Symposium 5

Comparative Evaluation Tests of Different Methods to Control *Tropilaelaps clareae*, a Mite Parasite in Nepal

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ABSTRACT

The beekeepers in India and Nepal apply formic acid or sulphur powder to control parasitic mites in Apis mellifera colonies. The ectoparasitic mites, *V. jacobsoni* and *T. clareae* create difficulties in keeping *A. mellifera*. Fifty *A. mellifera* colonies of similar size were randomly selected and grouped into 6 experimental groups. We used formic acid (group I), sulphur powder (group II), Apistol (Chinese strips containing Klartane-group III), Bayvarol (group IV), Perizin (group V) and a biological method invented by Woyke (1987a, b, c) (group VI). The colonies in each group were treated for 5 weeks. After final treatment we found 0-429 *T. clareae* on the bottom insert in particular colonies. The highest average efficiency was found in colonies treated with Apistol (97.9%) and the lowest - with sulphur powder (57.3%).

INTRODUCTION

The beekeepers in India and Nepal apply formic acid or sulphur powder to control parasitic mites in *Apis mellifera* colonies (Shivakoti and Bista 2000). The ectoparasitic mites, *V. jacobsoni* and *T. clareae* create difficulties in keeping *A. mellifera*. In most cases, infestations with *V. jacobsoni* or *T. clareae* are first detected by the beekeepers when infestation rates reached destructive levels. The impact on the growing bee industry is amplified because of the lack of knowledge on control methods for most diseases, including both mites. The aim of our experiment was to determine the efficiency of the control of *T. clareae* and *V. jacobsoni* with 6 different methods.

MATERIALS AND METHODS

Fifty *A. mellifera* colonies of similar size were randomly selected and grouped into 6 experimental groups. We used 65% formic acid (group 1), sulphur powder (group II), Apistol (Chinese strips containing Klartane - group III), Bayvarol (group IV), Perizin (group V) and a biological method invented by Woyke (1987a, b, c) (group VI). Formic acid was placed on the bottom of hives in a small plastic holder without direct

contact with bees. Sulphur powder was pulverised into the combs spaces. Each colony of group I and II received two applications of 30 ml of formic acid or two full teaspoons of sulphur powder (10 g), on day 1 and 15 of the experiment. In both those days we used Perizin according to the instruction of the producer, in colonies of group V. In groups III and IV, the strips were suspended throughout the experiment. The experiment was conducted from 21 October to 8 December 1998. The colonies in each group were treated for 5 weeks. During this period, we estimated the number of mite fall in the nest. We also used a bottom mesh insert to prevent mites from being removed by workers. Every day, the number of *T. clareae* and *V. jacobsoni* found on the bottom boards were counted. Four weeks after the beginning of the experiment, queens were caged in all the colonies and in colonies of group VI after 1 week. After 50 days, when no brood was present, a final treatment of all the colonies was made with Perizin to kill and estimate any remaining mites in the colonies.

RESULTS AND DISCUSSION

The number of falling *T. clareae* was very different. During the 5 weeks of treatment, we found 6-1796 *T. clareae* on the bottom insert in the colonies (Table 1). On the average, we found from 51.4 mites in group I, to 964.1 in group III. After the final treatment we found 0-429 *T. clareae* on the bottom insert of the colonies (Table 2). On the average, the highest number of mites on the bottom board was in group II (treated with sulphur powder - 216.8). The difference between this group and all others was significant at p=0.01.

The highest average efficiency was found in colonies treated with Apistol (97.9%), the lowest was with sulphur powder (57.3%). We had very good results using the biological method (96.1%) as well as with Baywarol (93.3%). We achieved the lowest control with sulphur (Waghchoure et al., 1997) and with formic acid (Boecking and Sito, 2000; Garg et al. 1984 and Hoppe et al. 1989). During the entire period of the experiment we only found a total of 8 *V. jacobsoni* mites in 5 colonies. This shows that *V. jacobsoni* is not a problem in *A. mellifera* colonies in Nepal. However, *T. clareae* caused serious injury to the brood. It is difficult to explain why we found such a low level of *V. jacobsoni*. Xu and Xie (1997) reported interspecific competition of both mites in the same colony, but we saw no evidence of this competition due to the lack of *V. jacobsoni*.

The best time to treat the colonies in Nepal is during the monsoon season (July-September) when no nectar is available and the colonies do not produce any honey. Our results show that the biological method without applying any medicine is adequate to control *T. clareae*. However, when it is difficult to find the queens, we recommend using the inexpensive Chinese Apistol during the monsoon season..

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Table 1 Control of *Tropilaelaps clareae* from 21 October 98 to 8 December 98 by different methods and chemicals during the treatment period.

Treatment-group	No. *T. clareae* falling on bottom boards during 6-week treatment			
	N	Range	Average	S
Formic acid	8	20 - 95	51.4 ^{Bc}	29.25
Sulphur powder	8	71 - 729	321.4 ^{bc}	228.63
Apistol China	8	49 - 1796	964.1 ^{Aa}	542.76
Baywarol	9	6 - 1276	185.2 ^{bc}	414.11
Perizin	9	14 - 1424	539.2 ^{b}	451.62
No brood	8	46 - 1453	399.9 ^{bc}	462.59

a, b, c - significant differences at p = 0.05; A B - significant differences at p = 0.01

Table 2 Control of *Tropilaelaps clareae* from 21 October 98 to 8 December 98 by different methods and chemicals during treatment period.

Treatment-group	No. *T. clareae* falling on bottom boards during 6-week treatment			
	N	Range	Average	S
Formic acid	8	11 - 56	32.1 ^{B}	12.81
Sulphur powder	8	78 - 429	216.8 ^{A}	126.02
Apistol China	8	2 - 31	17.8 ^{B}	10.33
Baywarol	9	0 - 17	4.4 ^{B}	5.48
Perizin	9	4 - 95	43.6 ^{B}	33.11
No brood	8	2 - 32	12.0 ^{B}	9.81

A, B - significant differences at p = 0.01

Table 3 Control of Tropilaelaps clareae from 21.10.1998 to 8.12.1998 by different methods and chemicals Efficiency of treatment

Treatment-group	Efficiency of treatment in %			
	N	Range	Average	S
Formic acid	8	39.30 – 77.55	59.3 ^{D}	13.80
Sulphur powder	8	47.40 – 69.37	57.3 ^{D}	7.28
Apistol China	8	96.08 – 98.84	97.9 ^{Aa}	0.96
Baywarol	9	90.48 - 100	93.3 ^{Aba}	4.50
Perizin	9	77.78 – 94.23	90.2 ^{BCb}	5.03
No brood	8	92.91 – 97.85	96.1 ^{Aba}	1.82

a, b - significant differences at p = 0.05; A, B. C, D – significant differences at p = 0.01

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