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SWEDEN | DENMARK | NORWAY

PP-291 [Beekeeping Technology and Quality]

Analysis of apitoxin yield and melliting percentage according to the use of three types of traps

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INTRODUCTION

Apitoxin is produced through the evaporation of volatile compounds from bee venom. In addition to peptides, enzymes, and dozens of other bioactive substances, its main component is melittin, which can reach concentrations of 60–70%.

The properties of melittin are important for its therapeutic applications. In worker bees, venom synthesis begins when the adult bee emerges and continues until the venom sac is fully developed three weeks later. The location of the trap in the hive is one of the factors influencing the quantity and quality of apitoxin, as it allows differential access by bees according to their age.

The objective of this study was to evaluate the performance of three types of traps, external trap (ET), internal trap (IT) and rooftop trap (RT), regarding the amount of harvested apitoxin and melittin concentration.

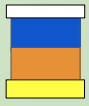
METHODOLOGY

20 standardized hives with same strength

Time of extraction: 11am

Bee venom was extracted through electric stimulation for 30 minutes

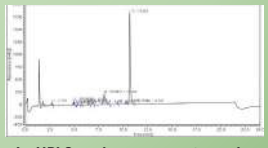
10 colonie with rooftop trap (RT)



10 colonies with external trap (ET)

10 colonies with internal trap (IT)

The apitoxin was dried and storage for each sample



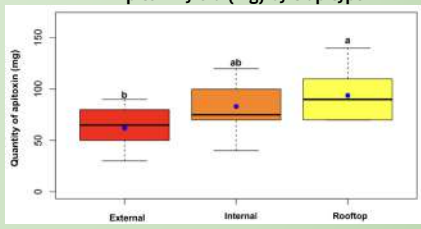
An HPLC analysis was performed to determine the [ ] of melittin

RESULTS

Apitoxin yield (mg) by trap type

Significant differences in the average apitoxin weight among the groups ($p<0.005$).

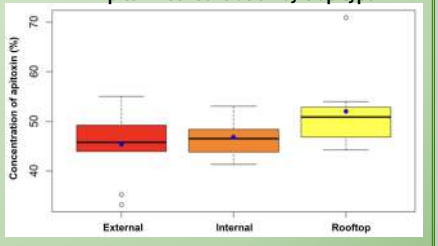
IT: 83 mg
ET: 62 mg
RT: 107 mg



Apitoxin concentration by trap type

No significant differences in the average concentration of melittin ($p>0.005$).

ET: 45,4%
IT: 46,9%
RT: 51,6%



A completely randomized design was used and the results were analyzed using an analysis of variance with an α of 0.05.

CONCLUSION

Regarding the amount of apitoxin, the top trap produced significantly more than the other two, followed by the internal trap and, finally, the external one. With respect to melittin concentration, no differences were observed among the three traps; however, the top trap yielded slightly higher values than the other two.

For beekeepers, the use of the top trap could be more convenient, not only because of the higher amount of apitoxin obtained but also due to its practicality, as it can be used both during the day and at night. In addition, the external trap could be placed vertically, which helps reduce contaminants introduced during extraction, such as bee parts or excretions.

Nevertheless, studies on apitoxin production are still scarce, and there is a need for protocols and standardized extraction methods to meet the growing market demand.

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Commercial apitoxin is obtained using an electrical current emitting device connected to traps that can be installed in different locations within the hive. The objective of this study was to evaluate the performance of three types of traps regarding the amount of harvested apitoxin and melittin concentration. The trial was conducted in December 2024 (austral summer) using 30 developed hives (population greater than 40,000 adult bees). They were divided into 3 groups of 10 hives (ET external trap, IT internal trap, RT rooftop trap). Extraction was performed in the morning for 30 minutes. The glass plates corresponding to each colony were identified, and the weight of the harvested apitoxin, as well as the percentage of melittin by HPLC, were quantified. Analysis of variance showed significant differences in apitoxin weight among the groups ($p = 0.021$): ET 62 mg, IT 83 mg, RT 107 mg. Tukey's post-hoc test indicated that the RT group showed a significantly higher yield than the ET group ($p = 0.015$), while other comparisons did not show significant differences. Regarding melittin concentration, ET 45.4%, IT 46.9%, RT 51.6% showed no significant differences among the groups ($p = 0.113$). This study confirms previous findings regarding the higher yield of RT traps in apitoxin collection, this time comparing traps under similar conditions, information that is important for those engaged in this field. Regarding the percentage of melittin in the collected apitoxin, no significant differences were found, unlike a previous study conducted in December 2022 comparing ET (62.4%) and RT (72.6%). We hypothesize that the difference may be due to the amount of open brood, which was low in 2022 due to the onset of a major drought and normal in 2024. As young bees produce royal jelly within the time window in which apitoxin components are synthesized, it should be studied whether open brood area affects the amount and/or composition of apitoxin.