

SCOTTISH VARROA

LEARNING PACKAGE



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This guide is not intended to provide comprehensive instruction on managing Varroa but is intended to ensure that as a beekeeper in Scotland you are aware of your legal responsibilities, and to provide advice on methods and treatments which you may decide are appropriate for you in keeping bees in Scotland. A full guide to managing Varroa can be found on BeeBase on the NBU's leaflet "Managing Varroa".

1. Background

This Varroa learning package contributes to the delivery of the Scottish Government's Honey Bee Health Strategy 2022–2032 which was developed by the Bee Health Improvement Partnership (BHIP). The Strategy is supported by a Honey Bee Health Implementation Plan which identifies Varroa as a key threat to Scottish honey bees, and sets out a number of objectives, including the development of this Scottish-specific guide, to tackle this issue.

Varroa became a reportable pest in Scotland in April 2021 through the [Bee Diseases and Pest Control \(Scotland\) Amendment Order 2021](#).

Varroa continues to be considered one of the main causes of honey bee colony losses in Scotland and across the world. This is due to both the physical damage caused by the parasite as well as through the transmission of pathogens. Effective Varroa management continues to be one of the main challenges for beekeepers.

Varroa treatments can be divided into biotechnical and non-biotechnical methods. Inadequate or illegal use of substances for Varroa control can lead to serious health issues to beekeepers, create resistance, damage health of the colony, have an impact on the environment or cause serious public health issues through the accumulation of residues in honey. It is important for the future of bee health in Scotland that Varroa treatments are well understood and carried out according to the legal requirements.



Varroa Working Group

The Varroa Working Group was established in October 2022 to implement the actions identified in the BHIP, with the following objectives:

- To improve the education and knowledge of Varroa management and control in Scotland.
- To support beekeepers in their management of Varroa, including protecting those in areas where Varroa is not present or has only recently arrived.
- To create Varroa management guidance specifically for Scottish beekeepers taking into consideration Scotland's climate, honey flow calendar and management practices. This includes, but is not limited to:
 - Identifying the Varroa treatments that are most suitable for use.
 - Identifying the correct timings of when suitable Varroa treatments can be used.
 - Providing guidance on the correct use and disposal of Varroa treatments.
 - Providing guidance on the efficacy of different Varroa treatments.
 - To work with Food Standards Scotland, the Veterinary Medicines Directorate, and local authorities to promote the appropriate and legal use of Varroa medicinal treatments. This includes education on the correct medicinal usage as well as strengthening controls to protect public health against the misuse of non-authorized substances.
 - Working with the Veterinary Medicines Directorate to clarify the labelling instructions and common applications of Varroa treatments for beekeepers in Scotland.

The Varroa Working Group agreed that a Short Life Working Group should be established to develop a Varroa Learning Package to help take this work forward.

The Varroa Learning Package Short Life Working Group (VLP SLWG) were tasked with developing a training and information package for beekeepers, based around the aims and objectives of the Varroa Working Group.

The aims of this package are to provide information and advice on:

1. Identifying Varroa
2. Monitoring Varroa
3. Beekeepers' legal responsibilities regarding use of medicinal products
4. Integrated pest management techniques
5. Timings and correct use of treatments
6. Varroa management issues in Scotland
7. The difficulties and consequences of natural beekeeping.

2. Scottish Varroa Management

Dr James Bonner Bee Master wrote in 1895 *"the inconstancy of the weather"* was the biggest difficulty in keeping bees in Scotland. This was before the arrival of Varroa but is still true and the weather and climate continues to be an issue for Varroa treatment in Scotland.

Most advice on treating Varroa is provided from the perspective of much more productive beekeeping areas, ie, in areas where the climate is less harsh, more forage available for a longer period, and a generally more benign environment to farm bees.

If you are a beekeeper in Scotland, you will be all too aware of the harsh climate and the short season. There are both pros and cons to this, but from the point of view of managing Varroa, it does mean that a more Scottish-specific approach must be taken to ensure that you can keep your bees healthy and help limit the spread of this disease.

Varroa free areas

Some areas in Scotland are sufficiently isolated to have avoided, or to have successfully combatted, Varroa incursions. It is important that reasonable and proportionate measures are taken to stop the spread of Varroa to these areas. It is also important to try to expand such areas, where possible.

The Varroa map produced by the Scottish Government is one way of trying to tackle this.

If you are planning to move bees to areas thought to be free from Varroa speak to the local beekeeper's association or local beekeepers in that area before doing so.



Varroa Mite - Scotland

How you can help to protect the health of our honey bees

Varroa is a major threat to the health of honey bees in Scotland. Beekeepers in Scotland still report absence of Varroa in some areas and movement of honey bees from infected areas is the most likely route of Varroa invasion into these areas.

DO'S

- ✓ We recommend that you contact the local beekeeping associations for advice before moving honey bees into the white coloured areas where small localised parts of these areas have not been recorded as infected.
- ✓ Register with BeeBase to keep up to date with disease and pest information.
- ✓ Regularly monitor and report any suspicion of notifiable diseases or pests to the Scottish Government Bees Mailbox at bees_mailbox@gov.scot

DON'TS

- ✗ Colonsay and Oronsay (coloured turquoise) are currently considered Varroa-free, and are nature reserves for *Apis mellifera mellifera* (Amm. Black Bee). It is prohibited to keep any honey bee other than a black bee (Amm) in these islands.
- ✗ In addition to Colonsay and Oronsay, the Orkney Islands are also currently reported as free from Varroa. We therefore recommend that you do not move bees from any other location into these islands.
- ✗ Other islands and localities (coloured grey) are currently reporting the absence of Varroa. We recommend that you do not move bees from the British mainland into these areas.

For further information about how to identify, manage and report varroa, please see www.nationalbeesunit.com - or scan here [QR code]

Logos: BeeBase, SASA (Supporting Scottish Agriculture), Scottish Government (Riaghaltas na h-Alba)

3. Good Husbandry

Good husbandry should be the starting point for managing Varroa or – if Varroa-free – preventing the spread. The health of your bees is important. Make sure you can recognise the signs of Varroa infestation and monitor Varroa levels at different times of the year. Minimise the effects of robbing and drifting and keep the hives well-spaced with entrances facing in a range of directions. The aim is also to keep strong colonies.

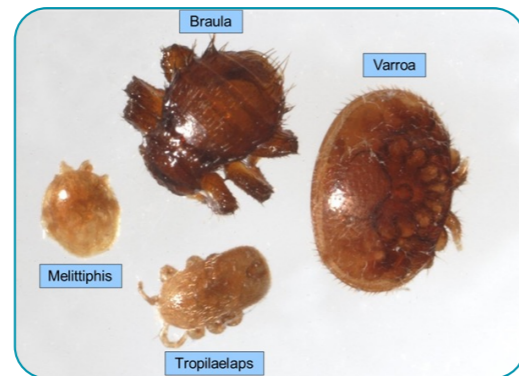
Control methods can be divided into two groups: management methods ('biotechnical methods') and medicinal controls ('Varroacides'). The best controls result from using a combination of methods at different times of the year depending on the level of infestation. This is known as Integrated Pest Management.

