

APPLICATION STUDY: HOP ACIDS TO CONTROL VARROOSIS -COLONY TRIALS



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Introduction

In the laboratory hop beta acids showed a high efficacy against *Varroa destructor* while being well tolerated by the bees after dermal application. During the winter 2010-2011 we tested a contact application of beta acids on the colony level to gain accurate data on the efficacy and bee tolerability.

Method

The field trial was conducted during December 2010 on colonies of *Apis mellifera carnica* (Pollmann) naturally infested with *V. destructor* (Anderson & Trueman). Trial colonies derived from nuclei colonies were all managed by good beekeeping practise. They received one formic acid treatment in August when the natural mite mortality was high. The colonies were chosen randomly for the trial with 10 colonies for the test group and 8 colonies as controls. Prior to the test treatment with HopGuard® strips (active ingredient: beta acids) all colonies were estimated on number of bees according to the Liebefeld method. The colonies had no brood.



Figure 1: Insertion of HopGuard® strips into the colony

Two test strips were placed in every colony into the winter cluster hanging over the frames (Fig. 1). The controls received no treatment. During a 11 day trial period mite and bee mortality was determined in intervals of 1 to 3 days. The strips were removed after 17 days and the follow-up treatment was conducted using Oxuvar®. Dead mites were then collected for another 3 weeks to account for the total mite fall in test and control colonies.

The statistical analysis was conducted using χ^2 -test ($p \leq 0.05$).

Results and Discussion

The colonies were of comparable strength, averaging 5000 bees per colony. The mean dosage/bee was calculated on the results of the laboratory trial concerning bee and mite mortality after individual dermal application of beta acids: the tolerable dosage for single bees resp. the efficient dosage against the mite was 50µg. Further laboratory trials on bee tolerability with acceptor bees resulted in a dosage of up to 250µg/bee. The dosage applied via strips in the colony was calculated in a range of 150µg/bee.

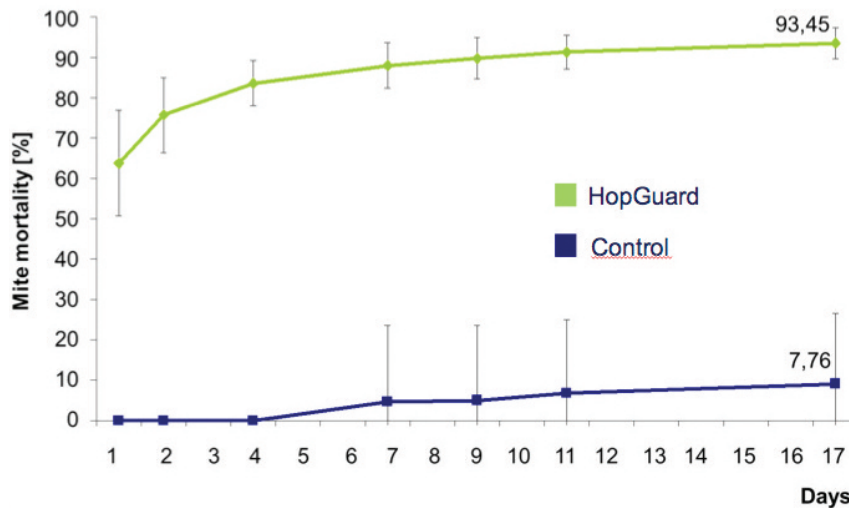


Figure 2 Mite mortality after application of HopGuard®

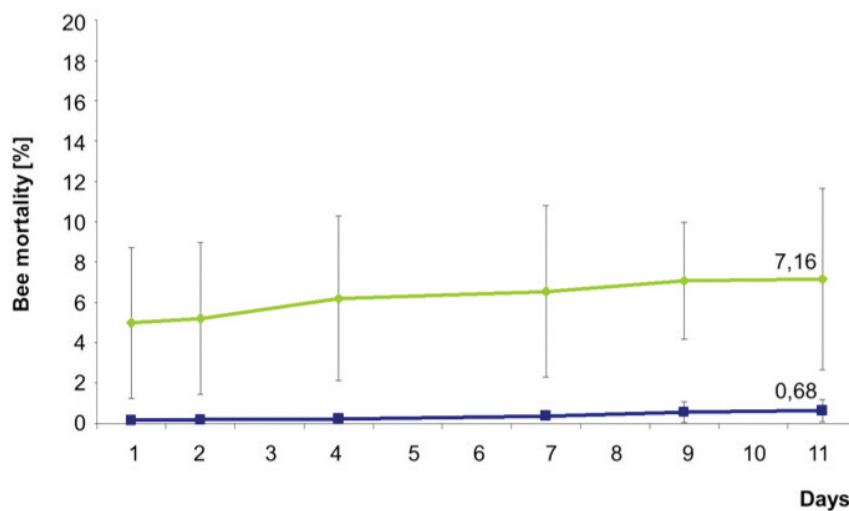


Figure 3 Bee mortality after application of HopGuard®

After colony treatment with this dosage mite mortality 24 h after application reached more than 60%, after 96h even more than 80%. 17 days after strip insertion high efficacy averaging 93.5% (min. 89.5%, max. 100%, Fig. 2) was achieved, significantly different to the controls at any point of data acquisition. In the control group only 7.8% of the mites died. Beta acids showed the highest effectivity in the colonies within the first 24h. Up to 96h the mite mortality rates rose to a high level, then the curve gently inclines.

Bee mortality 24h after application reached 5%, after 96h 6.2%. The total bee mortality 11 days after application summed up to 7.2% (min. 1.1%, max. 13.9%). The control group showed significantly lower bee mortality (0.7 %, min. 0.2%, max. 1.6 %, Fig. 3). Bee mortality was relatively high directly after application with only slight increase in curve progression.

Overwintering and colony estimation in spring 2011 will be conducted as well as analysis of residues after the first honey flow. These preliminary results of the field trials show potential for further investigation and approval as a drug to combat varroosis. Registration is already performed in some states in the US under an emergency act. Concerning Germany respectively Europe seeking for approval seems to be possible in 2012/13.

Supported by BetaTec hop products (DMP)

The product HopGuard® (BetaTec Inc) is currently being registered throughout Europe by Vita (Europe) Limited, UK.