner, and die.
- Change the lure every six weeks or more often in hot weather. The lure is effective only within about 200 feet.
- If you successfully catch enough male moths, the local mating ratio collapses. Unmated females will continue to wait for a partner, but as their brief adult life span ticks away, they will eventually die without ever laying viable egg clusters.



- Brands such as Dragonfli or Agralan sell Apple Ermine Moth Pheromone Traps that will only capture the target pest, leaving bees, butterflies, and ladybirds unharmed.

Atmospheric inundation (commercial disruption)

In larger orchards or heavily infested neighbourhoods, growers use hanging passive dispensers spaced out evenly across the trees.

- These dispensers continuously pump out high concentrations of the synthetic pheromone, creating a thick, uniform cloud of the scent across the entire area.
- This completely masks the faint, real scent plumes produced by actual female moths. The male moths become totally disoriented, cannot locate a single female, and quickly exhaust their energy flying blindly until they die.

Crucial factors for successful mating disruption

- You must use a trap specific to the *Yponomeuta malinellus* (Apple Ermine Moth) or small Ermine Moth family. A standard codling moth trap or clothes moth trap relies on entirely different chemical compounds and will be ignored by Apple Ermine Moths. Suppliers such as Agralan Growers or local specialist biological control outlets stock these specific lures.
- Do not wait until you see flying moths, but do not put traps out too early either. You need to hang the traps in the tree canopy by mid-to-late June, just as the caterpillars are finishing their pupation inside the silk cocoons, ensuring the traps are fully operational the moment the first adults emerge.
- Traps used should have semi-closed ends to avoid trapping small birds. The tiny moths can pass through easily, but birds will be safely blocked.
- Change the sticky glue insert and the pheromone lure every 4 to 6 weeks to ensure continuous protection through August.

Mass trapping

Caution : Whilst this may be pertinent in the context of a commercial orchard, it would be regarded as dubious practice by environmentally aware practitioners.

To mass-trap and eliminate a large, active population of adult Apple Ermine moths, you must scale up from standard "monitoring" to a strategy known as mass-capture. Because adult Ermine Moths do not respond to light traps or food baits, your approach must rely heavily on overwhelming the males with pheromones while preparing for direct intervention.

Standard garden guidelines recommend hanging just one trap per 3 to 5 trees for monitoring. To actively crash a large population, you must drastically increase the trap density:

- Hang one dedicated pheromone trap per mature apple tree.
- Buy traps explicitly labelled for the Apple Ermine Moth (*Yponomeuta malinellus*), such as those made by Agralan or Dragonfli. Codling moth traps use a different pheromone and Ermine Moths will ignore those.
- Hang the traps at head height inside the tree canopy. Position them on the outer southern or western branches where they are sheltered from the direct, midday sun, which can degrade the pheromone sticky glue prematurely.
- A large infestation will fill up the sticky base inserts very quickly. Check the traps every few days to clear out dead moths and swap out full sticky inserts; otherwise, new moths will simply land on top of the dead ones and escape.
- If adult moths are visibly fluttering around the branches in large numbers right now, pheromone traps alone may take too long to break the cycle. You can directly reduce the adult population using targeted sprays.
- When to Spray: Spray exclusively at dusk. Adult Ermine Moths become highly active as night falls, whereas beneficial pollinators (like bees) will have finished foraging for the day, keeping them safe.
- Consider contact insecticides based on natural pyrethrins, such as Neudorff Bug Free Bug and Larvae Killer or Bug Clear Ultra 2. These knock the flying moths down instantly on contact but break down quickly in the environment. **Caution - see RHS guidance on page 4.**

- Spray thoroughly into the canopy where adults are resting. If any late-stage silken nests or pupae remain, use a forceful, sharp stream of water from a garden hose first to tear open the webbing, then apply your treatment.

Chemical Control

Always consider an integrated approach with preventive measures together with biological treatments if available. Some internet references mention that extensive infestations can be controlled with an insecticide applied thoroughly over the tree. The contact insecticides deltamethrin or lambda-cyhalothrin can help to control the larvae. The systemic insecticide acetamiprid can also be used. Plants in flower should not be sprayed due to the danger to pollinating insects.

Caution. Jim Arbury of the RHS advises: Acetamiprid has no approval for control of caterpillars or for use on apples. It is also a neonicotinoid so best avoided. Lambda-cyhalothrin currently has no approval for apples although I think that it did have in the past. *Bacillus thuringiensis* only has approval as a professional product and is not approved for amateur use. Neem oil has no approval as an insecticide. Both *Bacillus thuringiensis* and Neem oil are widely available online, however.

