

# VARROA CONTROL USING INTEGRATED PEST MANAGEMENT

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## 1. INTRODUCTION

This document is designed to give an overview of Integrated Pest Management for varroa, available treatments and sources of further information.

The varroa mite is present in most colonies in the UK. If left untreated, it will usually cause the colony to collapse. Discovered in the UK in 1992, varroa was subsequently declared endemic and removed from the list of notifiable diseases.



Following its arrival here, beekeepers began to use pyrethroid treatments such as Apistan or Bayvarol on an annual basis. The mite has responded in many parts of the UK by developing resistance to these routinely used drugs. Beekeepers are now aware that reliance on a single approach is not a long term solution.

## 2. INTEGRATED PEST MANAGEMENT (IPM)

IPM means using a combination of different control methods at different times of the year in order to keep the varroa mite population to such a level as it causes no significant harm to a bee colony.

IPM allows the beekeeper to choose the products or methods appropriate to them. It encourages careful monitoring so that treatments are used in line with known risk. (see section 3) A record should be kept of treatments applied.

Chemical treatments have been used for a number of years in Wales, based on a combination of Apiguard (other thymol based treatments are now licensed) and oxalic acid. These offer a very simple means of controlling mite numbers effectively. It is particularly useful to beginners and should be seen as an important part of an IPM approach that can be adapted as necessary (see Sections 4 and 5.)

## 3. MONITORING

As a general rule, mite populations should be monitored three or four times a year. The aim is to keep the total population below 1000 mites per honey producing colony. A number of methods are possible but counting natural mite mortality is the simplest and is highly compatible with treatments:

- i. Put the (clean) insert under the mesh floor for 5-7 days in summer, up to 14 days in winter.
- ii. Count the number of fallen mites at the end of the monitoring period and divide by the number of days to give the daily mite drop.

- iii. Multiply the daily drop by 100 in March, April, September and October, 400 in November to February, and 30 in May to August, to give a good estimate of the total number of mites in the hive.

Uncapping drone brood regularly will give you a good idea of mite levels. When over 10% of pupae are infested, control will be required before the end of the season.

#### **4. APIGUARD**

Apiguard is thymol crystals in a slow-release gel. It is generally used when daytime temperatures are over 15°C in order that the treatment is fully effective. Treatment with honey supers in place should be avoided to prevent 'tainting' the honey. It can, in an emergency, be used more or less at any time of the year.

##### **Equipment**

- i. It is recommended that the hive is fitted with an open mesh 'varroa' floor with an insert for estimating mite numbers.
- ii. A hive with an open mesh floor **MUST** also have some sort of top insulation and the means of closing off all top ventilation. A cover board using 25mm polystyrene insulation is a good solution. (**NB.** Polystyrene insulation must be protected from the bees which will quickly chew holes in it.)
- iii. Some sort of spacer to provide clearance over the Apiguard tray is essential, either a deep crown board or a 25mm eke. An eke will be required where double brood or brood and a half is in place.

##### **Application**

A 50g foil tray of Apiguard is opened and placed directly on the top bars of the brood box, two weeks later this is repeated. If a double brood or brood and a half is in place, the tray should be positioned on the top bars of the bottom brood box with the second brood or super above it. Space for the tray should be provided by a mini eke.

##### **Late Summer**

- i. Apiguard is usually used in late summer. Correct timing is particularly important in order to establish a healthy winter bee population.
  - a. If there is a high population of mites building up in the hive (1500-2000) then treatment must commence as early as possible in August. It may even be necessary to take a premature honey harvest.
  - b. If the number of mites is reasonably well under control (less than 1000) then treatment can be delayed until the end of August or beginning of September.
  - c. If the hives are going to heather, it is safest to give a half treatment i.e. 1 x 50g tray of Apiguard in late July after removal of the honey crop. The second treatment should then be given after the return from the heather,

around mid- September. Two staggered Apiguard treatments will be less effective than two consecutive ones but winter treatment with oxalic acid will deal with any mites that were in the brood.

