

# CONTROL OF PYRETHROID AND COUMAPHOS-RESISTANT MITES IN NORTH AMERICA USING APIGUARD.

By

Dr Max Watkins  
Vita (Europe) Limited  
21/23 Wote Street  
Basingstoke, Hants RG21 7NE. UK

## **Abstract**

Varroa mite infestations have increased in The United States over the past few years due to mite resistance to treatments currently in use. Varroa in some areas have become resistant to pyrethroids as well as to organophosphates (coumaphos or CheckMite+ Strips). Beekeepers relying solely on these products for control of varroa have lost many colonies because of insufficient control levels.

The slow-release gel, Apiguard, containing thymol has been developed especially to control pyrethroid, amitraz and OP- resistant mites; it has a different mode of action to these pesticides. Apiguard is registered and used by beekeepers in many countries and has been trialled in several sites within the USA, prior to registration.

Results are reported here from trials conducted in several states and show that the product can be used successfully under a variety of environmental conditions.

## **Background**

In the United States there are around 2.5 million commercially farmed honeybee hives and somewhere around 500,000 colonies are kept by hobbyists and semi-professional beekeepers. These numbers are, however, declining at a rapid rate – largely due to the influence of Varroa. Hive deaths have increased dramatically over the past 3 years with the situation reminiscent of the first waves of infestation of the new varroa parasite to North America back in the early 1990's. In the US, pyrethroids, especially tau-fluvalinate in the form of Apistan and the agrochemical product Mavrik have been used extensively – and almost exclusively – for nearly 15 years. With the inevitable development of mite populations resistant to pyrethroids, other control measures have been tried in later years. Coumaphos (CheckMite+) was used in several States, originally under Emergency exemption for control of Small Hive Beetle but of course also used to combat varroa mites. However, the mites developed resistance to coumaphos in just a few short years and that active ingredient cannot now be relied upon either in many areas. Reports of varroa resistance to amitraz seem to make the situation more bleak as far as chemical control of the parasite is concerned.

Pollination is the major business of many commercial beekeepers in the US. As an example, over 1.2 million hives are used in the pollination of almonds in California each year, the colonies being transported from states across the nation during the season.

However, because of the severe dearth in colonies across the US, due to poor overwintering, climatic factors affecting colony nutrition, and the stress of large populations of resistant varroa mites in many areas, beekeepers have been hard pressed to find enough bees for pollination or for honey production. Various reports this year suggest a loss of 10% to 50% of bee colonies in the United States for one reason or another. The need for alternative varroa control measures in this desperate time is obvious.

## **Apiguard as a control agent**

Since the first signs of pyrethroid-resistant varroa in Italy in 1992/93 Vita have worked with bee institutes and Universities to monitor the situation and to try to develop alternative treatments for this most insidious pest. The slow-release thymol gel, Apiguard has been registered now in over 30 countries and is used widely in the control of varroa.

## **Apiguard currently registered in 30 countries (also pending in many others, inc USA)**

### **APIGUARD is registered widely as a Veterinary Medicine**

<b>Albania</b>	<b>Egypt</b>	<b>Iran</b>	<b>Lithuania</b>	<b>Portugal</b>
<b>Algeria</b>	<b>Estonia</b>	<b>Iraq</b>	<b>Luxembourg</b>	<b>Slovenia</b>
<b>Austria</b>	<b>France</b>	<b>Ireland</b>	<b>Mexico</b>	<b>Spain</b>
<b>Cuba</b>	<b>Germany</b>	<b>Italy</b>	<b>Morocco</b>	<b>Switzerland</b>
<b>Cyprus</b>	<b>Greece</b>	<b>Jamaica</b>	<b>The Netherlands</b>	<b>Tunisia</b>
<b>Denmark</b>	<b>Hungary</b>	<b>Latvia</b>	<b>New Zealand</b>	<b>UK</b>