Natural predators

Encouraging local wildlife can significantly keep the caterpillar population in check. Importantly, the moths and their predators rely on the same blossoms for feeding, and their life stages have evolved to be synchronised.

- Avoid broad-spectrum insecticides: Chemical sprays such as pyrethroids kill beneficial insects, including the small parasitic wasps (Ichneumonidae and Chalcididae) that lay eggs inside Ermine Moth larvae.
- Install bird boxes: blue tits, great tits, and other insectivorous birds will, reportedly, rip open the silk tents to feed the caterpillars to their chicks in May and June.

Generalist predators such as tachinid flies, birds and spiders can help control Apple Ermine Moth. One of the most important predators are parasitic wasps. These are often overlooked or misidentified as “just flies”.

Parasitic wasps

These are non-stinging wasps that lay their eggs on or inside other insects. Once the egg hatches, the wasp larva eats the host alive before emerging as an adult wasp. They are an important predator of caterpillars, sawflies, leaf midge, aphids, and ants. They have a role as a pollinator in the spring and summer.

In the UK, Apple Ermine Moth populations are naturally regulated by several specialized parasitic wasps. The most notable of these is the polyembryonic wasp ***Ageniaspis fuscicollis***, alongside ***Diadegma armillata*** and ***Herpestomus brunnicornis***. These wasps act as natural biological controls by preying on the moth at different stages of its life cycle (See next page)

How these wasps control moth populations

Ageniaspis fuscicollis is a tiny, beneficial parasitoid wasp native to the UK and Europe. It plays a critical role in natural pest control by targeting the caterpillars of Ermine Moths (*Yponomeuta* species).

Key Identification Features

- Size: Extremely small, usually measuring between 1.0 to 1.5 mm in length.
- Colour: entirely dark metallic black or dark brown body, often with a subtle iridescence under magnification.
- Antennae: distinctly elbowed, which is a characteristic feature of the Encyrtidae family.
- Wings: clear, translucent wings with reduced, simplified vein patterns.

Three important parasitic wasps

Ageniaspis fuscicollis: A tiny, specialized wasp that lays its eggs inside the moth's eggs. Thanks to "polyembryony," the wasp egg divides inside the developing Ermine Moth caterpillar, eventually killing it and producing dozens of new wasps from a single host.

It is naturally present in the UK and across Eurasia. It acts as a primary biological control by laying eggs inside the moth's eggs. *Ageniaspis fuscicollis* is one of the most important regulators of Ermine Moth populations



Diadegma armillata: An ichneumonid wasp that specifically targets the young caterpillars inside their characteristic silk "tents"



Herpestomus brunnicornis: This wasp targets the pupae of the moth, laying its own eggs inside the cocoon



Fascinating Biology: Polyembryony

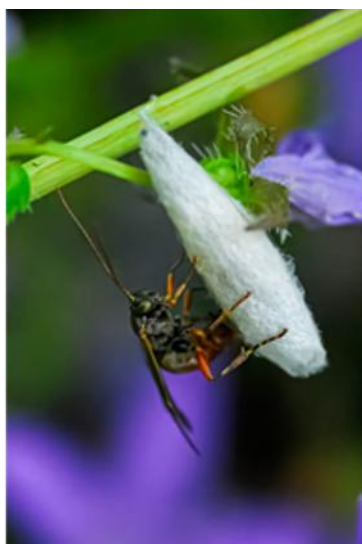
Ageniaspis fuscicollis is notable for a reproductive strategy termed polyembryony which works as follows:

- The tiny adult wasp lays its eggs inside the egg masses of the Apple Ermine Moth in late summer.
- The wasp eggs do not hatch until the moth caterpillar reaches its third larval stage. Once inside, the egg divides multiple times (polyembryony), producing up to 100 clonal wasps from a single victim.
- The developing wasps consume the caterpillar, eventually killing it and mummifying the host as they pupate.
- While natural enemies like *A. fuscicollis* usually keep numbers down, Ermine Moths can still experience population spikes in the UK, resulting in trees covered in heavy, silken webs and temporary defoliation.

The relationship between *Ageniaspis fuscicollis* and Ermine Moth (*Yponomeuta* species) infestations is one of the most effective examples of natural population regulation and classical biological control. In their native European and UK habitats, these tiny wasps act as a major environmental brake, preventing small Ermine Moth caterpillars from permanently decimating orchards, hedgerows, and woodlands.

