



Pyrethroid Resistance

Pyrethroids are chemicals that have a low toxicity to mammals and birds but a high toxicity to insects. They require very low doses to kill their target species and are very fast acting. Pyrethroids also have lipophilic properties which mean that the chemical compounds are able to dissolve in fats and oils and as a result, accumulate and persist in beeswax. They work by inhibiting the nervous system of the target which can result in paralysis. The effectiveness of Pyrethroids to *Varroa destructor* has declined in the past decade due to it having developed resistance to the acaricides. This Fact Sheet discusses how to determine whether you have pyrethroid resistant mites and what to do should you discover you have them.

What does it mean?

It means that *Varroa* mites are resistant to treatments using pyrethroids such as 'flumethrin' or 'tau-fluvalinate', which are the active ingredients of the proprietary varroacides 'Bayvarol®' and 'Apistan®'. Using these products on honey bee colonies may have little impact on the *Varroa* mite populations.

As a beekeeper what should I do?

If you are using these treatments for *Varroa* control you should:

- a) Ascertain if you have pyrethroid resistant mites by carrying out either the Beltsville test (see Fact Sheet 8 or the Fera/NBU leaflet 'Managing *Varroa*') or by the NBU test. Subject to availability kits and instructions for the latter are available from your association secretary or your Regional Bee Inspector.

- b) If you do not carry out this test then after your treatment is completed check the mite population within the hive. This can easily be done in respect of full size colonies i.e. not nuclei, by using a square of sticky back plastic such as Fablon®, covering it with 3mm. plastic greenhouse shading mesh and inserting it through the entrance, sticky side up, onto the hive floor. Leave it for a week, remove and count the number of mites stuck to it. Divide by seven to calculate the daily mite drop and multiply that number by:- 400 during

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November to February, 30 during May to August 100 during March, April, September and October. During these last four months i.e. March, April, September and October the result is an approximation and should be used as a guide only. The resulting figure is the mite population within the colony. If it is greater than 1,000 the colony is at risk so immediate action is required. Further details can be found in the NBU leaflet '*Managing Varroa*'.



Using the Beltsville test to monitor for pyrethroid resistance in *Varroa destructor*

- c) If you suspect resistance you should report it at once to the National Bee Unit, Food & Environment Research Agency, Sand Hutton, York. YO41 1LZ. tel. 01 904 462 510 or e-mail nbu@fera.gsi.gov.uk or to your Regional Bee Inspector (RBI).
- d) Notification of positive tests is published on a map within the NBU Web Site. This can be found at www.nationalbeeunit.com The fact that no positive results are recorded in area does not mean that pyrethroid resistant *Varroa* mites are not present.

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- e) When using proprietary varroacides always follow the manufactures instructions. If you do not, it increases the selection pressure on *Varroa* mites becoming resistant to that product.
- f) Where possible alternate the use of varroacide treatments. At the moment within the United Kingdom there are four registered varroacides Apiguard®, ApiLife-VAR®, Bayvarol® and Apistan®. The active ingredients in Bayvarol® and Apistan® are very similar so alternating these two preparations makes no difference to the selection pressure. Apiguard® is a thymol-based gel and Apilife-VAR® is based on essential oils including thymol.
- g) Consider other systems of *Varroa* control and develop an integrated management system to control mites. These can range from using open mesh floors to bio-technical control methods, some of which can remove up to 95% of mites within a colony. You may also wish to consider other treatments. Further details can be found in the NBU/Fera leaflet '*Managing Varroa*'.

Whatever control method you use, check the colony mite population afterwards to ensure that it is not at risk. (See Para. b)