

Breeding Carnolian bees on different comb cell sizes and analyzing the effect of the different cell sizes on the Varroa infestation rates. (Small breeding cells in honeybee - An experimental approach.)

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Worldwide on *Apis mellifera* the “new” ectoparasite *Varroa destructor* is considered as a major cause of bee colony-looses.

In 1997, after the arrival of the Varroa mite (*Varroa destructor* Anderson & Trueman, 2000) in Arizona, Ed and Dee Lusby observed a better survival rate of their colonies on honey combs with a small cell size (5,08 mm). Nowadays the western honeybees are commonly kept at the cell size 5,4mm to 5,6 mm. In this study, I analyzed whether small cells (4,9 mm) have a negative effect on the population development of varroa mite compared to the standard cell size (5,5 mm).

First I had to search in my Carnolian (*Apis mellifera carnica* Pollmann, 1879) closed breeding population for colonies who could built small cells. Then I created 2 groups of test colonies consisting of young sister queens and 1,5 kg varroa-infested bees on small cell size (4,9 mm) and large cell size (5,5 mm) respectively. To prevent any contamination with residues from miticides new hives and organic-certified foundation were used. The bottom boards were equipped with mesh-protected drawers to collect the natural mite mortality.

The data of 3 years, analyzing 494 test-colonies, have shown a positive result: the colonies on small cells had a slower varroa-mite population development.

For 2 additional years the Varroa reproduction parameters were determined.

Four lines with 80 new colonies on large cells and small cells with small sized bees were created. From each colony a comb with older sealed brood was analyzed for reproductive success of Varroa.

The following year 2 lines with small cells queens and bees were used for 20 new test-colonies. Each fitted with 4 small cell and 4 large cell drawn combs alternately positioned. The infested brood cells were analyzed again.

The collected data allowed to calculate the VSH parameter (=Varroa Sensitive Hygienic) as the quotient of brood cells with a non-reproductive varroa per total number of infested brood-cells.

Comparing both cell sizes in one colony has shown that there is a higher level of VSH for infested brood-cells on small cells in the selected Carnolian bee population.

The heritable traits “ability to construct small cell size comb” plus “VSH” results in a reduced population growth of Varroa in those colonies where worker bees when both traits are present. Smaller cell size combs in combination with breeding for the ‘right genetics’ (cell size and VSH) can be one part of an integrated sustainable treatment concept for Varroa control.

It remains unclear what made the VSH-activity on small cell size combs more intensive as compared to the large cell size infested cells in the same colony.