Host Specificity and Synchronization

- *Ageniaspis fuscicollis* is highly specialized. It primarily targets the Apple Ermine Moth (*Yponomeuta malinellus*), Cherry Ermine Moth (*Yponomeuta padella*), and Bird-cherry Ermine Moth (*Yponomeuta evonymella*).
- In the UK, *Ageniaspis fuscicollis* is present, but its abundance varies by region and orchard type.
- The wasp's life cycle is flawlessly synchronised with its host. Adult wasps emerge in mid-to-late summer exactly when adult Ermine Moths are laying their egg batches on tree branches.
- The host caterpillar hatches and overwinters safely under its protective shield (hibernaculum). The parasite egg inside it stays dormant, allowing the caterpillar to grow normally into late spring, build its large silk communal tents, and feed on leaves.
- Only when the caterpillar reaches its final, largest larval stage does the polyembryonic wasp clone army activate. The wasp larvae consume the host from the inside out, completely killing the caterpillar before it can pupate into a moth. So while the wasp does not prevent initial spring defoliation, it dramatically lowers the following year's moth population, breaking the multi-year infestation cycle.
- Because Ermine Moth caterpillars live gregariously inside massive silk webs, they are highly insulated from birds and chemical sprays. *Ageniaspis fuscicollis* bypasses this defence by attacking before the web is even built.
- In balanced native UK/European ecosystems, it regularly accounts for 10% to 24% of natural caterpillar mortality.
- *Ageniaspis fuscicollis* rarely works alone. In a natural environment, it operates alongside a complex of other natural enemies, such as the ichneumonid wasp *Herpestomus brunnicornis* and the braconid wasp *Dolichogenidea delecta*. While *Ageniaspis fuscicollis* attacks the egg stage, these other species pick off survivors at later larval and pupal stages, creating a multi-tiered defence system that naturally collapses major outbreaks within 2 to 3 seasons.



Ichneumon Sp. laying eggs in cocoon of Apple Ermine Moth



Wasps emerging from cocoon of Apple Ermine Moth

Supporting a good population of parasitic wasps

You can support a good population of *Ageniaspis fuscicollis* (the key UK parasitoid of Apple Ermine Moth, but only by creating the conditions that let the wasp find, parasitise, and overwinter inside Ermine Moth egg batches. You cannot “attract” it like a pollinator; you must support its ecological cycle.

- Do NOT remove every egg batch. This is the single most important rule. *Ageniaspis fuscicollis* parasitises freshly laid egg batches in July–August. If you remove all egg batches in winter, you also remove the parasitoids overwintering inside them.
- Instead, remove **some** egg batches, especially heavily clustered ones. Leave a proportion (10–30%) so the parasitoids can emerge next spring. This creates a balance: fewer larvae next year, but parasitoids still present.
- Avoid winter tree washing or broad-spectrum sprays. Winter washes (e.g., tar oil substitutes) and summer insecticides kill parasitoids inside egg batches. Even “bee-safe” sprays kill micro wasps.
- Avoid pyrethroids, deltamethrin, lambda-cyhalothrin, etc. Avoid “bug killer” sprays marketed for caterpillars — they kill parasitoids too. Parasitoids are extremely sensitive to residues.
- Avoid removing all webbing too early. This sounds counterintuitive, but parasitoids emerge from egg batches in spring. If you remove every larval colony immediately, you reduce the number of adults that will lay eggs later and therefore reduce the number of egg batches available for parasitism.
- Remove most webbing to protect the tree. Leave a few small colonies so the lifecycle continues.
- Keep the area around the apple tree dark at night. Do not use UV moth traps or bright night lighting. These do not help control Ermine Moths but they do disrupt parasitoid activity by:
 - Reducing nocturnal navigation
 - Attracting and killing beneficial insects
 - Altering predator–prey balance
- Encourage other parasitoids and predators. A diverse ecosystem gives stronger biological control. *Ageniaspis* works best in a community of natural moth enemies.
 - Spiders (leave some webbing, avoid over tidying)
 - Ground beetles (mulch, leaf litter)
 - Birds (nest boxes, hedges)
 - Other micro wasps (nectar plants)

Observing egg masses for parasitism

Parasitised

- Dull grey-brown colour
- Matte surface
- Multiple tiny round holes
- No larvae in April
- Egg batch still intact in June

Healthy

- Tan/light brown
- Glossy
- No holes
- Larvae hatch in April
- Batch splits open and empties

Herpestomus brunnicornis is a parasitic ichneumon wasp that exists in the UK and naturally attacks the Apple Ermine Moth (*Yponomeuta malinellus*). The wasp acts as a natural biological control agent by targeting the moth's pupae or older larvae, successfully reducing pest populations in orchards and hedgerows.