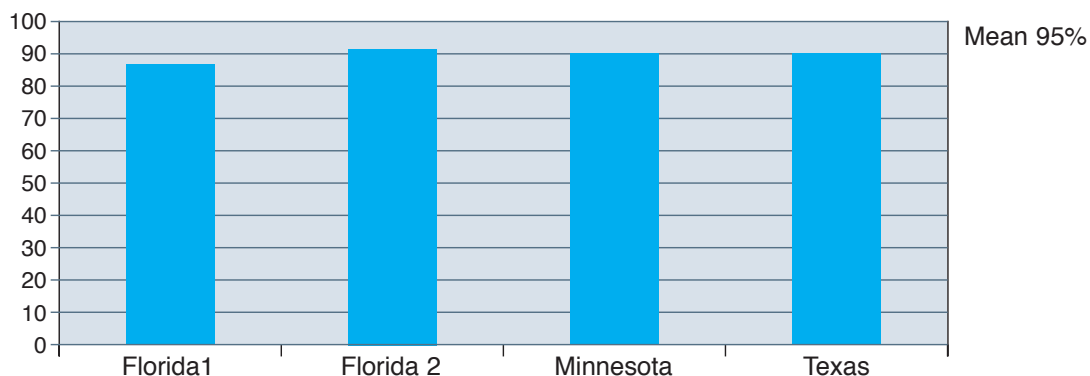
Amitraz (Apivar), pyrethroids such as flumethrin (Bayvarol), acrinathrin (Rufast) or tau-fluvalinate (Apistan) and organophosphates such as coumaphos (Perizin and Checkmite+) target the mites through specific nervous conduction routes; strains of *Varroa destructor* have managed to adapt their physiology to counter these substances. Thymol, however, has a generalist mode of action. It acts as a protein denaturant, destroying cell walls for example rather than attacking a specific nervous channel. Because the mode of action is so different from the “traditional” pesticides used thymol can be used, in the correct formulation and dosage, to control mites in highly “resistant” areas or indeed to protect hives from totally “pesticide-susceptible” mites.

## **Apiguard trials in the U.S.**

Vita has been working with beekeepers and bee scientists in North America for several years, trialling Apiguard in different geographic and climatic areas. Although the evidence from countries as diverse as Albania to Mexico shows that Apiguard can well protect honeybee colonies from varroa, it was imperative to determine the efficacy of the product under US conditions.

Results from recent trials conducted in Florida, Texas and Minnesota are shown below:

### **APIGUARD efficacy in recent US trials**



As can be seen, the levels of mite control are encouraging and at a range of temperatures from 17 degrees C to 41 degrees C using 2 x 50g Apiguard with a 2 week interval between doses OR by using 3 x 25g doses, with 1 week between doses.

Because of the uncertainty of control effected by the existing registered products, efficacy of the Apiguard treatments was determined by subsequent treatment of the colonies by Apistan, followed by treatment with Checkmite+ and/or alcohol body wash sampling of adult workers prior to, throughout, and after treatment.

### **Conclusion**

Apiguard is an effective agent for the control of varroa mites that could protect honeybee colonies under U.S. conditions, just as it is used by beekeepers in other parts of the world. Apiguard is intended to be used as one product in an integrated approach to varroa control. It is NOT A SILVER BULLET that could replace Apistan or Checkmite+. Mite resistance to classical pesticides is not universal; the levels of resistance differ from colony to colony even within the same apiary and certainly from region to region, state to state. If Apiguard were employed as one tool in rotation with other methods, the levels of resistance to the active ingredients in the two latter products could gradually subside, potentially to a point where these products – which after all have saved thousands of honeybee colonies over the years – could be used again in previously resistant areas, with some security.

There is no sole treatment to rely on. Beekeepers need to consider using a variety of tools to suppress this insidious pest, Varroa destructor, and Apiguard remains as one very powerful alternative resolution to the problem.