

VETERINARY DRUGS FOR ORGANIC BEEKEEPING

Kalinka Gurgulova* Ivanka Zhelyazkova** Vera Popova***

*National Diagnostic & Research Veterinary Medical Institute, kalinkag@abv.bg., Republic of Bulgaria
 **Thracian University, Faculty of Agriculture, Apiculture Department, Stara Zagora, Republic of Bulgaria
 ***“Primavet – Sofia” Ltd., Sofia, Republic of Bulgaria

Introduction

The organic beekeeping needs specific drugs for treatment of bee diseases. The use of no registered drugs is forbidden in the productive animals' treatment including honeybee according to the veterinary laws. The therapy and prophylaxis in organic beekeeping exist the application of natural products, such as essential oils, acids, etc.

The destruction of *Varroa* is a very difficult and complicated task and its fulfillment has required the creation of a program designed for the prevention and bee pest extermination.

Nosemosis is a widespread disease on honeybee *Apis mellifera* L. caused by spore-forming protozoan *Nosema apis* and recently by *Nosema ceranae*. According to OIE (2002) the parasite is spread in 43% of the countries. During the period of five years, the disease largely exhibited in many regions of Bulgaria.

The Bulgarian product *Nosestat* based on iodine, potassium iodide and formic acid (Krstev, 1989, 1990, 1994) showed high activity.

For the organic beekeeping Primavet-Sofia Ltd developed and legalized both veterinary products *Ecostop* and *Nosestat*.

The objective of the research is to study the effectiveness of *Ecostop* against *Varroosis* and *Nosestat* against *Nosemosis*.

Material and methods

The investigations were carried out on bee colonies at a test apiary in the region of the city of Stara Zagora. The bee colonies were treated with *Ecostop* (active substance containing 5.0 g of thymol and 2.0 ml of mint oil per plate, that was offered as solid aerosol with prolonged release of the active substances) as follows:

Group I: bee colonies with strength of $1,72 \pm 0,04$ kg were treated with 2 plates of *Ecostop* for 45 days.

Group II (K): bee colonies with strength of $1,77 \pm 0,06$ kg remained untreated.

In order to obtain a more comprehensive and complex evaluation of the effectiveness of *Ecostop* the EI (Extensivisation) of trial and control groups before and after the treatment was determined.

The number of natural mite drops in the control groups and mites killed by *Ecostop* during the experiments in the treated group was estimated by counting the mite drop-down in five-days intervals (on the 7th, 14th, 21st, 28th, 35th, 42nd, and 45th days) onto a sticky paper sheets placed at the bottom of the hives. The acaricidal activity of the preparation was established via control treatment of the trial and control groups with *Varrostat - R* (*Rodovar*), contained Amitraz 12.5%, and was applied on the 45th day.

The following formula was used to estimate the percentage of mites killed by the experimental and control treatments:

Efficacy of *Ecostop* (%) = $(E / (E + R)) \cdot 100$ %, Where: E = *Ecostop* and R = *Rodovar*.

The colony strength for all groups was evaluated. Behavioral changes in the bees or brood during the treatment were visually established.

Efficacy of *Nosestat* ((4% iodine and potassium iodine, formic acid)) we established by application of *Nosestat* in the experimental group E using the food (sugar solution) according to the following scheme:

1st treatment – 3 times at intervals of 3 days.

2nd treatment – repetition of the same scheme after 7 days.

To count *Nosema* spores we used all the techniques of diagnosis of *Nosema apis* infection, recommended in the OIE (World Organisation for Animal Health) Manual of Diagnostic Tests and Vaccines for Terrestrial Animals (2004).

Results

The monitoring of the mites fallen showed that in group I have fallen 820.2 ± 216.32 mites (fig.1). The number of the mites fallen after the control treatment in the trial group was 62.60 ± 8.95 in the group that was treated with 2 plates of *Ecostop* for 45 days ($p \leq 0.001$). In the control group that remained untreated have fallen, i.e. 259.89 ± 33.45 mites in comparison with Group I ($p \leq 0.001$).

It has been ascertained that *Ecostop* have a good acaricidal activity against *Varroa destructor* in Bulgaria. *Ecostop* has shows an effect of $90.59 \pm 1.83\%$ against varroosis at application of 2 plates to colonies with 6-8 frames and an infestation level of $4.98 \pm 1.40\%$ for bees and $46.80 \pm 21.17\%$ for the brood for a period of 45 days (Fig.2). The observation showed that *Ecostop* did not have any adverse side effects upon the bee colonies, such as death of queens, bees and brood, and no robberies were observed during the treatment.

It was found (fig.3) that after triple administration of *Nosestat* at intervals of 3 days the average level of *Nosema* spores in the group E decreased from 16560 ± 3529.21 spores to 3920 ± 1352.85 , and the average number of the spores in untreated control group (C2) increased with a difference from 8400 ± 1469.69 spores to 11040 ± 1912.48 spores. After the second treatment with *Nosestat* (7 days later at the same scheme) it was found that the reduction of the spores had a high differences ($P \leq 0.001$) compared to the initial infestation in the treated group E – from 16560 ± 3529.21 spores before the treatment to 960 ± 314.12 spores at the end of the experiment (Efficiency of *Nosestat* - 94.20%). At the same time, for the infested untreated control group (C2) the *Nosema* spores average number increased from 8400 ± 1469.69 spores at the start of the experiment to 13920 ± 2476.77 spores at the end ($P \leq 0.001$). The monitoring of the treated group showed that *Nosestat* is well tolerated by the bee colonies and does not have any harmful impact on the queens, bees and brood. No changes in the bee behaviour are noticed. The colonies developed normally and no mortality was noticed after the treatment.

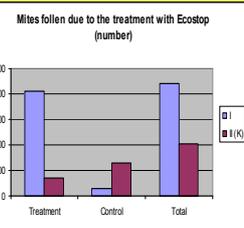


Fig.1. Mites fallen (number)

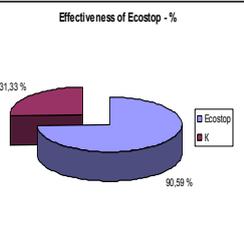


Fig.2. Effectiveness of Ecostop - %

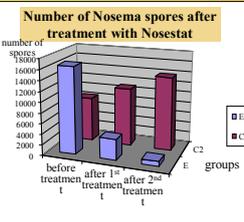


Fig.3. Reducing of *Nosema* spores

The Results obtained by us provide good reasons to consider *Ecostop* a suitable mean for fighting against *Varroa* in bees under the conditions in the Republic of Bulgaria, due to its proven effectiveness when applied during fall and spring treatments – effectiveness - 90.59% .

For optimal *Nosema* control in overwintered colonies, initial infection levels needs to be reduced in early winter and in late fall, when brood rearing normally declines. Based on the results obtained, we are of opinion that *Nosestat* is an adequate means for prevention and control of nosemosis under the conditions of Bulgaria because of the comparatively high efficiency found at double treatment – 94.20%

These veterinary products are appropriate for organic apiculture as their active substances have permission to this type of production and they are effective against target diseases. Both have market authorization.

References:

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