4. Identifying Varroa

- **Varroa – parasitic mite that feeds on the fat bodies of bees**
- **Adult female mite is red/brown, oval, and has 8 legs**
- **She feeds on the immature bee and lays eggs in brood comb cells**
- **They prefer drone brood cells**



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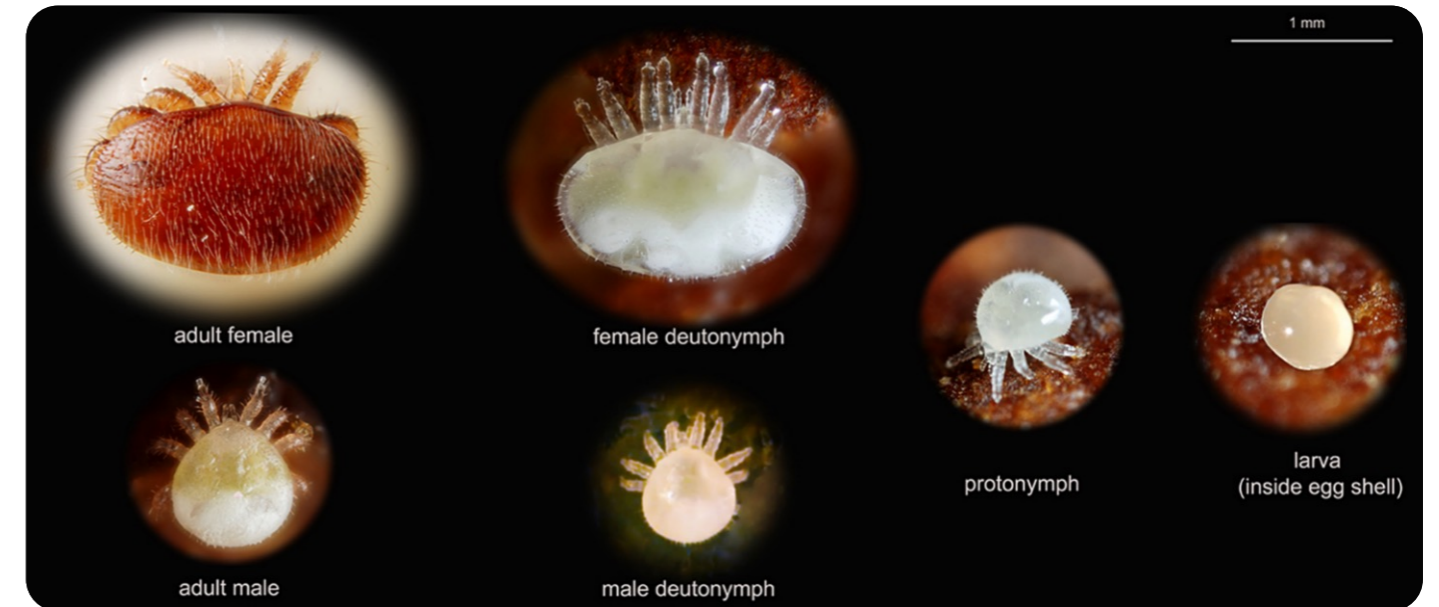


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The actual size of a Varroa mite is measuring 1.1 to 1.2 mm in length and 1.5 to 1.6 mm in width (about the size of a pinhead). You may need to use a magnifying glass to see them properly.

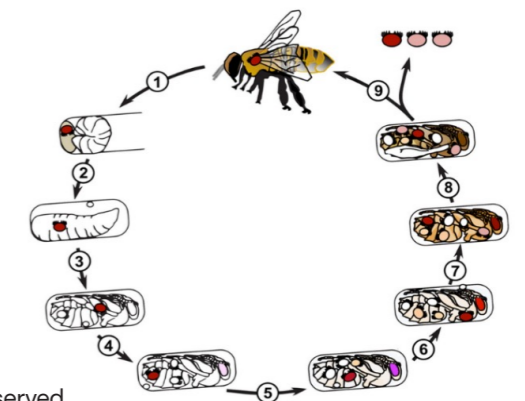
Varroa Biology

LIFE-SPAN: During the summer, female Varroa mites may live for 2–3 months. This means the mite load will increase during this time. When brood is present the average lifespan of a Varroa mite is 27 days. During the summer, one mite can complete 2–4 breeding cycles. Lifespan in winter and broodless periods may be up to 100 days. No reproduction takes place during broodless periods as the mites can only reproduce when either worker brood or drone brood is present in the colony.



Life stages of Varroa destructor (Mesostigmata); four individual photos by Gilles San Martin/Flickr; male deutonymph and larva photos by MrJEberhardt/Youtube

1. **Enters cell shortly before sealing**
2. **Opens feed hole. After 30 hours, lays a male egg**
- 3-6. **Lays 3-4 female eggs-30 hour intervals**
- 6-7. **Female mites' mate with the male**
8. **Bee finishes pupation and emerges**
9. **Female mites live phoretically (on adult bees) for approximately 1 week**



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5. Methods of Monitoring Varroa

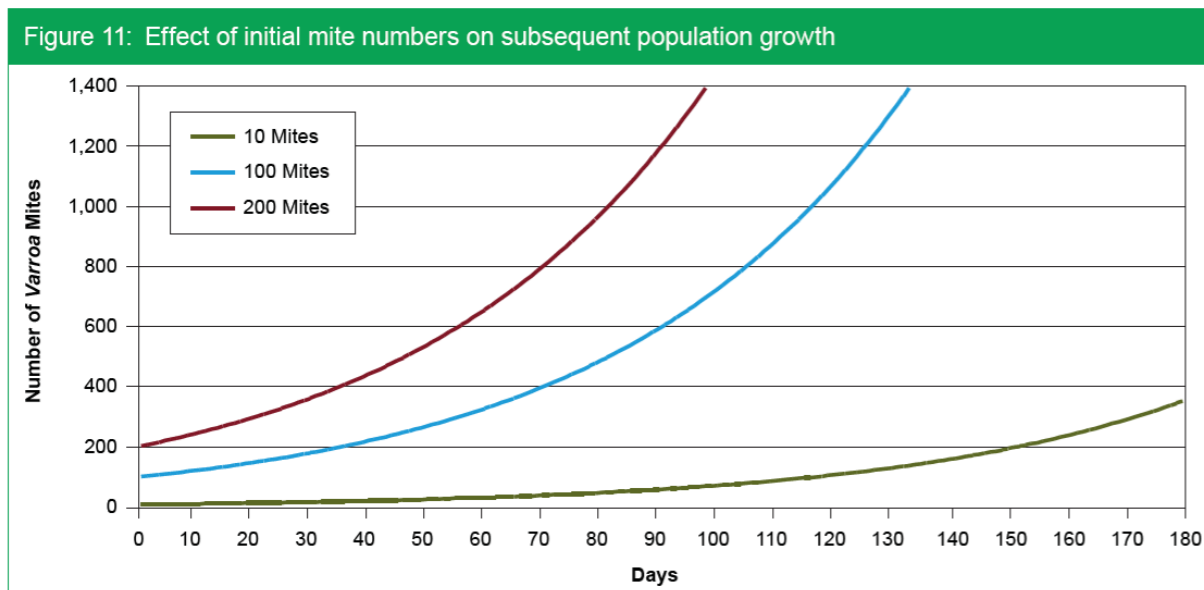
It is important to monitor your Varroa levels, so you know the infestation level of your hives are and when and how to treat your hives.