- ii. **The aim is to get the bees to completely clear the Apiguard tray in the 2 week treatment period.** After 2 weeks, a second tray should be used. If the first tray is substantially cleared, all is well. If it is not, you should consider repositioning the trays for the second part of the treatment period. The first tray can be left in place or its remaining contents emptied into the second tray. It is good practice to remove the trays after 4 weeks, smearing any remaining gel over the top bars of the brood box and removing the mini-eke. For nucs and small colonies, half the quantity of Apiguard should be used.
- iii. **The floor insert and an insulated crown board with no top ventilation should be in place throughout the treatment period.** This is to keep the hive warm and encourage bee activity. It will also help to maintain a high concentration of thymol vapour. Fitting an entrance block is recommended to discourage robbing, as thymol will mask the hive scent.
- iv. **The presence of Apiguard in a hive inhibits the taking of sugar syrup from the feeders at the top of the hive.** The best strategy is to feed after treatments are completed and, therefore, time treatment before you plan to feed.
- v. **When the treatments are carried out correctly, Apiguard should kill 90-95% of the mites in the colony.** This is significantly less than the 99% achieved with pyrethroid treatment (provided you have not got resistant mites), hence the potential need to carry out a follow up treatment with oxalic acid.

## Early Spring

The natural mite drop should be counted and, if high (>8 mites per day), you may decide that treatment is necessary early in the year. One tray of Apiguard should suffice unless you get a large fall of mites when it would be necessary to use a second tray. This must be completed in April before supers are put on the hive.

Chemical free control measures are possible during the season when supers are on:

- i. A shallow frame, drawn with worker comb, is placed about 1/3 into the brood box and the resulting space below will almost always have drone comb drawn down, laid up and capped. Cutting off and destroying the sealed drone brood every 2-3 weeks will remove a significant proportion of the breeding mites from the colony. Timing is critical as allowing the drone brood to hatch into drones will increase the mite population in the hive.
- ii. At the same time the 'phoretic' mites carried on the body of the bee can be dusted with a cupful of icing sugar; this encourages grooming behaviour in bees. The mites will drop down through the mesh floor (insert removed) and be lost to the colony. These two methods complement each other well but will not remove sufficient mites to act as stand alone treatments.
- iii. Products such as 'Hiveclean' also encourage grooming behaviour.

## **OXALIC ACID**

Oxalic acid is applied as 3.2% oxalic acid in 1:1 sugar solution using a 50ml plastic syringe with a wide bore needle. It has an efficacy of about 90% and will mop up mites that escaped the Apiguard treatment. It will also kill mites that have bred since then and those that have come into the hive from external sources.

We recommend that you buy the solution ready made. It is available from all beekeeping equipment suppliers at reasonable cost and avoids the risks associated with preparing the solution from crystals.

**Oxalic acid solution is poisonous and should be used and stored safely. It should be very pale in colour with no crystals formed. If the solution is darker than straw colour or has crystals, DO NOT USE IT. It should not be stored for the following winter as there is a build up of HMF that is toxic to bees.**

### **Timing**

Oxalic acid only kills mites that are living on the bees, in the phoretic stage. It does not kill mites in the brood. When there is brood in the hive, only about 15% of the mites are found on the bees and the majority (85%) found in the brood. It follows that oxalic acid works best on colonies that are broodless at the time of treatment. This is most likely to be the case in late December to early January. Removing the floor insert to ensure good ventilation will encourage the bees to have a broodless period. It is worth noting that oxalic acid will kill open brood. Oxalic acid can be used on both natural and artificial swarms that offer a broodless period.

### **Application**

Treatment is best carried out when the weather is cold and dry when the bees will be well clustered. Only treat once and do not overdose.

- i. Fill a 50ml syringe with oxalic acid solution (ideally at blood temperature).
- ii. Open the hive to expose the clustered bees.
- iii. Trickle 3 - 5ml of solution between the frames along each seam of bees. A small colony may only require half the syringe or less.
- iv. Close hive.

After the oxalic acid treatment has been completed any top ventilation should be closed and the floor insert cleaned and put in place. Mites will continue to fall for about 2 weeks after which the insert can be removed.

## **5. FURTHER INFORMATION**

For more detail on managing Varroa and IPM, as well a large range of other training manuals, advisory leaflets, fact sheets, best practice guidelines and varroa calculator visit BeeBase at [www.nationalbeeunit.com](http://www.nationalbeeunit.com) and go to [advice for beekeepers](#).