

The Efficacy of Apivar® and Bayvarol® and CheckMite+® in the Control of *Varroa destructor* in Iran

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Introduction

Varroa destructor was first found in Iran in the 1980s and for three decades Iranian beekeepers have had to deal with this mite. Various treatments were evaluated and pyrethroids (Apistan®, Bayvarol®) became the most popular. However, in 1996 their problems worsened when Apistan resistant populations of varroa emerged. The main reasons for the resistance development are the following:

- Since 1989, Apistan has been the principal treatment used in Iran.
- Fluvalinate is liposoluble, so residues are left in beeswax combs and accumulate progressively as the wax is reused for comb foundation.
- The wax of continuously used comb contains only small amounts of the active compound.
- Wooden frames impregnated with klartan (phytosanitary formulation) are used.
- The new use of used strips that only contain a small dose of the active preparation.

The parasitic mite *Varroa destructor* is well known to beekeepers because in many countries it is the most common cause of death of *Apis mellifera* colonies. It was first found in the 1980s, and we have been faced with this problem for three decades.

Methods of controlling the mite have been investigated and several products are now approved for use. A recent difficulty in Iran as well as in other countries has been the development of resistance in varroa to pyrethroids (Apistan®, Bayvarol®). This has led to a high mortality of colonies worldwide, and we have therefore investigated various new control products on sale.

Recently, use has been made of Thymol, which is the active component of Apiguard, ApiLifeVar and Thymovar as well as Apiguard. In 2000 and 2002, I tested Apiguard in Iran and 2008 in Afghanistan, also studied many publications from around the world. Thymol has the advantage of being a natural substance, and one with a low toxicity to humans. Also *Varroa destructor* has not been reported as resistant to it. However, the use of Apiguard has the following disadvantages:

- Colonies must be given a double dose, and the treatment repeated in the autumn. Mites that survive the first treatment reproduce during the bees' active season. So it is necessary to use another acaricide (according to J.P.Faucon and R. Shahrouzi 2002).
- When colonies infested with *Varroa destructor* were treated only with Apiguard, they showed abnormally high winter losses, with clear evidence of mites (Jean.P.Faucon, Reza Shahrouzi 2003).
- A strong odour is apparent during the three days following treatment, which disturbs the colony and stimulates the bees to clean their hive.
- For two applications the treatment takes 14 -16 weeks, which is inconvenient for the beekeeper.

- It is necessary to provide a space between the top of the frames in a hive and the hive roof, for instance by inserting an empty super; this reduces the temperature of the bees and increases their honey consumption.
- Temperature variations during the treatment are important. If the temperature is above 35°C, the treatment is more effective (< 70%) but causes a higher larval mortality. If the temperature is less 12°C the treatment is less effective (>60%), and leads to a higher mortality of adult bees.
- Apiguard is ineffective against *Acarapis woodi*; both Menthol and Formic acid were found to be effective in tests at four sites in the Department of Gillan in the north of Iran during 2001 and 2002.
- If proper conditions for its use are adhered to, thymol residues do not increase.

The objective of this experiment was to study the efficacy of plastic strips impregnated with amitraz 500 mgr(Apivar®, Biove), with flumethrin 0.06% (Bayvarol®, Bayer HealthCare AG, Germany) or coumaphos 10 % (CheckMite+®, Bayer HealthCare AG, Germany) against *Varroa destructor*.

Materials and Methods

The trial site was the apiary of the Ghazvin department in Iran. The study lasted from September 9th 2009 to October 21st 2009. Twenty colonies with about 25,000 bees and 1 mated queen and with a normal brood pattern (eggs, larvae and pupae) were used. At the start of the trial the colonies occupied 10 frames: the 3 to 4 middle frames contained brood while the other frames contained the pollen and honey stores. Colonies were naturally infested with *Varroa destructor*. Colonies were randomly allocated to four treatment groups of 5 colonies each.

- The first group (Tab.1A, 1B) was treated by Apivar®, Apivar was registered in France. Two strips were placed between frames close to the brood nest area for 6 weeks.
- The second group (Tab.2A, 2B) was treated by Bayvarol® Bayvarol® was registered in Germany four strips were placed between frames close to the brood nest area for 6 weeks.
- The third group (Tab.3A, 3-B) was treated with CheckMite+®, strips, CheckMite+®, was registered in Germany Two strips were placed between frames close to the brood nest area for 6 weeks.
- The fourth group (Tab.4A, 4-B) remained untreated. The hives were arranged in groups. Within each group the hives were standing side by side. Between the groups there was a minimum distance of two metres.

Results and Discussion

1) Treatment with Apivar® strips

Tab.1A - Taken before treatment on the 9th September 2009

N° Hives	Department	Take bees	N° Varroa	% Infestation
1 to 5	Ghazvin	593	50	8.43%

Tab 1B - Taken after treatment on the 21st October 2009

N° Hives	Department	Take bees	N° Varroa	% Infestation
1 to 5	Ghazvin	692	2	0.28 %

2) Treatment with Bayvarol® strips

Tab 2A - Taken before treatment on the 9th September 2009

N° Hives	Department	Take bees	N° Varroa	% Infestation
6 to 10	Ghazvin	601	51	8.48 %

Tab 2B - Taken after treatment on the 21st October 2009

N° Hives	Department	Take bees	N° Varroa	% Infestation
6 to 10	Ghazvin	681	2	0.29 %

3) Treatment with CheckMite+® strips

Tab 3A - Taken before treatment on the 9th September 2009

N° Hives	Department	Take bees	N° Varroa	% Infestation
10 to 15	Ghazvin	591	57	9.64 %

Tab 3B - Taken after treatment on the 21st October 2009

N° Hives	Department	Take bees	N° Varroa	% Infestation
10 to 15	Ghazvin	699	1	0.14 %

4) Untreated hives

Tab.4A - Taken before treatment on the 9th September 2009

N° Hives	Department	Take bees	N° Varroa	% Infestation
16 to 20	Ghazvin	601	54	8.98 %

Tab 4B - Taken on the 21st October 2009 untreated

N° Hives	Department	Take bees	N° Varroa	% Infestation
16 to 20	Ghazvin	609	89	14.61 %

Conclusion

The tests we carried out in Ghazvin in Iran against *Varroa destructor* show a good effectiveness, of Apivar® 96.68 %, for Bayvarol® 96.59%.for CheckMite+® 98.55 %

With Apivar® or Bayvarol® or CheckMite+® strips, a single treatment seems to be sufficient to reduce significantly the impact of varroa on the colonies for a year. *Varroa destructor* is a serious disease. It is necessary to learn how to live with it. This can be done:

- By preserving only strong colonies in the apiaries.
- By systematically changing the queens every two years, by developing queens selected for resistance to the diseases
- Also changing treatment with pyrethroids, (Apistan®, Bayvarol®) also Apivar® every 5 years.

But pyrethroids, (Apistan®, Bayvarol®) and Apivar, CheckMite+® have a tendency to be resistant after several years of treatment. When the colonies are strong and well populated and have one good treatment a year against *Varroa destructor* with an acaricide, this has good efficacy (+ 95 %) and does not make them perish.

Although we are in the 21st Century, *Varroa destructor* will undoubtedly remain for several years one of the principal agents of the weakening of apiarian livestock.

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