

PRACTICAL EXPERIENCES IN THE USE OF MAQS® STRIPS BASED ON FORMIC ACID

The first acaricide based on formic acid available on the Italian market was tested in different situations. It proved to be effective and easy to use, while highlighting side effects on hives.

The antivarroa medication MAQS® is available for Italian beekeepers since June 2014, since July 2015 it is sold freely without a veterinary prescription. The product was developed by the Canadian company NOD in partnership with BASF, and consists of strips impregnated with formic acid and coated with a special sugary film which regulates the evaporation of the active ingredient.

The CRT - PA of the Unaapi had already published, edited by Umberto Vesco, an article in 6/2014 which summed up the results of a series of tests of MAQS® conducted in France, Switzerland, USA and Canada. The tests had shown a strong variability of both acaricide efficacy and the incidence of adverse effects such as brood loss, showing a correlation with temperature at the time of application.

Thus, the next step was to test the use of the drug in the Italian climate and beekeeping conditions. In the summer of 2014, the technical network of CRT - PA has organized a series of tests on the national level to verify the uses of the new product.

The treatment was incorporated in the treatment strategy - as per the supplier's recommendations - to assess its capacity to contain varroa under "damage threshold" and to assess the possible adverse effects on colonies.

The trials included 11 apiaries, with a total of 208 hives, located in 6 regions (Figure 1 p.7), using a standard protocol for the test and data collection. In two apiaries we also carried out tests to assess any direct sun exposure effects and conformation / standardization of the opening of the beehive.

Picture:

The dose for each individual hive and consists of two strips. (Photo by L. Colombarij)

Fig. 2 - Boxplots infestation of adult worker bees beginning of treatment

Fig. 3 - Boxplots infestation of adult bees 25 days after the end of treatment.

Fig. 4 - Boxplots of brood loss percentage (average 12.5 %)

Fig. 1 - Location of the apiaries where the tests were performed.

Materials and methods

In each apiary, at least 15 hives were tested with an average varroa infestation rate (adult bees) of between 2 and 10% (measured with the icing sugar method before treatment).

All hives have been checked, in addition to the degree of infestation, the presence of the queen was verified, the presence of eggs and brood of all stages was verified, and at least six well-populated honeycombs were confirmed. The treatment was carried out, and at this point, the field assistant had two main tasks: placing two strips in the hive on the topbars and paying attention to outside temperatures.

Once the seven days of treatment were over, all hives were checked to verify the presence of the queen, queen cells and to monitor the general condition of the colonies.

25 days after the beginning of treatment, eventual replacement of the queen, the egg laying rate and the degree of varroa infestation were monitored. In the following spring, when cherries started flowering, the state of some of the colonies was monitored again by estimating colony strength, looking at the number of brood combs.

Results

The Results are summarized in Table 1 on page 6.

At the inspection carried out 25 days after the beginning of treatment, the varroa infestation of adult bees was reduced by an average of one third (33 %) compared to before the beginning of the treatment.

In all treated groups (Figures 2 and 3 on page 6), the varroa infestation was kept below damage threshold, which is considered 5% of infestation rate on adult bees. Queen loss was found in 12.5% of the hives after treatment, which equals 24 of 208 hives tested in total. The variability between apiaries was high, ranging between 0% and 38% queen loss per apiary.

The phenomenon does not appear to be related to the degree of shading, or such an effect could not be detected here, as ca. 90% of the hives were located in full sun exposure. As for the presence of the supers, in the hives with supers the queen loss has been attested by an average of 10% compared with 15% of the hives without supers, but the difference is not statistically significant ($\text{Chi}^2 = 2.38$, $\text{df} = 2$, $p = 0.30$). As for the population of bees 25 days after the treatment was applied, 3.8% of the hives appeared strongly depopulated, and 12.2% somewhat depopulated.

Depopulation was not related to initial varroa infestation rate in the colonies.

Of the 53 hives followed until the next spring, 1.88% passed in the winter after having received MAQS® as a summer treatment. Even if comparable data on the strength of colonies was not collected in detail, we can report that in the opinion of the beekeepers, the strength of the tested apiaries in spring did not differ from comparable apiaries, which had received several summer treatments.

Picture, page 7:

The strips can also be administered in the presence of supers, positioning them between the nest and supers. Any devices for the collection of propolis should be removed to avoid excessive dispersion of formic acid vapors.

Conclusions

In the tests conducted, MAQS® was used as instructed by the manufacturer as part of an integrated pest management strategy. It has allowed us to well control the varroa infestation level, even in cases where the infestation was already close to damage threshold. The rate of queen loss caused by the treatment was variable, sometimes very high. This seriously reduces the possibility of summer treatment; especially, considering the relatively low maximum temperatures in summer 2014. We remain in favour of the product for the possibility of use during late summer / autumn and its simplicity of use.

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Picture, page 9:

After seven days in the hive, formic acid has completely evaporated. The sugar matrix and the wrap around it remain in the hive. Everything can be left in the hive, and then deleted by the bees, or being biodegradable, removed and thrown onto the compost.

(Photo by G. Guido and U. Vesco)