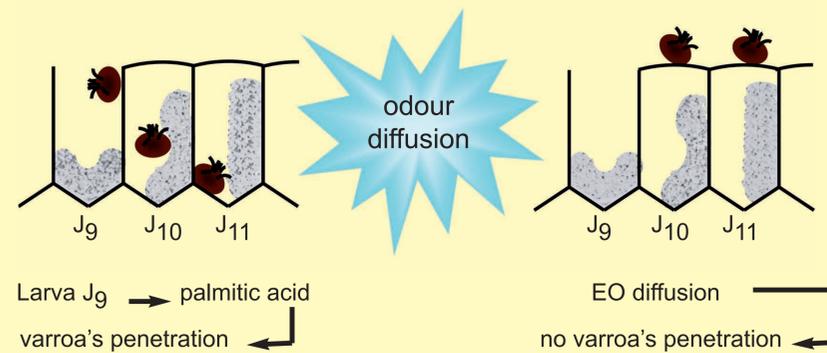


Control of varroa population in honeybee colonies by olfactive confusion using essential oils.

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Fig1 : Experiment principle



Varroa destructor is a parasite of the grown-up honeybee which gets into the units of the brood before its operculation. The perception of smells emitted by larvae determines its entrance to alveoli, specific odours to every stage of the embryonic development.

The diffusion of essential oils having a composition close to secretions of the glands of Nasanov by microporous supports induces a phenomenon of olfactive confusion which stops its growth. This method is applied to colonies of honeybees during the spring development.

Tools and méthode

During the spring development, two groups of Honeybees colonies are exposed or not to essential oils diffusion. At the end of the period, a control of varroa's population is done through acid formic application (concentrated at 60%).

Description of the experiment

The experiment was conducted from the beginning of February to end of April 2009 depending on areas. Four apiaries are part of the experiment, one in the Gard region and three in the Auvergne Region.

In each apiary, 10 to 20 beehives are selected with the same number of brood frames, generally 2, and with queens of the same age. The implementation of porous tablets impregnated by 3 g of natural and chemo typed essential oil (code B06AM1) is done during the first visit on half of the selected beehives. The other half will serve as sample test. On each experimental beehive, 4 tablets are laid down framing the brood (photos 1,2 & 3).

At the end of the 6 weeks period, each colony is treated with formic acid at 60%, 30ml per beehive, two times, spaced out of 48 hours.

Varroa mites are collected on greasy papers that have been previously laid down on the pierced floor of the hive (photos 4,5 & 6).

Studies have been realized on two types of apiaries:

- 3 apiaries using conventional methods: autumn nourishment with simple syrup and thymol treatments.
- 1 apiary using alternative methods : autumn nourishment with syrup enriched with essential oil (Thymus Vulgaris Thymol) and oligo-elements and treatments with B06AM1 tablets during autumn and winter.

Essential oils and porous tablets



Photo 1 : EO B06AM1



Photo 2 : Porous tablets



Photo 3 : In the beehive

Varroa mites counting



Photo 4 : Formic acid sheet

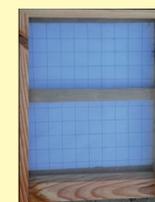


Photo 5 : Pierced floor



Photo 6 : Varroa mites fall

Results

Conventional method apiaries		Formic acid I	Formic acid II
Treated sample	Number of Varroa mites per hive	104	50
Untreated sample	Number of Varroa mites per hive	128	83
Alternative method apiary		Formic acid I	Formic acid II
Treated sample	Number of Varroa mites per hive	2	2
Untreated sample	Number of Varroa mites per hive	4	2

Illustration of the varroas mite fall compared to bee fall



Fig. 1 : Estimated evolution of the honey bee population in the beehive



Fig. 2 : Estimated evolution of the varroa mite population in the beehive

n1 = Conventional method apiary untreated sample
n2 = Conventional method apiary treated sample
n3 et 4 = Alternative method apiary untreated sample and treated sample

Discussion

In the conventional method apiaries, the decrease of Varroa population is about of 30% during the colony development period. In the alternative method apiaries, the Varroa population seems to be insignificant.

Our preliminary results show that a prolonged diffusion of essential oils appears to eliminate the varroa mites population while possessing low toxicity. Moreover these essential oils are part of the EU Annexe II of the substances without M.L.R.

Other actions, like the more coherent bee behaviour or the decrease of swarming seem to demonstrate the importance of olfactive message in the beehives.

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