You must know approximately how many Varroa are in your colony so you know whether you should treat or not. When discussing monitoring Varroa by counting, we are referring to counting adult female Varroa only. You should aim to keep the mite population below 1000 mites to avoid serious damage to the colony.

Monitoring ideally should take place four times a year: in early spring, after the spring honey flow; after the honey harvest and late autumn.

There are many ways in which you can do this and there are advantages and disadvantages for each of these methods. Your aim is to find one which suits you whilst giving as accurate as possible estimation of Varroa numbers. A description of how to carry out a variety of methods is detailed below.

The graph shows the increase in the mite population for colonies infested with differing numbers of mites at the start of the season (without any mite invasion from outside). During the 180 days shown, mite populations build up steadily. Where only very few (e.g. 10) mites are initially present the mite population remains well below the harmful threshold of 1000 mites for the entire period shown (the blue line). However, in colonies starting with larger numbers of Varroa (100 or 200 mites – the orange or grey lines respectively), the build up to harmful levels is much faster. It is essential to ensure mite populations are as low as possible at the beginning of the active rearing season.



Courtesy The Animal & Plant Health Agency(APHA), Crown Copyright

Counting Varroa

Natural Mite Drop/sticky insert method

One commonly used method for monitoring Varroa is through counting the number of mites which die through natural causes (mite drop). You can monitor mite drop by placing a sticky board under an open mesh floor for seven days.

Remove the board after seven days and count the number of mites. You may need to spread the debris out on a white surface and use a magnifying glass to spot all the mites. Calculate your daily mite drop by dividing the total number of mites by seven. Generally speaking, the average daily mite drop should not be more than ten as this indicates a serious mite infestation and treatment is urgently needed, while below four is considered manageable, this depends on the time of the year.

You will find many different versions of a Varroa table on the internet. There are some variations and opinions about the exact numbers, but as a guidance, the number of daily mite drop quoted above, at different times of the season, are the point at which urgent treatment should be undertaken.



Courtesy The Animal & Plant Health Agency(APHA), Crown Copyright

Monitoring your colonies routinely using an open mesh floor (OMF) and a sticky insert tray coated with Vaseline will tell you how mite infestation is developing.

[Fact_17_Open_Mesh_Floors.pdf \(nationalbeeunit.com\)](#)



Drone Brood Removal



Select an area of sealed drone brood at an advanced stage of development (pink-eyed) as this is least likely to disintegrate when removed.

Slide the prongs of a honey uncapping-fork under the domed capping's, parallel to the comb surface, and lift out the drone pupae in a single scooping motion. Varroa mites are easily seen against the pale drone bodies. Repeat until at least 100 cells have been examined.

Estimate the percentage of pupae that have Varroa mites on them. If more than 5–10% of drone pupae are infested, then the infestation is serious, and you should plan to treat.

Sugar Shake/Roll

Collect a sample of approximately 300 adult bees from one to three brood-nest combs (**avoiding the queen!**). Three hundred bees are equivalent to about ½ cup of lightly packed bees. Shake bees directly from two or three brood frames into a larger collecting container (honey bucket, cardboard container, or lipped tray) and scoop up ½ cup (around 8 tablespoons) of bees and quickly pour them into a jar, or similar, containing around two tablespoons of powdered sugar, with large mesh or holes over 2mms where the lid would be (or you have a risk of varroa not falling out of the jar).

1. **Secure the lid and roll the bees in the jar for two to three minutes to cover the bees in sugar and dislodge the mites from the bees.**
2. **Set the jar down and wait five minutes. (Rushing the process increases the risk of undercounting the mites.)**
3. **Invert the jar and gently shake it like a saltshaker, capturing the falling mites onto a clean white plate or tray below. Shake the inverted jar until mites stop falling out.**
4. **Add an additional tablespoon of sugar to the jar, roll the bees again for 30 seconds, and repeat steps 4– 6 to improve the accuracy of the count.**
5. **Spray the powdered sugar deposit in the plate or pan with a water mist to dissolve the sugar.**
6. **Count the mites that remain.**
7. **Count the number of mites in the plate or pan.**
8. **Calculate the mite number per 100 adult bees. (See Counting the Mites section)**
9. **Sampled bees can be released back into the top of their colony or at colony entrance.**

Do not perform this test in high humidity or during strong nectar flow as this will cause the icing sugar to clump.

Alcohol Wash Method

Collect a sample of approximately 300 adult bees from one to three brood-nest combs (**avoiding the queen!**). Three hundred bees are equivalent to about ½ cup of lightly packed bees. Shake bees directly from two or three brood frames into a larger collecting container (honey bucket, cardboard container, or lipped tray) and scoop up ½ cup of bees and quickly pour them into a jar, or similar.

Perform the alcohol wash away from the hive.

1. **Add enough alcohol to completely cover the bee sample in the jar.**
2. **Roll or shake the jar for at least one minute to dislodge the mites from the bees.**
3. **After shaking, empty the liquid contents into a clear plate or white shallow pan through a mesh screen, of at least 2mm in order to allow varroa to fall, that traps the adult worker bodies.**
4. **Add more alcohol to the jar and repeat steps 2 and 3. (This increases the accuracy of the count.)**
5. **Count the number of mites in the plate or pan.**
6. **Calculate the mite number per 100 bees. (See Counting the Mites section).**

CO₂ monitoring

For this method you will need a specific container and some CO₂. Kits can be purchased on most beekeeper suppliers. Some beekeepers make their own containers and use CO₂ cartridges commonly found on cycling shops to inflate tyres.

The basic equipment is an airtight container, ideally with a compartment or mesh basket inside which would permit varroa to pass through but not the anesthetised bees.

Collect a sample of 300 bees, preferably from a frame of capped brood (make sure the queen is not in the sample).

