

The efficacy of Oxuvar® and Thymovar® in the control of Varroa destructor and Tropilaelaps mercedesae in Afghanistan

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Varroa destructor is considered as the causal agent of the most severe parasitosis of the honey bee. During its expansion throughout the whole world, it appeared in Afghanistan in the 80s. It is known that this mite is characterized by its special reproductive cycle, linked to the different evolutionary phases of the bee colony.

Varroa destructor is well known to beekeepers because in many countries it is the most common cause of death of Apis mellifera colonies. Methods of controlling the mite have been investigated and several products are now approved for use. A recent difficulty in Afghanistan as well as in other countries has been the development of resistance in varroa to pyrethroids. This has led to a high mortality of colonies worldwide, and we have therefore investigated various new control products on sale.

Tropilaelaposis is due to a haemophagous ectoparasitic mite tropilaelaps clareae. After a short phoretic period on the adult bee, it enters the brood cell just before capping, where it reproduces. It causes a rapid decline of Apis mellifera colonies. The re-classification on the genus Tropilaelaps is based on genetic and morphological variation of the parasite, new name is Tropilaelaps mercedesae Anderson and Morgan 2007. During its expansion throughout the whole world it appeared in Afghanistan in the 80s. The mite was first described on Apis mellifera in the Philippine by Delfinado and Baker 1961. Later, it was described on the other species of genus Apis (Table 1).



Varroa.d and Tropilaelaps.m

Table 1. Distribution of *Tropilaelaps clareae*(*mercedesae*) on its known *Apis* hosts (Agganwal,1998)

Host	<i>A.dorsata</i>	<i>A.mellifera</i>	<i>A.cerana</i>	<i>A.florea</i>
Stage & Cast	Ad,drB,Wb	Ad,drB,Wb	Ad,drB	Ad
Infested countries	India Philippines Nepal Burma	india Philippines Burma Malaya Vietnam Thailand China Taiwan Pakistan Afghanistan Iran(2000)	india Burma Malaya Java Pakistan PapuaN.G Afghanistan	india India

AD=adult bees; drB=drone brood; wB=worker brood

In India, the mite was responsible for the loss of 50% of the brood in A.mellifera colonies, Introduced six years earlier (Atwal and Goyal).

The same situation was observed in the Philippines(Laigio and Morse 1968).In other countries ,Thailand and Afghanistan,where A.mellifera is native,Tropilaelaps mercedesae is considered a serious pest,marking control treatments necessary.

The objective of this experiment was to study the efficacy of natural control of Tropilaelaps mercedesae,Varroa destructor with Thymovar® and Oxuvar® products of company Andermatt BioVet .



Materials and Methods

The trial site was the apiary of the Takhar department in Afghanistan. The study lasted from 25th February 2024, for Oxuvar®, 25th March 2024 for Thymovar®. 5 colonies brood less used. At the start of the trial for Oxuvar®, the colonies occupied 7 to 9 frames.

5 colonies with a normal brood pattern (eggs, larvae and pupae) were used. At the start of the trial for Thymovar® the colonies occupied 9 to 10 frames. Bee colonies.

Were naturally infested with *V. destructor* & *T. mercedesae*. Bee colonies were randomly allocated to 2 treatment groups of 5 colonies. Groups were treated with two medicaments.

The first group treated by Oxuvar®, Oxuvar® was registered in Switzerland. It has 5,7 % Oxalic acid dehydrate solution for brood-less colonies.

One (1) part of concentrate is simply mixed with one (1) part of sugar. At a concentration of 3.5% this ready to use sugary trickling solution is well tolerated by the winter-bees and queen in the cluster.

The solution is trickled over the bees sitting between the combs. In low outside temperatures the bees will remain in the hive and a dose of 5–6 ml per row for hives will be sufficient. For elevated temperatures an increased dose of 6–8 ml per row is required. Best results are being achieved on bees remaining inside the hive after treatment. Oxalic acid dihydrate solution 3.5% with sugar is very well tolerated by the bees and the queen. The Varroa mite fall will peak in the first three days after the application. The sugary solution will stay active for a longer period of time since the hygroscopic sugar attracts water and keeps the oxalic acid in solution for a longer time compared to the spraying solution.

One treatment is sufficient when no closed brood cells at present. Repeated treatments on the same generation of worker bees may lead to the accumulation of sublethal effects and shorten the life span of worker bees.