How *Herpestomus brunnicornis* attacks

- The female wasp lays her eggs inside the caterpillar or the newly formed pupa of the Apple Ermine Moth.
- As the wasp larvae hatch, they feed on the developing moth from the inside out, ultimately killing the pest before it can mature into a breeding adult.
- In the UK and Europe, *Herpestomus brunnicornis* is one of a suite of natural parasitoids (along with flies and other wasps) that help regulate Ermine Moth outbreaks naturally.

Social Wasps: Common UK social wasps (like the yellowjacket and common wasp) are also formidable predators of caterpillars. During the summer, they will actively hunt and harvest the caterpillars from the host plant to feed their developing brood.

While the communal, silky webbing of the Apple Ermine Moth provides partial protection from birds and the elements, wasps are well-adapted to bypass this defence, often harvesting caterpillars directly from the webs.

Ground beetles (carabidae)

These are voracious predators; they love slugs and snails, but in an orchard system they may play an important role in eating sawfly larvae and moth caterpillars and wingless females when on the ground.

Many ground beetles are nocturnal and require shelter and shade during the day. A few logs or large stones scattered around your mulch circle will foster a population ready to attack anything emerging from fallen fruit.

Appendix 1 - Plants for moths and their predators

Adult **Apple Ermine Moths** are micro-moths equipped with a relatively short, fragile proboscis (a tube-like mouthpart) and they rely on shallow, open-faced flowers and heavily night-scented plants that bloom in high summer (July to August) where the nectar is sitting right on the surface and gives them the carbohydrate energy required to survive their 10-to-12-day pre-mating maturation period.

The tiny parasitic wasps, which predate Apple Ermine Moths, also have microscopic mouthparts and need plants with exposed, highly accessible nectar, exactly like those the adult moths feed on, but with a different seasonal focus. Unlike the adult moths, these wasps are active during the day throughout spring and early summer (May to June) precisely when the Ermine Moth caterpillars are feeding inside their tents.

If you are fighting an Apple Ermine Moth infestation, **do not remove** these nectar plants. Adult moths will easily fly over fences to find food elsewhere. Instead, use these exact flowering areas to your advantage: hang your pheromone traps directly above or next to these nectar-rich flower beds. The adults will naturally congregate around these food sources at night, making it significantly more likely that the male moths will be intercepted by your traps before they can ever find a mate.

Position these wasp-attracting plants directly underneath or within a few metres of your apple tree's drip line. This ensures the wasps do not have to travel far to find the caterpillar tents after feeding.

Ensure you have something flowering from May through August. This keeps the wasp population resident in your orchard during the exact weeks the Apple Ermine Moth larvae are active and vulnerable.

Avoid using any broad-spectrum insecticides (including organic ones like pyrethrum) anywhere near these flower beds. These sprays will kill the tiny beneficial wasps much faster than they will harm the caterpillars protected inside their silk tents.

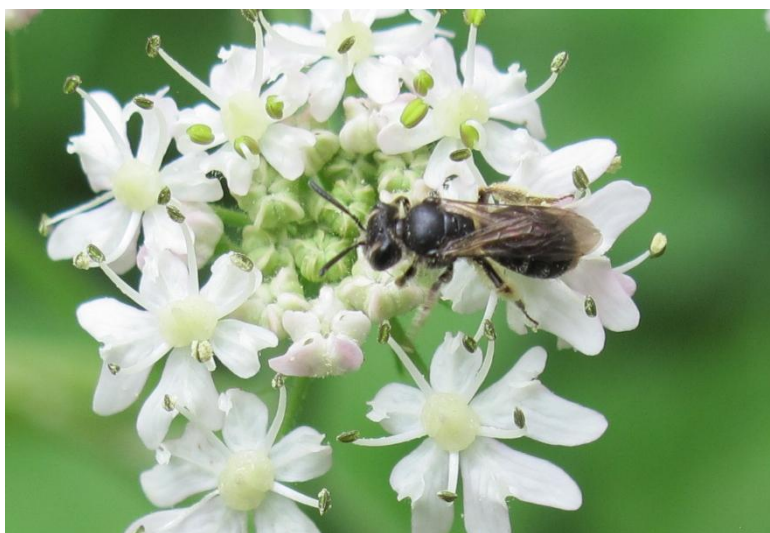
To create a parasitoid habitat for maximum ecological control and balance

