OBSERVING THE EFFECT OF FORMIC ACID ON *APIS MELLIFERA* USING ACOUSTIC EMISSION METHOD

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ABSTRACT

The subject of the research is the development and application of acoustic emission in the animal kingdom. The method focuses on *Apis mellifera* (honeybees), which represents a significant importance for the society. The honey bee is involved in the production of crop and livestock production. There were detected some intensive biological processes, which were deviated from the standard norms. It was the insertion of formic acid into the colony. The method of acoustic emission scans disconcerted colonies in the imminent vicinity. Sensors are located in the colony to register the intensity of agitation and to soothe the entire colony. The primary impulses are transmitted through the environment that is detected by the acoustic emission. The established methodology to check the status of the hives when you insert the media into the colony and the subsequent reaction of the colonies on the situation. Inserting formic acid has an effect on the dynamics of the colonies during subsequent development. The method of acoustic emissions is recorded impact of these effects on the colony.

Key words: honey bee, acoustic emission, formic acid

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INTRODUCTION

Bee hive or other versions of bee homes are artificially created by man, for breeding one colony. Ideal structure of the hive is very intricate. It is necessary to find a compromise between an easy access if the beekeepers for the maintenance of the hive and the vital needs of the bees that fill the space in the hive. The complexity of such an intention is documented by a wide range of different types of hives that can be found in both Czech and worldwide beekeeping communities.

Method AE detects and characterizes the development of the process. It is working with the goal of interception of "the acoustic activity, which is emitted by processes occurring in the material such as plastic deformation, initiation and development of the disruption, locking and widening cracks, leaks of the media through the cracks etc. AE method detects, locates and evaluates the activities and infringement of defects being only in the course and can be described as passive. (Kopec, 2008)

Catch assembly consists of parts such as:

- Lid - requires sufficient thermal insulation
- High extension piece - of dimensions 37x30, which is introduced at a experiment. The entire area Extension you can insert up to 10 frames.
- Low extension piece - of dimensions 37x15, which is introduced at a experiment.
- Hive bottom - has a low subject, ie., The height of the hive bottom respectively. clearance between the bottom and the bottom edge of the frames is 3 cm or less.
- on the front bottom edge of the bottom is apparent overlap areas outside the boundaries of the hive plan. Area flyer bears. Facilitates bees "start" and "stop". Over the entire width of sheet respectively. front wall of the bottom of the slot. It is called cesium; bee "main entrance" to the hive.
- the position of the frames due to cesium distinguish the cold storage longitudinal and transverse structure to warm the building. In the experiment, the frames found on a cold building.

MATERIAL AND METHODS

Beehive contained 19 frames with dimensions 37 cm x 30. The sensors were placed on a glass plate, which was placed at the middle of broods. The sensor was associated with 35 dB preamp. The contact surface was applied acoustic for better acoustic coupling. The actual sensor was fixed by fixing rubber and the entire board was hung in the hive between the frames. For better signal transmission between the colonies and the sensor was removed by a bezel. This coupling medium consists mainly of beeswax, which was chosen for reasons of hygiene. (TLAČBABA A KOL., 2013)

Fig. 1 Sensor locations

Do hive assembly is inserted glass plate, on which were placed two sensors. One sensor is placed on top of the glass plate, which intervened to another extension. A second sensor was inserted into the bottom edge of the glass plate that was at the bottom of the first extension. The first part was measured normal activity in the colony. The following day, inserting carrier Mitegone which will wearer formic acid. The setup was left out of the previous measurements, where the gain of the preamplifier 45 dB 35 dB . On the sensor was applied silicone glue, due to aggressive environment that is called acid. The sensors were attached fusing rubber, which allows a fixed contact surface sensor. The sensors were inserted through the eyelet, which is designed for ventilation. Glass plate, which is located in the center of the colonies, will guarantee uniform transmission signals to be transmitted at a colony of spreading of acid. Measurement is focused on reactions in the colony and its subsequent reaction behavior when exposed to formic acid. The generated concentration of formic acid is 65%. At this concentration there is an ideal concentration for the treatment of species investigated.

In the initial experiment measured the normal state in the colony, which was analyzed. In the colonies were placed two sensors that were recorded in detail the events that take place in the colony in the whole area.

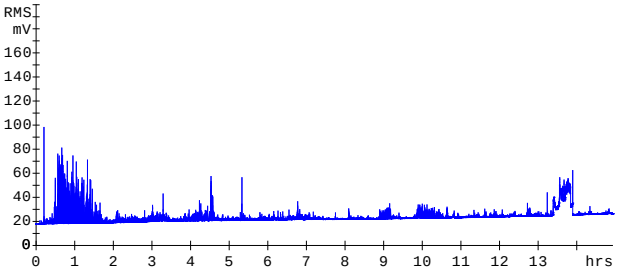

Fig. 2 RMS normal condition

The picture recording RMS normal activity colonies that initially run exhibits ventilation activity that is used to steer the climate in the environment of the hive. The normal condition the colony should be compared with the natural biological processes colonies that run without operator intervention. The sensor was placed between the brood frames, where there was a large group of bees that number of impulses transmitted by equipment XEDO recorded.

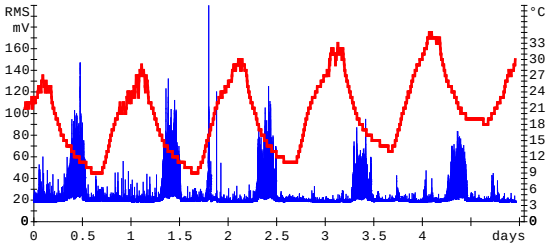

Fig. 3 RMS with intermediate acid

When you insert media formic acid leads to an increased concentration of acid in the hive environment and the aggressive environment affects disease or mite, which is located in the hive. The influence of aggressive environment acts on the colony, which is thus exposed to the intervention of stress, which is a manifestation of a kind of humming and unrest across the hive environment. Acoustic emission analyzes the extent of disruption and attack the colony. With the increased evaporation and subsequent reaction of the acid, which is reflected in the increased activity of RMS, which is recorded and then analyzed to capture specific conditions and processes through which passes the colony.

RESULT AND DISCUSSION

The experiment was carried out due to deepening experience with the application of formic acid. Support measuring system Dakel XEDO and acoustic emission method differences were found in the behavior of the colony when applying acid to the environment colonies. The issue of when inserting media into the hive, the technique was focused on acoustic emission, which scans impulses that spread material. When analyzing signals from sensors which were attached to a glass plate between amniotic frames. Subsequent evaluation of the different information that is spread in the environment of the hive between the exposed samples. Verifiability of experiments that supported the theory of acoustic emission for increased colony when you insert media is

undeniable. Clear benefit in analyzing biological processes and the subsequent reaction of the intermediate acid. AE system was used to investigate the use of this method, a pilot methodology for capturing animal species such as the honey bee , the administration of the drugs .

CONCLUSIONS

Upset colony, which was caused when inserted into the evaporator Mitegon environment hive, when this type of acid reacted more experimental bees in the hive, and it subsequently increased expression of excitement that was recorded. Exclusively acoustic emission, which was used with a suitable methodology for setting and recorded the activity of colonies on a glass plate. Glass plate impulses transmitted from individual colonies that have shown significant differences between both samples. Total RMS samples are very different from each other on the reaction of acid insertion. General view of the insertion of formic acid in the hive environment is an increased activity of the colony, which manifests enhanced cleaning soil and intensive ventilation, which was recorded in the third Fig. Finally, it is an effort to encourage the use of application of formic acid, which, when properly handled is beneficial for the treatment of hives.

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