- **Create a small opening or a hole between lid and the container and inject the CO₂ through the hole for 5 seconds, until the bees stop flying. Do not inject directly toward the bees. Then, quickly close the lid. Let the container with CO₂ sit for about 10 seconds, until the bees are anesthetised.**
- **Turn the container upside-down and gently shake the sample for 15 seconds, so you do not hurt the bees. Varroa mites will be dislodged from bees and fall through the holes of the basket.**
- **Open the lid and count the mites inside. Calculate infestation rate per 100 bees using the approach set out in the Counting the Mites section.**
- **Put the bees back in the hive where they will recover. Dispose of the fallen Varroa mites, as with the bees, most will still be alive and just anesthetised.**

Counting the Mites: Drone Brood Removal; Sugar Shake/Roll; Alcohol Wash; CO₂ Methods

You need to estimate the number of Varroa mites per 100 adult bees, as the percentage of infestation.

Counting steps:

Option 1:

Count the number of mites collected in the plate or pan.
 Divide that number by the approximate number of bees in the sample eg 300
 Multiply by 100 to yield a percentage.

Example:

A beekeeper samples 300 adult bees and counts 12 mites in the pan.
 $12 \text{ mites} \div 300 \text{ bees} = .04 \times 100 = 4\%$ (4 mites per 100 adult bees)

Option 2:

Divide the number of Varroa mites by the number of hundred bees on the sample.

Example:

If the sample has 300 bees (3 times 100), and you count 30 mites: $30/3 = 10$ mites per 100 bees.

To increase the accuracy of the assessment, count the actual number of bees in each sample. As you gain experience with sampling, your sample sizes will become more consistent.



Summary of methods for counting Varroa

Method	Pro's	Con's
Natural mortality/mite drop Sticky insert	<ul style="list-style-type: none"> • Easy for beginners • Don't need extra equipment • No need to manipulate or harm bees 	<ul style="list-style-type: none"> • Easy to over or underestimate • Varroa count can vary day to day (so a 7 days monitoring period is recommended) • Takes longer to get a result
Drone brood removal	<ul style="list-style-type: none"> • Quick • No extra cost • Good accuracy 	<ul style="list-style-type: none"> • Kills ~100 drone brood. • Difficult to select the right cells to uncap
Sugar Roll	<ul style="list-style-type: none"> • Quick • No bees killed • Low cost 	<ul style="list-style-type: none"> • Disrupts the brood nest • Requires handling of bees. • Less accurate than alcohol wash
Alcohol wash	<ul style="list-style-type: none"> • Good accuracy • Quick & consistent 	<ul style="list-style-type: none"> • Kills bees • Disrupts the brood nest • Higher cost?
CO ₂	<ul style="list-style-type: none"> • No bees killed • Accurate 	<ul style="list-style-type: none"> • Requires specific equipment. • Has a higher cost (CO₂) • More complicated

NBU estimating Varroa document

www.nationalbeeunit.com/assets/PDFs/3_Resources_for_beekeepers/Fact_Sheets/Fact_13_Estimating_Varroa_mite_populations.pdf



6. Treating/Managing Varroa

Varroacides

Veterinary Medicines Regulations 2013

- Unless prescribed by a veterinary surgeon, anyone treating food producing animals under their care may only use authorised veterinary medicinal products, and must use them in full accordance with the directions that come with the product.
- It is illegal to apply 'home-made' remedies, generic substances, or unauthorised products to honey bees without a prescription.
- The Veterinary Medicines Directorate's (VMD) Product Information Database lists the products which are approved for sale and use in the UK.
- Any beekeeper wishing to import a product outwith that list will have to apply for a Special Import Certificate (SIC) from a veterinary surgeon

Veterinary Medicine Regulations 2013: Purchase of veterinary medicines

When a veterinary medicinal product is bought beekeepers must, at the time, record:

1. The name of the product and the batch number;
2. The date of acquisition;
3. The quantity acquired; and
4. The name and address of the supplier.

Veterinary Medicine Regulations 2013: Administration of veterinary medicines

When administering the medicine, beekeepers must record:

1. The name of the product;
2. The date of administration;
3. The quantity administered;
4. The withdrawal period; and
5. The identification of the animals treated.

Veterinary Medicine Regulations 2013: Disposal of veterinary medicines

A beekeeper who disposes of any or the entire veterinary medicinal product other than by treating a colony must record:

1. The date of disposal;
2. The quantity of product involved; and
3. How and where it was disposed of.

Please ensure that spent Varroacides are disposed of responsibly. Synthetic pesticide strips, such as Apivar or Apistan, may still contain some active ingredient, even after the product has been in the hive for the recommended treatment period. This means that they can contaminate the environment if not correctly disposed of. They are not suitable for household waste and should be taken to a local recycling or waste disposal centre for professional disposal. Any waste with remnants of thymol should be discarded at a waste disposal centre as thymol is not suitable for household waste. The formic acid-based product, Formic Pro, is compostable and can be placed in compost piles, but should be kept away from water sources, such as streams or ponds.

IT IS A LEGAL REQUIREMENT THAT BEEKEEPERS KEEP A MEDICINE RECORD FOR 5 YEARS. YOU MUST KEEP THIS EVEN IF YOU NO LONGER HAVE BEES

Scottish Government Honey Bee Health Inspectors may inspect your medicine records and may take samples of honey produced from your colonies to test for medicine residues. Indication of misuse of medicines or lack of medicine records may result in a report being lodged with the Veterinary Medicine Directorate.

When using medicines, **always follow the full up to date instructions for use in the UK**. Failure to do so can lead to bee mortality, including Queen mortality. Follow them carefully as instructions may change over time.

At present no treatment is available for use with supers on (honey intended for human consumption).

Timing of treatments and product efficacy is determined by a range of factors such as climatic zones, weather, temperature, presence of brood, reinfestation rate from neighbouring colonies, etc. It is essential to protect the winter bee production which begins in late summer.



Veterinary medicinal products authorised in the UK for treating Varroa

Product Format Active Substance	Contra Indications	Temp Efficacy	Timing in Scotland	Application Summary Duration	Overdose	Known Resistance
API BIOXAL OXALIC ACID DIHYDRATE SOLUTION (GB ONLY) OR POWDER		More than 3C	Brood less period Winter	Solution trickled over bees no more than twice a year or sublimated no more than once a year Left in hive	Higher bee mortality. Over-wintering diminished when trickled. Detrimental effects on colony development.	No
APIGUARD THYMOL GEL		15-40c Average temp at 15	Summer after honey flow. Be aware of temperature restrictions unlikely to work in Scotland.	Trays inserted above frames 4-6 weeks Max 2 treatments per year	Disturbances in the behaviour of the colony (agitation, absconding, or increased mortality).	No
APILIFE VAR THYMOL STRIPS	Efficacy reduced if used in multistorey hives. Scottish temperatures mean it's unlikely to be sufficiently effective	15-30c	Summer no flow after honey flow, be aware of Temperature restrictions - unlikely to be used in Scotland	Strips inserted above frames 7 days x 4 treatments = 28 days	Bees can be agitated. They exit the beehive and remain outside. If dead bees and grubs are found, remove strips.	No
APISTAN TAU FLUVALINATE	Residues. Comb exposed should not be used for honey production. High resistance and ineffectiveness is widespread.	Over 10c	Anytime after honey harvest in late summer/ autumn	Strips inserted between frames 6-8 weeks	Evidence of mite resistance to Tau Fluvalinate. Mite drop should be monitored carefully during and after treatment.	Yes HIGH
APITRAZ AMITRAZ STRIPS	Do not use comb for honey production		Late summer / Autumn after honey harvest to protect the winter bees	Strips inserted between frames 6-10 weeks	Overdose higher mortality	Possible = low