- maintain a semi-wild area containing long grass and umbellifers.
- place nectar plants within 2–5 metres of the apple tree as the parasitoids are tiny and do not travel far
- ensure continuous bloom from June–August for example:
thyme (June), yarrow (June–Sept), dill (July–Aug), fennel (July–Sept), wild parsnip (July–Aug)
- allow umbellifers, which are biennial, to self-seed to ensure continuity.

The Umbellifers (the absolute best choice)

Umbellifers produce wide, flat clusters of hundreds of tiny, shallow flowers. These act as perfect landing pads for moths and also parasitic wasps and have completely exposed nectar droplets for feeding.

- Ammi majus (False Queen Anne's Lace): A beautiful, airy summer annual that attracts swarms of tiny beneficial wasps.
- Fennel (*Foeniculum vulgare*): Its bright yellow, flat umbels bloom for weeks and are a magnet for parasitic braconid wasps, huge nectar production, long flowering window, supports a wide range of beneficial insects, one of the best plants for parasitoid longevity
- Yarrow (*Achillea millefolium*) has flat, open flower heads accessible to micro wasps and a long flowering season (June–September), thrives in dry, sunny UK sites, excellent for sustaining parasitoids between egg-batch searches



Parasitic wasp feeding on wild parsnip in my orchard

- Dill (*Anethum graveolens*): classic umbel structure, very high nectar accessibility, flowers exactly when parasitoids need it (July–August), short-lived but extremely attractive to micro-wasps
- Coriander: If you let these kitchen herbs bolt and go to flower in late spring, their blossoms will immediately draw in predatory insects.
- Wild Carrot / Cow Parsley: Excellent native options if you maintain a wild patch in your garden or orchard
- Wild parsnip (*Pastinaca sativa*) is one of the best nectar sources for micro parasitoids in UK ecosystems, flowers in July–August, exactly when *Ageniaspis* adults are active, prefers poor, dry soil and can get tall (1–1.5 m). However it is an irritant and not advocated where small children roam.

Other supportive blooms

- Ice Plant / Stonecrop (*Sedum* spp.): These flat, nectar-rich succulent flower heads bloom heavily in July and August. They are highly attractive to small Ermine moths.
- Knapweed and thistles: While looking complex, the brush-like heads of wild knapweeds provide shallow, readily available sugary secretions.
- Marjoram and Oregano: When left to bolt in late summer, their tiny purple and white flowers produce massive quantities of accessible nectar.
- Mint (*Mentha*): Mint flowers heavily in late summer, drawing in dozens of micro-moth species to its tiny, exposed blooms.
- Thyme (*Thymus vulgaris*), tiny, shallow flowers, good for very small wasps, flowers earlier (May–July), so it supports early-season adults, works best as a “bridge” plant before the umbellifers bloom
- Lavender: Short-lipped flowers that fit the physical limits of smaller moths.

Summary

If you want to support *Ageniaspis fuscicollis* strongly, this combination gives you the same nectar structure that orchard ecologists use to maintain parasitoid pressure:

- Plant yarrow, fennel, and dill near the apple trees
- Allow wild parsnip to grow if it appears naturally
- Add thyme as early-season support
- Keep a wild patch unmown
- Avoid removing all Ermine Moth egg batches in winter

Appendix 2 - Water jetting

This is highly effective against Apple Ermine Moth webs, but should be adapted to the eco-system you are following. In a depleted biodiversity context with bare soil and short grass, it is a useful, nature-friendly approach.

If however beneficial plants are supporting parasitic predators and, for example, nesting robins are present to devour the newly exposed caterpillars, the method below should be modified.

Because the larvae spin a remarkably dense, water-repellent silk, a standard garden hose spray will slide right off. However, a sharp, targeted blast of high-pressure water physically rips the protective tents apart.

A high-pressure water jet destroys the infestation through three mechanisms:

- It shreds the silk matrix, instantly exposing the caterpillars to daylight.
- The physical force knocks the gregarious caterpillars out of the canopy and onto the ground.
- Once the caterpillars are on the ground without their protective webbing shield, they are completely defenceless against ground beetles, ants, frogs, and foraging birds such as ducks, robins, and blue tits.

