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► To cite this version:

Yves Le Conte. Honey bees surviving Varroa destructor. infestations in the world: Lessons we can take. 5th International Organic Beekeeping Conference, Mar 2019, Hohenheim, Germany. hal-02274485

HAL Id: hal-02274485

<https://hal.science/hal-02274485>

Submitted on 5 Jun 2020

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Honey bees surviving *Varroa destructor* infestations in the world: Lessons we can take

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Abstract

When *Varroa destructor* invaded France in 1982, feral colonies disappeared destroyed by the mite. In 1994, few feral colonies could be observed back in different places. An experiment was designed to look at natural selection and survival of those colonies. Since they were still alive in 1999, we evaluated the surviving of other varroa untreated honey bee colonies. We collected about 70 colonies which were varroa untreated since at least 3 years from different places in France. Those colonies survived about 8 years to the mite, some of them being untreated for 14 years. In Avignon, we studied the population dynamics of those bees compared to hybrid control susceptible bees and showed a significantly lower number of mites in the tolerant colonies.

Different hypothesis can explain this phenomenon. Honey bees could have become resistant to the mite. The mite could have evolved toward a less virulence to the bees. The bees could be more resistant to virus associated to the presence of the mite. Or a co-evolution between those actors in their typical biotopes could have been favoured. Beekeeping management could also explain it. The search of varroa resistance traits associated to this survival can be helpful for selecting honey bee against the mite. Chemical communication and genomics are interesting tools to understand this phenomenon and to select bees. Other honey bee populations have been naturally selected in different parts of the world. The mechanisms of this tolerance are partly known and will be discussed in the framework of selection and beekeeping.