Treatment with oxuvar®

The second group was treated by Thymovar®. Thymovar® was registered in Switzerland, each strips containing 15 g thymol. Thymovar® strips gradually release thymol into the hive. One strips per colony, it is more effective to place on top of the brood combs and to replace it with another one after 14 days later.



Treatment with Thymovar®

Under optimum conditions of application, the efficacy of treatment was greater. The optimal temperature must be over 25°C .

The third group 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 20 meters. At the start of study all the colonies were naturally infested with *V. destructor* & *T. mercedesae*.

1) Treatment with Oxuvar®

Tab.1-A) taken before treatment on the 25 February 2024

No hive	Department	Take bees	N.Varroa and Tropilaelaps	%Infestation
1 to 5	Takhar	665	38+27=65	9.77 %

Tab.2-A) taken After treatment on the 25 March 2024

No hive	Department	Take bees	N.Varroa and Tropilaelaps	%Infestation
1 to 5	Takhar	674	1+1=2	0.29 %

1) Treatment with Thymovar®

Tab.1-B) taken before treatment on the 25 March 2024

No hive	Department	Take bees	N.Varroa and Tropilaelaps	%Infestation
5 to 10	Takhar	601	36+27=63	10.48 %

Tab.2-B) taken after treatment on the 25 April 2024

No hive	Department	Take bees	N.Varroa and Tropilaelaps	%Infestation
5 to 10	Takhar	603	2+2=4	0.66 %



Beekeepers on Roustaq in Afghanistan

3) Non treatment

Tab.1-C) taken before treatment on the 25 February 2024

No hive	Department	Take bees	N.Varroa and Tropilaelaps	%Infestation
10 to 15	Takhar	656	32+23=55	8.38 %

Tab.2-C) taken After treatment on the 25 April 2024

No hive	Department	Take bees	N.Varroa and Tropilaelaps	%Infestation
10 to 15	Takhar	675	48+37=85	12.59 %

Conclusion

The tests we have carried out in Afghanistan against varroa destructor and Tropilaelaps mercedesae show a good effectiveness, of 97.04 % for Oxuvar® for Thymovar® 93.71 %.

With Oxuvar®, a single treatment seems to be sufficient to reduce significantly the impact of varroa and tropilaelaps on the colonies for a year.

Since 2002 we have been using thymol-based product requires special conditions of use, in case of temperatures outside the colony higher than 15° C.. used too late in autumn or at unfavorable times .its effectiveness can be reduced due to cold periods. Temperatures between 15°C and 25°C should be used. Among thymol-based products, Thymovar® from Switzerland has better results in Iran and Afghanistan. The disadvantages of Thymovar® are less other thymol-based products. Thymol-based products have not given resistance against Varroa until today

Varroa destructor and Tropilaelaps mercedesae are serious illnesses. After over four decades of experience in the Middle East in the use of different types of treatment against varroa mite and tropilaelaps :by inhalation(fumigation),absorption (systemic action),contact (slow release) and evaporation,I feel that efficacy depends on local conditions and that care is needed when using these products.In the Near East and Middle East,the optimal conditions are a high and stable external temperature and the absence of worker brood.The main precautions consist of preventing re-infestation and robbing by treating outside periods of nectar flow or queen rearing and by checking the efficacy of the treatment.

The alternative to chemical control is thus more than the simple use of a vegetable or animal extract in place of synthetic acaricide. It requires an additional effort from the beekeeper to manage the bee colonies, which is more time consuming.

Since 1996 to up today difficulty in Middle East as well as in other countries has been the development of resistance in varroa to pyrethroids (flumethrin and fluvalinate) in 2015 to coumaphos and Taktic. This has led to high mortality of colonies worldwide.

Products from China based on fluvalinate and flumethrin, coumaphos have already given strong resistance in the Middle East and Asian countries (R. Shahrouzi 2006-2014).

Oxalic acid from China is industrial, this oxalic acid is harmful to bees. Since beekeepers have used in Iran and Afghanistan, there were deaths of colonies at the apiary.

Although we are in the 21st century, varroa destructor & Tropilaelaps mercedesae will undoubtedly remain for several years one of the principal agents of the weakening of apian livestock. V. destructor & T. mercedesae are 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.
- The first treatment must be carried out in October in Middle East by acaricide. To give overwintering bees the optimum potential for survival, it must be sufficiently effective to ensure that at the end of the treatment there will be fewer than 50 parasites within treated hives.
- If an apiary's colonies are located in an area conducive to the rearing of brood (potential source of development for the parasite), the second treatment must be carried out in early spring.



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