The “Tarp Method”

- If using an industrial pressure washer on apple trees in May and June, use a wide fan nozzle spray rather than a pinpoint pencil jet, or use a high-velocity adjustable nozzle on a standard garden hose. You want a heavy kinetic slap, not a wood-stripping laser.
- Avoid blasting developing young apples (fruitlets) as this will impact your autumn harvest.
- There is a risk that dislodged caterpillars will simply crawl right back up the trunk or land on lower branches and continue feeding. Because Apple Ermine Moth larvae are highly mobile, simply knocking them out of the web is only half the battle. They will instinctively seek out food to finish their development.
- Before you start blasting the tree with water, wrap a **sticky insect barrier band** (such as grease bands or Tanglefoot) around the main trunk of the apple tree, roughly 3 to 4 feet off the ground to prevent these displaced caterpillars from climbing back up and re-infesting your tree. Any caterpillar that hits the ground and tries to climb back up the trunk will become permanently stuck in the non-toxic glue and die.
- If there are tall weeds, long grass, or low-hanging shrubs touching your apple tree branches, they act as perfect natural ladders. Trim back any surrounding vegetation so the trunk is the only pathway back up into the canopy.
- Lay a plastic sheet or tarp on the ground directly beneath the branch before you spray. The water jet will drop hundreds of caterpillars onto the sheet, allowing you to easily roll it up and dump them straight into a bucket of soapy water.
- Aim directly at the core of the silk tent to tear the structure open and wash out the caterpillars.
- The water jet rips the web open and removes their waterproof shield.
- If you spray the tree with *Bacillus thuringiensis* (Bt) or a mild soapy water mixture immediately *after* blasting the webs, the treatment will actually reach the remaining caterpillars and leaves instead of bouncing off the silk.
- Once you are finished blasting, immediately gather the corners of the tarp, drag it away from the tree, and dump the caterpillars into a bucket of soapy water or a garden bonfire pile.
- Alternatively, jetting the tree every two or three days will deter reinfestation.

Appendix 3 - Dealing with mature and tall trees

Mature trees possess a major advantage: they are well-established ecosystems. Blue tits, great tits, and woodpeckers naturally forage in the upper canopies of mature trees. If you hang bird boxes directly on the trunk of your mature tree, the parent birds will aggressively harvest the high caterpillar tents to feed their young in May and June.

To tackle an Apple Ermine Moth infestation effectively in tall trees, you must shift from manual removal to a combination of upward physical barriers and specialised high-reach tools.

Because mature apple trees have deep, rugged cracks in their bark, standard sticky bands can fail. Caterpillars knocked down by wind, rain, or water will easily crawl *underneath* the tape through the bark fissures.

- Before applying your sticky band (like Grease band or Tanglefoot), wrap a layer of foam packing material, cotton batting, or insulation wool tightly around the trunk.
- Wrap the sticky tape tightly over the top of the foam. The foam squeezes into the deep grooves of the mature bark, completely sealing off any hidden tunnels or pathways up the trunk.
- Ensure no low-hanging branches from the mature tree are touching the ground, fences, or nearby sheds. These act as bypass bridges that render your trunk bands useless.

To reach the upper canopy of a mature tree without dangerously balancing on top of a tall ladder, look into these tools:

- A bypass lopper attached to a telescopic fiberglass pole can extend your reach up to 4 or 5 metres (12 to 18 feet). You can carefully snip out individual high-up tents and let them drop.

- Use a brass "fireman" style adjustable high-pressure hose nozzle or a specialized pressure-washer extension lance. These can cast a solid, tightly focused stream of water straight up into the high canopy to break the webbing.



Systemic Treatment Options

If the tree is too massive for spraying or physical intervention to be practical, you may need to look into systemic treatments, although this is not advocated for biodiversity considerations and should be avoided if possible.

- Systemic insecticides are applied to the soil around the base of the mature tree or injected directly into the trunk by a professional arborist. The tree absorbs the chemical through its roots and distributes it up to the leaves.
- When the caterpillars bite into the high leaves, they ingest the pesticide and die. However, you must ensure the treatment is applied *after* the spring blossom period has completely finished so you do not accidentally poison bees and other vital pollinators visiting the flowers.