Product Format Active Substance	Contra Indications	Temp Efficacy	Timing in Scotland	Application Summary Duration	Overdose	Known Resistance
APIVAR AMITRAZ STRIPS	Comb exposed should not be used for honey production.		Late summer / Autumn after honey harvest to protect the winter bees	Strips inserted between frames 6-10 weeks	Overdose-higher mortality	Possible = low
DANY'S BIENENWOHL OXALIC ACID DIHYDRATE SOLUTION		Above 3C	Brood less period Winter	Solution trickled over bees no more than once a year	Higher bee mortality.	No
FORMIC PRO FORMIC ACID STRIPS	Do not use for colonies less than 10,000 bees or with other acaricides or when daytime temperatures are outside the range of 10 - 29.5°C	10-29c Optimal 15C-25C	Spring-Autumn When temperature suitable	Strips above frames 10 days x 2 treatments = 20 days Bottom boards should be closed. entrance must be provided the full width of the hive. Allow 1 month between treatments.	Increased adult mortality, queen loss. Signs include bees absconding, reduced reproduction and queen rejection, triggering supersedure,	No
OXUVAR OXALIC ACID SOLUTION	Do not use when brood present	5C	Brood less period	Trickling application in the brood less colony in autumn/winter. a single treatment at 5 °C to -15°C. The spraying application (autumn/winter or spring/ summer) as a single treatment at above 8 °C.	The colony may become agitated during treatment. The trickling treatment can lead to a slight weakening of colonies in spring. Trickling or spraying can increase bee mortality.	No
OXYBEE OXALIC ACID DIHYDRATE SOLUTION OR POWDER		Above 3C	Brood less period	Tricked over bees	Excessive mortality	No
THYMOVAR THYMOL STRIPS	Do not treat more than twice a year. Do not use when max daytime temperature is above 30 °C	15-30C Do not use in Scotland	Summer	Strips above frames	Excessive mortality	No
VARROAMED FORMIC ACID, OXALIC ACID DIHYDRATE		Any	Treat 1-3 in spring 3-5 in Autumn 1 winter	Trickled over bees	Injury. Excessive mortality	No

Please report any suspected adverse effects or treatment failures involving bee medicines to:

www.gov.uk/report-veterinary-medicine-problem



Veterinary Medicines Database of approved medicines

Google “VMD product database”. Click on the Search button and in the “Species” dropdown list select “Honey Bees”. This will bring up product information on all the approved medicines for use in honeybees.

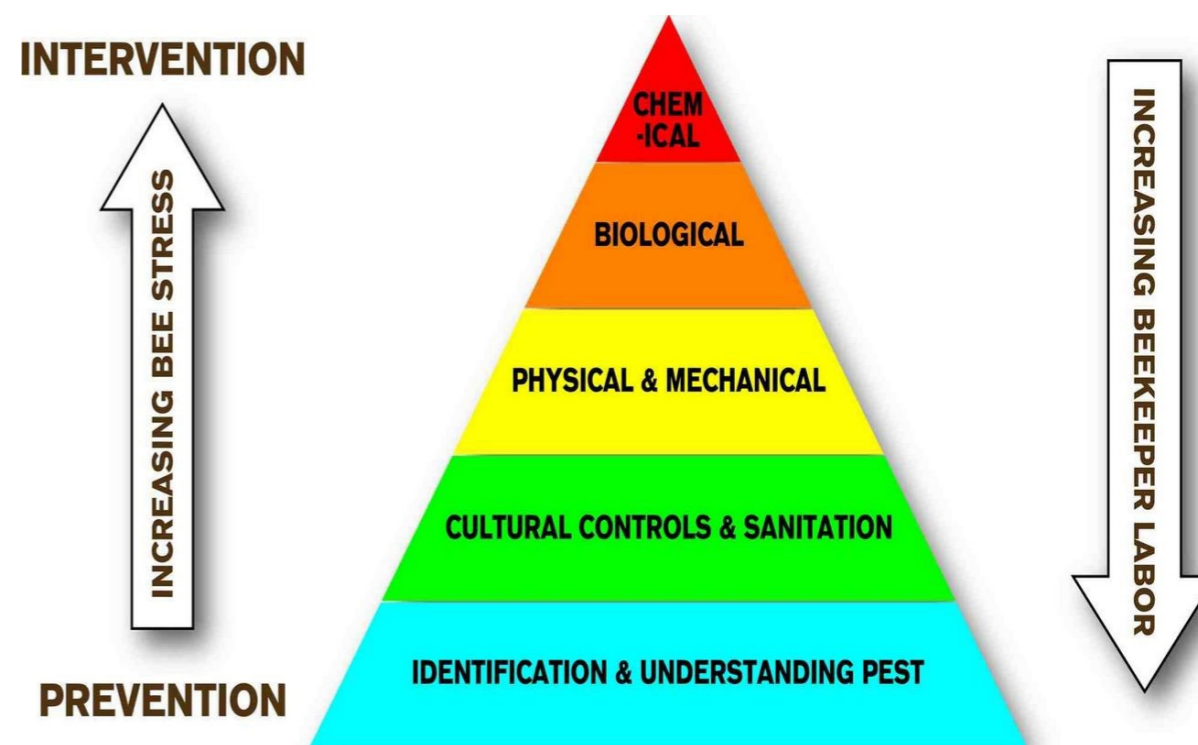
Product Information Database – Search (defra.gov.uk)



7. Integrated Pest Management

Integrated Pest Management (‘IPM’) is a principle where chemical inputs are minimal but not excluded entirely. No attempt is made to completely eradicate Varroa. The aim is to keep the mites below the level at which they cause significant harm. A beekeeper can do this by using a combination of controls applied at different times of the year. Over 1,000 mites per hive are considered the level where they will have a damaging impact on the colony’s health.

The level of miticide controls applied depends upon the numbers of mites in the hive. This is a much more effective approach than waiting until pest numbers have reached a damaging level before applying controls or applying the same controls each year regardless of pest numbers.



IPM can be applied to control many bee pests and diseases, particularly Varroa. Potential benefits include:

- **Control at several points of the year makes it harder for the mite population to reach harmful levels**
- **Use of management methods can reduce the need for Varroacides and delay the development of mite resistance**
- **Using two or more chemically unrelated Varroacides will delay the development of mite resistance**

There is no single IPM Varroa program suitable for all circumstances. This all depends on infestation level, mite invasion, climate and beekeeping practices. As a rule, when infestation is serious more control and monitoring will be needed than at other times.

