

Ecological and Control Studies on Certain Diseases of Honeybee with Special Reference to Integrated Management of *Varroa* Mite

Thesis

Submitted in partial fulfillment of
the requirements for the degree of

Doctor of Philosophy
in Agricultural Science
(Economic Entomology)

By

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ABSTRACT

Ecological and control studies on certain honey bee diseases with special reference to integrated management of *Varroa* mite

The present work was conducted at Fayoum governorate for ٧ successive years to study and control certain important honeybee diseases (*Varroa*, chalkbrood, viral diseases and other infections). It was found that: The infestation with *Varroa* mite was high in winter and autumn and was low in spring and summer on brood and on adult worker bees. The number of dropped mites varied from season to another. There was highly negative correlation between these parameters and the areas of sealed worker brood. The presence of one mite category in infested cells was the most common, while the least was seven mites or more. The infestation with chalkbrood disease was relatively high in spring and autumn and was low in summer and winter. The number of dropped mummified larvae followed the same trend. Regarding viral diseases, sacbrood was the most common while the other tested diseases (acute bee paralysis and deformed wing) were less common. Parasitic mite syndrome was noticed in some tested colonies. For *Varroa* control, nine essential oils (spearmint, thyme, Eucalyptus, marjoram, cumin, garlic, basil, orange, geranium) and two essential oil fractions (menthol or eugenol) were tested separately, combined, in pollen supplement or in an IPM program with organic acids (formic and oxalic acids). Some tested materials (basil, geranium and eugenol) exhibited noticeable effects against *Varroa* while the others were less effective. Bee mortality and reduced brood area were observed in some treatments compared to untreated colonies. For chalkbrood control, clove (powder or oil) basil, geranium and marigold oils were very effective as antifungal agents (in vitro). Geranium, eugenol, basil oils were effective (in vivo). Bee mortality was observed also after applying these materials, but in limited levels.

Key Words: Honeybee - *Varroa* mite - Chalkbrood disease – Viral diseases - Ecology - Infestation - Population dynamics -Essential oils - Organic acids - Integrated Pest Management (IPM).