Caution - see RHS guidance on page 4

Appendix 4 - The impact of high temperatures

High temperatures generally *increase* the severity and speed of Apple Ermine Moth infestations because they improve larval survival, accelerate feeding, and boost reproductive success. The webbing itself is not directly harmed by heat; instead, heat influences the *population dynamics* inside those webs. The main effects are:

- Mild winters and warm springs allow more larvae to survive under the egg-mass “hibernaculum,” leading to heavier spring infestations.
- Once larvae emerge in early spring, they feed continuously for up to 40 days. Warm, dry conditions accelerate leaf development and larval metabolism, causing webs to expand more rapidly and defoliation to intensify.
- For mating to occur, night temperatures must exceed 12 °C. Hot, dry summers therefore produce more successful mating and more eggs, increasing the following year’s infestation.
- Reduced natural mortality Heavy rain suppresses reproduction and can physically damage webs. Conversely, hot, dry weather protects the webs and larvae, reducing losses from weather-related disruption.

If you are currently seeing Apple Ermine Moth webs during a warm spell:

- Expect faster defoliation as larvae feed more aggressively.
- Webs may spread more extensively across branches.
- The tree may look dramatically worse, but established apple trees usually recover and re-leaf later in the season.
- Young or neglected trees are at higher risk of stress or reduced yield the following year.

Effect of extreme temperature

There is little evidence that typical UK heatwaves kill larvae inside the webs. The silk tents provide insulation, and larvae tolerate the temperatures normally reached in British summers. The main climatic factor that harms them is prolonged wet weather. However, extreme heat may cause:

- High heat and intense UV radiation dry out the silk proteins (fibroin and sericin). This makes the flexible, tightly woven webs brittle, fragile, and prone to tearing.
- Increased temperatures lower the stickiness of the silk threads. This makes it easier for wind or heavy rain to rip the tents apart.
- Prolonged heat causes the silken threads to stretch, warp, and slacken. This ultimately shrinks or collapses the protective living dome.

Microclimate Transformation (The Greenhouse Effect)

- Dense silk webbing excels at trapping solar radiation. In hot weather, the inside of the web becomes a high-temperature greenhouse, often spiking far above the ambient air temperature.
- While the web protects larvae from external elements, extreme heat rapidly cooks the moisture out of the leaves trapped inside, raising internal humidity to suffocating levels.

Impact on the Pests Inside

- Within their tolerable limits, higher daily temperatures (up to around 30°C to 33°C) cause caterpillars to eat faster and pupate much earlier in the summer.
- If temperatures inside the tent exceed 35°C for extended periods, the caterpillars suffer from heat exhaustion, reduced reproduction rates, or outright mortality.
- As the web dries out and structural holes open up, the caterpillars lose their primary shield against environmental hazards, chemical sprays, and predatory birds or wasps.

Appendix 5 - Feedback - Field Observations - 2026

The reaction from colleagues to an earlier draft has provided further insights and an **abridged and edited** discussion follows.

Thank you to all who have provided commentary. It has been an interesting learning curve !

East of England Apples and Orchard Project (Martin Skipper)

If it is any help at all, we supplied some apple ermine moth caterpillars to Dr. Ian Bedford (recently retired from John Innes Centre and with a special interest in plant pests and diseases) so he could see which beneficial creatures predated them. It was not a particularly scientific experiment but he noted that earwigs will only predate the caterpillars as a last resort when there's nothing more palatable to eat !

In our west Norfolk orchard there were no obvious infestations of this moth species until last year (2025), when their telltale webs were recorded on twenty-two apple trees. This year the infestation rate had increased to sixty-seven apple trees.

We did see Long tailed tits regularly feeding on the caterpillars but only when they had escaped the protective webs and were out feeding on the leaves.

Our control method was to manually pick off and prune out the web hatcheries and place them into buckets of water (without any added washing up liquid - but we 'll try that next time).

I know we missed a lot of the caterpillars as they were abseiling on threads down to the ground as we disturbed them. Some chickens would have been helpful for mopping these up.

Next year we will place a sheet beneath each tree when we are working on it to make sure we capture as many caterpillars as possible. Hopefully, this will keep the resident population in check but I fear we might be fighting a losing battle long-term.