In Scotland, beekeepers might need to make compromises in order to implement their most suitable integrated pest management plan.

IPM PLAN

Guidance for England & Wales

Control	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Open mesh floor	■	■	■	■	■	■	■	■	■	■	■	■
Drone brood removal				■	■	■	■					
Comb trapping				■	■	■	■					
Queen comb trap						■						
Formic acid							■	■	■	■		
Apiguard								■	■	■		
Exomite Apis			■					■	■	■		
Apistan/Bayvarol								■	■	■		
Lactic/Oxalic acid	■											■

Diagram from the NBU

Suggested Scottish guidance

Control	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Open mesh floor	■	■	■	■	■	■	■	■	■	■	■	■
Drone brood removal					■	■	■					
Comb trapping					■	■	■					
Queen comb Trapping						■						
Formic acid						■	■	■	■			
Apiguard Api life var							Temp dependant	■				
Amitraz								■	■	■		
Oxalic Acid											■	■

Biotechnical methods

Use of these methods alone is unlikely to keep mite levels at a manageable level.

Open mesh floor & Varroa insert

The open mesh floor allows Varroa to drop out of the hive and not crawl back up to spread in the hive. The insert allows the beekeeper to do a Varroa count (see Counting Varroa section). We recommend that the insert is removed at all times and only inserted during Varroa monitoring periods. This includes winter. Ventilation is beneficial for the colony. It is humidity and not cold that will harm your bees. This is not enough to minimize Varroa to manageable methods and should be used as part of an IPM plan.



Open mesh floors removes some live Varroa it improves hive ventilation & you can use collection tray to measure mite drop when required. Floor is only required when doing a count.

1. Fit a mesh Varroa-monitoring floor (without a collection tray) to the hive.
2. Many of the mites falling from the colony are alive. The mesh floor allows these to drop out of the hive rather than returning to the colony.
3. A lower proportion of mites is considered to enter the brood to reproduce.
4. Used in conjunction with other control methods, this method helps keep mite numbers down

[Fact_17_Open_Mesh_Floors.pdf](#)
(nationalbeeunit.com)

Drone brood removal

Varroa mites prefer to enter drone cells as they have 24 days until they emerge as opposed to workers who emerge day 21. Beekeepers can place either a frame with drone brood foundation or a super frame into the brood box which the bees will extend almost invariably with drone comb. By removing and destroying the capped drone brood you are eliminating mites enclosed in the sealed brood. This can be done in late spring and summer. It is vital that the frame is removed before any drone brood in it emerges.

This method has the disadvantage of destroying comb and drone brood.

Studies have shown that drone brood removal has only a relatively minor impact on the overall mite population.



It is easy to use, quick and no special apparatus is required. It is tolerated by colony. It has limited efficacy especially if used alone. You must get rid of it before the drone brood emerges or you will have a big infestation.

1. Place two shallow combs in the brood chamber in spring and allow the bees to build natural drone comb beneath them. A good time to put these in the colony is when the queen first begins to lay up drone brood. Place the combs into the colony one at a time and alternate at 9 day intervals (a run of alternating pairs of frames). Another option is to use an empty deep frame fitted with a starter strip of foundation to avoid possible misshapen comb.
2. When a drone comb is full of sealed drone brood (infested with Varroa), cut it from the frame before it emerges and destroy it. Failure to do this will breed more mites. The frame can be re-used immediately.
3. Repeat the process several times in the season for maximum effectiveness.

[Fact_26_Using_Drone_Brood_Removal_as_a_Varroa_Control.pdf \(nationalbeeunit.com\)](#)

[Fact_26_Using_Drone_Brood_Removal_as_a_Varroa_Control.pdf \(nationalbeeunit.com\)](#)



Comb/Queen Trapping

This can be very effective but time consuming and you would need to be a more experienced or knowledgeable beekeeper to do this.

1. Confine the queen to a worker comb 'A' using a purpose-made comb-cage (available commercially).
2. After 9 days confine her to a new, empty comb 'B' and leave comb 'A' in the brood chamber to become infested with mites.
3. After a further 9 days remove comb 'A' (now sealed). Confine the queen to a new comb 'C', leaving comb 'B' in the brood chamber.
4. After 9 more days remove comb 'B'. Release the queen (or re-queen by introducing another queen) leaving comb 'C' in the brood chamber.
5. After 9 more days, remove comb 'C'.

It can be very effective and means more bees are recruited to foraging. However, it is time-consuming, requires good beekeeping skill and can harm/weaken the colony if used without regard to time of season.

[Fact_20_Queen_Trapping.pdf \(nationalbeeunit.com\)](#)

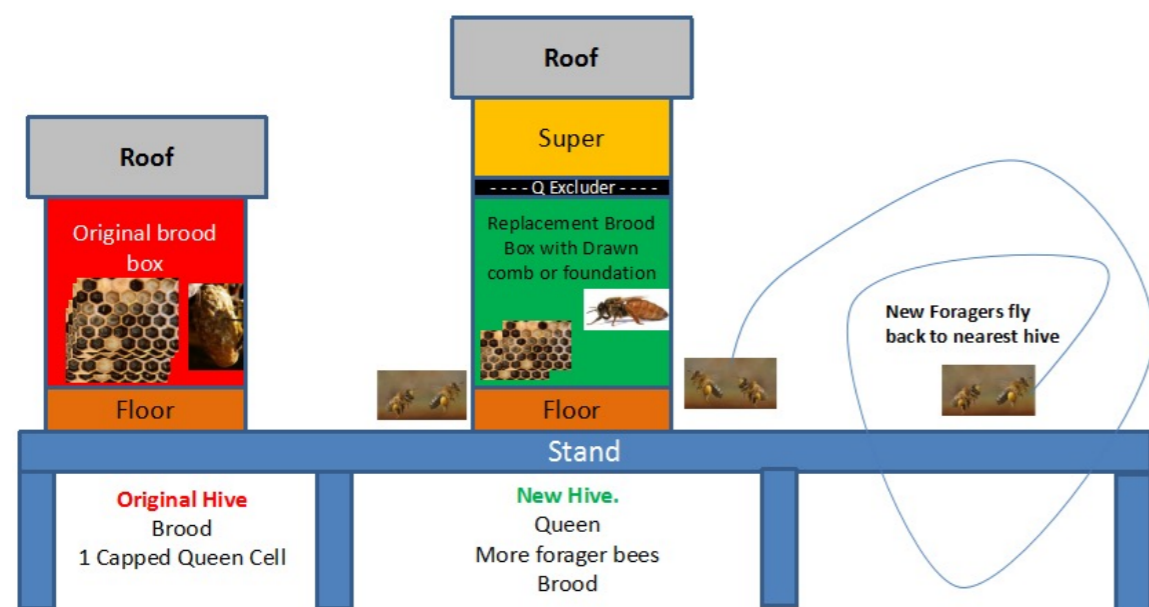


Artificial Swarm

This will reduce the Varroa count but can only be used during the swarm season. You can give the brood less colony a VMD approved oxalic trickle or vaporization before day 9.

