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Optimisation of Varroa destructor control strategies in Ukrainian apiaries

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Varroa destructor remains a major threat to Apis mellifera globally, with chemical acaricides being the primary control method, including in Ukraine. However, excessive use, combined with pesticide exposure and climate change, has led to increasing resistance in Varroa populations (Maggi et al.2010a, 2011) and higher colony mortality. This necessitates the development of new strategies for managing Varroa mite populations in bee colonies throughout the season under Ukrainian conditions.

The study was conducted from August 7 to December 14, 2024, at a private apiary in Kazanka, Mykolaiv Region, Ukraine, involving 145 colonies of A. m. carnica (85%), A. m. ligustica (10%), and A. m. macedonica (A. m. sossimai) (5%). The effectiveness of Avatar Bi VarroaOff, an organic acaricide, was tested on two groups of A. m. carnica colonies (n=5 per group) using different application intervals: four treatments every four days vs. three treatments every six days. The remaining colonies received Varoflu (flumethrin, 3.6 mg/strip, 3–4 strips/colony). Mite infestation levels and colony strength were recorded before and after treatment, with daily mite drop assessed separately (Dietemann et al. 2015).

After 38 days from the start of treatments, all bee colonies were subjected to additional treatments with various acaricides:

- Oxalic acid (sublimation);
- Oxalic acid (aerosol vaporization);
- 60% formic acid;
- Amitraz (Apimitryn).

Treatments continued until mite drop ceased. Avatar Bi VarroaOff achieved 65% efficacy (three treatments) and 77% (four treatments). No method fully eradicated Varroa destructor in the presence of brood.

Even the combined use of different types of acaricides at specific intervals did not immediately reduce the mite infestation level to an acceptable threshold. The results confirm the low efficacy of synthetic acaricides in Ukraine, which aligns with global trends (Sammataro et al. 2005).

The high demands for the quality and safety of beekeeping products, climate changes prolonging the brood-rearing period into late autumn, and the declining efficacy of synthetic acaricides underscore the need for new strategies to control Varroa destructor populations. Continuous mite monitoring and season-long population regulation, utilizing organic acids (oxalic, formic) or complex organic acaricides like Avatar Bi VarroaOff, alongside biotechnical methods, are promising strategies for sustainable Varroa management.