Suffolk Traditional Orchard Group (Dr. Paul Read)

In April this year we, like many with apple trees in Suffolk, Norfolk and Essex, suffered an infestation of these moth caterpillars in their characteristic string bags at the growing tips of about-to-flower apple shoots, see attached. Every apple tree in our parish has been affected to some extent, including 4 of our, Home Farm's, 5 orchard sites, and several smaller groups of trees, all with mixed fruit species, and although apples were targeted principally, a few plums were too, and a smaller number of pears (which may be other Ermine species). It also seems that apple trees in isolated locations such as farm hedges, including trees recently analysed for genetic similarity to the native crab apple, *Malus sylvestris*, **were not attacked**, and some villages had no trees attacked at all, but in general our members report extensive attacks across East Anglia. We also now realize we were less affected than elsewhere in England as some attacks completed defoliated trees.

We also notice that terminal flower and leaves were attack centres, and that that flowers on spurs set back from a massively affected shoot had already flowered and apple fruit already formed, before the caterpillars were active, and now in July are the few remaining fruit on a tree. Rigorously tip bearing cultivars, apples which flower only on terminal inflorescences, have generally lost all flowers.

In early April I took a medium-sized colony of the largest/oldest caterpillars, about to scatter and pupate, broke open the net protection, and tipped them out to count ...about 130,... The tree had a colony on every flowering branch tip, about 40. I tipped some of them into a pond with 2 species of newts; amazingly they floated and several newts, skaters and whirligigs really did arrive for breakfast! Other caterpillars I watched on bare ground where they could not bury themselves it was so hard but kept on walking...I also noticed various tits feeding below infested trees ... the death rate at this stage must be considerable.

I can remember only two infestations in the last 20 years, and not, or not seriously, repeated in following years, but this one is already the worst. Some 15-20 years ago the apple orchards in Cambridgeshire were seriously affected some years, with reports of complete defoliation, followed by later years of little or nothing, or a repeat ... an erratic history.

For those of us that have planted or manage UK Priority Habitat Traditional Orchards funded by Countryside Stewardship grants are not permitted to use any insecticide as defined within DEFRA's formal definition of the habitat. It is just as well that despite the overwhelming effect of an attack by Apple Ermine, in the following years its return is uncertain and irregular... and some years has little affect, but a targeted non-chemical species-specific control system is essential. Let us hope it stays that way!

I have trapped 3 species in our moth trap. It has got at quite a few of our pears too. Also seen several "attacks" that must be other species ... one that smothered trees in cobwebs, and several complete defoliations (all now re-growing!).

Jim Arbury (RHS)

Ermine moth damage has been increasing in recent year both in traditional and un-sprayed orchards but also in commercial orchards. The reference I often use is Pests of Fruit Crops A Colour Handbook by David V. Alford which mentions this moth and also the common small ermine moth which is found on *Crataegus monogyna* and *Prunus spinosa* but can also be found on cultivated cherry and plum.

Dr Joan Morgan

I have not seen any ermine moth on my apple trees, but a month or more ago I had a huge amount of ermine moth on the wild spindle trees - *Y. cagnagella*, I think. Absolutely covered in it. Fine threads hanging down with caterpillars crawling down and eventually dropping on the ground. It was really amazing. I have a lot of wild spindle trees, which thrive on chalk. Hedges nearby also covered - great stretches shrouded in the webs and appearing white with it. All disappeared now and leaves growing back on the trees.

Gerry Edwards (RHS Fruit Group)

Over the last few years a good number of my trees are badly affected each year and some have never been affected.

Peter replied- I also wondered about cultivar preference. I noticed at Audley End some trees stripped and adjacent touching trees in the espalier line unaffected, but I did not have time to investigate. Perhaps a more detailed survey next year would be interesting. We would need to eliminate the random localisation by chance in order to show whether a cultivar preference by the egg laying moth was evident.

Jim replied - It is hard to determine if they have preference for certain cultivars. The more there are, the more cultivars they seem to affect. However they probably do have some preference as do Winter Moth and Codling moth. Some of this can relate to timing of the tree's growth stage.

Gerry replied - I certainly think that cultivar preference may occur looking at my orchard and it is well worth monitoring.

Steve Oram (PTES) has offered to host a survey on this topic - see PTES website

Stephen Ainsleigh Rice - (Marcher Apple Network)

I have only twice encountered AEM, once in an orchard near Kilkenny the day after the Grenfell Tower disaster where there was a fairly large outbreak. Before that Henry May's Tidnor Woods orchard (SE of Hereford) was stripped of foliage. I have not seen it recently, but do look fairly carefully for any webs and tents during summer pruning.

I usually destroy whatever I find, say one web in 30-50 trees. I reckon I will miss some and those will help propagate any beneficial elements.