This method combines swarm control with Varroa control. If done correctly it can remove a high proportion of Varroa mites present. It may be necessary to take precautions to prevent absconding in the artificial swarm – such as placing a queen excluder below the brood chamber for a few days.





How to perform an artificial swarm:

On finding a swarm/charged queen cell in a colony...

1. Move parent hive to one side. If you have heavy supers on, then remove those first.
2. Replace with a floor facing the same direction and an empty brood box.
3. Remove one frame of brood and bees from parent colony. It is important there are no Q/Cs, otherwise there may be a swarm.
4. Place the queen on this frame.
6. Fill up new box with drawn comb or foundation. Comb is preferable. Cut out all Q/Cs bar one from the parent colony. If it is unsealed it allows longer time before returning to remove any emergency cells. It is best to shake bees off the other combs to make sure that no Q/Cs are left, otherwise the colony may swarm.
7. Fill the gap created by the removed frame in the parent colony by closing the existing frames up, then fill the gap with drawn comb or foundation.
8. If the parent colony had supers, you need to distribute them to suit the situation. If the parent colony is short of food in the brood box it won't be able to collect nectar for several days, because it has lost the foragers, so give it a super with honey in. If it has plenty of food, then give the supers to the new colony.
9. After satisfying yourself both colonies have enough food, then close them down.
10. Check both colonies for emergency/swarm cells after a few days. The timing will depend on the state of the Q/Cs at the last operation.

[Fact_25_Using_Artificial_Swarms_for_Varroa_Control.pdf \(nationalbeeunit.com\)](#)



Shook swarm

Although a shook swarm can be harsh on the bees in Scotland some beekeepers use it to reduce Varroa loads by destroying sealed brood and providing a short brood break

See the link below for how to perform a shook swarm.

[Fact_22_Shook_Swarming.pdf \(nationalbeeunit.com\)](#)



8. Treatment Free Beekeeping

Treatment free beekeeping can be a controversial and complex issue. There is also great debate about what it means. It is not a practice recommended for beginners as there is a lot to learn about the methods used to keep Varroa numbers at a manageable level.

Treatment free does not mean doing nothing. Many beekeepers will still use biological management methods such as an open mesh floor, queen trapping and drone brood removal. For others it may be that they feel it's acceptable to use more organic based treatments such as VMD approved Oxalic and Thymol based products.

There are some beekeepers who advocate using other essential oils or things such as rhubarb leaves. This is illegal. **Using any products, treatments or homemade concoctions that have not been approved by the VMD to treat for Varroa is illegal.**

There is an abundance of misleading information about Varroa treatments online. Some of these treatments might appear appealing, effective and harmless. At best, there is no scientific evidence to prove they work. At worst, it is important to remember that honey is a food product destined for human consumption. These products have not undergone adequate testing, they could leave residues, cause allergic reactions, or cause serious harm to the bees or the beekeeper or the consumer of that colony's honey.

Some beekeepers believe in natural beekeeping. It is important that all beekeepers are aware of their responsibilities and the consequences of their actions. 80% of honey bee swarms that subsequently form feral colonies do not survive due to Varroa infestation. An infected feral colony on a tree cavity can act as a source of Varroa infection for all nearby colonies. The colony will almost inevitably die with the nest being robbed by nearby colonies which will get infected.

There is an increasing number of beekeepers concerned with the potential negative consequences of medicinal use. These beekeepers are moving away from licensed treatments and attempting to manage Varroa through the selection of hygienic honeybee behaviours as well as integrated pest control management techniques. It is important for the future of bee health in Scotland to understand the impact of these methods on the wider beekeeping community.

There are efforts to develop bees that are tolerant to Varroa. While this would be very welcome, it is unlikely to be successful unless a full coordinated approach was undertaken by all beekeepers in the UK.

Summary of methods for treating Varroa

Method	Advantages	Disadvantages
Authorised Varroacides	<ul style="list-style-type: none"> Proven efficacy when used as directed. Proven safety when used as directed. Convenient to use 	<ul style="list-style-type: none"> Mite may develop resistance if incorrectly used. Residue issues if misused
Integrated Pest Management	<ul style="list-style-type: none"> Can reduce the need for Varroacides Reduces development of resistance in mites 	<ul style="list-style-type: none"> Requires monitoring to adapt to changing infestation levels Can require a higher level of knowledge and beekeeping techniques.
Biotechnical methods	<ul style="list-style-type: none"> Can be combined with summer management Inexpensive or free 	<ul style="list-style-type: none"> Time consuming Higher level of beekeeping skill required Not sufficient by itself Misuse can harm colonies
Treatment Free Beekeeping	<ul style="list-style-type: none"> Inexpensive or free 	<ul style="list-style-type: none"> Not recommended for beginners Can be harmful to bees, beekeepers and other pollinators if mismanaged

9. Management Practices in Scotland

In the context of the whole UK, the relatively late start to the season in Scotland results in Varroa levels rarely needing attention before the end of the season. The good thing about our shorter season is that Varroa levels reduces the opportunity to build up to very high levels. This has a big impact on Varroa replication.

Apiary density tends to be lower than other areas in the UK. Consequently, there is, generally, less of a problem with robbing and drifting of mite-laden bees, or of collapsing nearby colonies being robbed out.

We usually have harsh winters which means that there is almost always a brood-free period between mid-October and late-December. Good observation of your hives can help identify optimum management timings and application.

The downside of our shorter season is that everything is packed into a shorter period – spring build up, spring honey, swarming, June gap, summer honey, possibly heather, mite treatment. Many of the books/websites etc available are from the perspective of much more productive beekeeping areas. This can give a false impression of the best way to tackle Varroa in Scotland.

The main issues relating to Varroa management in Scotland are:

Scotland's climate

Low temperatures render some treatments inefficient. Thymol based treatments such as Apiguard and Apilife Var require a minimum temperature of 15 degrees for the duration of the treatments. This is unlikely to happen in spring or autumn in Scotland. On a more positive note, Formic Pro can be used with almost no fear it will ever be too hot!

A relatively short beekeeping season

This means that any Autumn winter treatments need to be as effective as possible. It may also mean we may need to think about treating at other times. For example, those who focus on a heather crop could treat before taking the bees to the heather.

Supers and honey are often present on or in the hive

This limits the Varroa control treatment options that are available to Scottish beekeepers as all control treatments at present require an absence of honey supers. Taking bees to the heather can delay treatment. There is a period between the spring honey coming off and the summer flow starting when a treatment could be used. Those experiencing a June gap can possibly treat then. Queen trapping is also a possibility to reduce Varroa load.

Guidance on Specific Issues Related to Varroa in Scotland

Many Varroa treatments, particularly chemical based treatments such as amitraz, are used after the honey flow has ended and supers are removed for harvest. For many parts of the UK, this happens around early August and treatments can be applied to hives after the supers have been removed. Winter bees emerging in late August and September will be born without varroa damage as a result of the treatment (healthy winter bees) and the colony will have a low Varroa load going into winter.

In Scotland, heather migration leads to a very late end of the season. This again limits the efficacy of Varroa treatments and the developing winter bees may not be treated in time. The heather often doesn't finish until mid or even late-September, by which time many of the winter bees are already reared, so will be exposed to mites/viruses **before** treatment occurs.

Some beekeepers will be reluctant to open hives and remove Apivar strips in winter. 10 weeks from mid-September is late November and opening a hive to remove strips when the colony is clustered risks chilling the colony.

The beekeeper therefore has the option of treating **before** going to the heather and then again when brood-less early in the winter. If treatment is done late enough in summer, before going to the heather the mite levels will not have recovered sufficiently to be a significant problem.

Some beekeepers treat with Oxalic acid products in the winter but if the Autumn treatment isn't effective then the bees surviving going into winter may be fewer. As soon as the colonies are brood less it will be important to treat with an approved Oxalic acid product. Beekeepers are finding that the brood less period is earlier than before, and you may get your brood less period in Late November to early December. **Don't** leave it to January. Any brood is likely to be exposed to high mite levels and spring build-up may be slower.



Scottish Varroa scenarios

Scenario	Best Practice	Options
How to monitor for Varroa in hives with a solid floor	Use a sticky insert	A Varroa insert is often used with open mesh floors and is an easy way to do a Varroa count but with a solid floor you may want to use a sticky insert you can slot into the floor. You can buy these but also make them easily with a sheet of plastic and some Vaseline. You would need something to stop the bees getting stuck to the floor so a piece of mesh over the top would prevent this. You should do a Varroa count in Spring, summer and winter and before and after treatment to see if it is effective.
Varroa treatment options in June	Formic Pro strips for 7 days in temperature of 10-29 degrees on day of application	<ul style="list-style-type: none"> • Administering Formic pro in June is a quick and easy treatment and supers can be returned soon after. • Drone brood removal or queen trapping could also be carried out at this time. • Applying an approved Oxalic treatment may be considered if you have a brood less period (). • If temperatures are above 15 degrees, Apiguard , a longer treatment, may be appropriate. Remember that there is no medicinal treatment you can use with supers on.
Varroa treatment options for swarms.	VMD approved oxalic trickle or sublimation	The hive will be brood less therefore an approved Oxalic treatment would be effective. An Amitraz product may also be possible depending on how large the swarm is. Always read the instructions before any treatment. A treatment such as Apilife Var requires to have a period of 4 consecutive weeks where temperatures are over 18 degrees Celsius and so is unlikely to be indicated for use in Scotland.
Natural varroa controls.	Use a variety of integrated pest management techniques including Biotechnical methods & brood breaks and oxalic or formic or thymol products	Doing nothing is not an option, your bees will die. Some beekeepers who avoid "hard chemicals" are happy to use an oxalic treatment as it is a naturally occurring compound but requires safety procedures. Using IPM methods such as a Varroa mesh floor, brood breaks, shook swarms, drone uncapping may have some impact, but the bees may still suffer from a high Varroa load if no medicinal treatment is used at the correct time.
Varroa treatment after the Heather harvest. (late autumn)	Try to treat at other times such as the June gap, when there's no flow on.	Removing the Amitraz strips will require opening the hives in winter. Formic pro & winter oxalic treatment will help keep numbers low.

For More Information

If you have any queries about any aspect of this guide, please contact the Scottish Government Honey Bee Health team via the beesmailbox.

10. Acknowledgements

Many thanks to the members of the Varroa learning package working group for helping produce this guide and for reviewing the links. Other blogs, videos and resources are easily available on the internet.

Members of the Short Term Varroa Learning Working group are:

Mairi Carnegie, David Evans, Claire Gill, Lorraine Johnston, Julie McDiarmid, Jed Russell, Barbara Sandbach, Malcolm Watson & Matthew Richardson. Many thanks go to all for their contributions.

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Any comments or queries relating to the Varroa Short Life Working Group should be sent to Lorraine.Johnston@sruc.ac.uk

11. Resources Used and Further Reading

The guide will have some basic information on key issues with links to further information.

Please note that links to resources are correct at the time of publication and Scottish Government and SRUC are not responsible for any changes which may be made by the site owners.

This guide does not recommend or promote **specific** sources or treatments but is a pointer to already available information to inform your decisions on managing Varroa. The links have been **reviewed** for relevance and accuracy.

Legislation

The Bees Act 1980

[Bees and the Law » APHA – National Bee Unit – BeeBase](#)



The Bees [Diseases and Pests Control \(Scotland\) Order 2007](#)

[The Bee Diseases and Pests Control \(Scotland\) Order 2007 \(legislation.gov.uk\)](#)



[The Bee Diseases and Pests Control \(Scotland\) Amendment Order 2021](#)



The Veterinary Medicines Regulations 2013



The Veterinary Medicines (Amendment etc.) Regulations 2024 (legislation.gov.uk)



Scottish Government Honey Bee Health Team

[Honey bee health: guidance – gov.scot \(www.gov.scot\)](https://www.gov.scot/honey-bee-health-guidance)



Scottish Government Honey Bee Health Strategy

[The Honey Bee Health Strategy 2022 – 2032 – gov.scot \(www.gov.scot\)](https://www.gov.scot/honey-bee-health-strategy-2022-2032)



Scottish Government Honey Bee Health Implementation Plan

[Scotland's Honey Bee Health Strategy: implementation plan – gov.scot \(www.gov.scot\)](https://www.gov.scot/scotlands-honey-bee-health-strategy-implementation-plan)



Scottish Government Honey Bee Health Improvement Partnership

[Bee Health Improvement Partnership \(BHIP\) – gov.scot \(www.gov.scot\)](https://www.gov.scot/bhip)



Beebase Resources

[Report Varroa – NBU – BeeBase](#)



[NBU – Bee Medicines](#)



[NBU – Varroa management and treatment](#)



[Latest updates in Scotland » APHA – National Bee Unit – BeeBase](#)



Scottish Beekeepers Association



NatureScot



Food Standards Scotland



Videos

A Demonstration of how to carry out an Alcohol Wash for Monitoring Varroa. (youtube.com) – https://www.youtube.com/watch?v=mVB5_bclyus

Shook swarm – [PrimaFocus UK V60 16x9 VO1 \(youtube.com\)](#)

Varroa & Varroacides video – [Varroa and Authorised Varroacides in the United Kingdom \(youtube.com\)](#)

Books

[Varroa Management by Kirsty Stainton](#)

Blogs

[The Apiarist by David Evans](#)



[The Bee Listener by Ann Chilcott](#)



