MANAGEMENT OF VARROA MITE (*Varroa destructor*) ON HONEY BEE (*Apis mellifera*) IN BEE HOUSE AND OUT DOOR APIARY IN EGYPT

By

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B.Sc. Agric. Sci. (Plant Pathology), Fac. Agric., Cairo Univ., 2011

THESIS

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APPROVAL SHEET

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Title of Thesis: Management of Varroa Mite (*Varroa destructor*) on Honey Bee (*Apis mellifera*) in Bee House and Out Door Apiary in Egypt
Supervisors: Dr. Ayman Mohamed Hefny Mabrouk
Dr. Sally Farouk Mohamed Allam
Department: Zoology and Agricultural Nematology
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ABSTRACT

Varroa mites have been considered a problem for beekeeping for about 40 years. Mint oil, Eucalyptus oil, lemon juice and to concentration from the extract of propolis alcohol prepared in carton strips saturated with aforementioned compounds with known concentrations hanged in the middle of Carnica bees at Aga county, Dakahlia governorate for 12 weeks. The population dynamic of the varroa mite on the brood and the adults of honey bee was significantly differed in the inspected months .In addition, the peak of infestation with varroa mite was occurred during September of each year of 2013 and 2014, on brood and on adult bee then gradually decreased until November of both years. In addition, the average of the total count of varroa mite on brood and adult bee was greatly increased during 2014/2015, than during 2013/2014. The importance of beehouse on overcome the environmental changes that effect on the population of varroa mite and bees activity either for collecting nectar or pollinating the crops in addition to preservation bee queens and brood in the time of the high arising of the degrees of temperature or frozen periods that effect of the fertility of queen and energetic brood. As, beehouse could be used in the protected houses that need bees for pollinating the crops. Furthermore, protect bees from the harmful effect of the different pesticides that can effect on bees in the ordinary fields and protect bee colonies from the interring the infected foreign bees with different diseases to the apiary, in addition to, avoiding the accumulation of and carbon dioxide to hives due to closing the hives during spraying the pesticides near the apiary. The three types, *i.e.* saturated carton paper, feeding and spraying with Eucalyptus oil revealed that the three types were safe to honey bee. Also, mint oil was safe, especially when used as feeding and saturated carton paper. Saturated carton paper with formic acid was the most safety method followed by feeding on it then as spray. Oxalic acid showed a harmful effect, Both Eucalyptus and sulfur were safe on honey bee when the three method of using were used. In general, the treatment with 65 % formic acid recorded the highest the rate of efficacy for the tested treatments followed by the two acaricides Mafrik and Apistan then Eucalyptus oil. There were significant differences among the eight treatments of Apiguard, formic acid, and sulfur on the number of dead varroa mite. This result indicated the importance of the eight treatments, because the data were significantly differed from one treatment to another. The number of dead mites on white cardboard was higher than that found on brood and adult bees due to using Apiguard, formic acid and micronized sulfur for management the varroa mite, respectively. The tested products ,i.e. Eucalyptus oil , lemon juice , mint oil and propolis 10 and 20 % as well as the two acaricides Apistan and Mafrik significantly increased the number of fallen varroa mite during September, October and November on the paper sheets compared with the control.

Key words: Honeybee, varroa mite, management, indoor and outdoor apiaries, formic acid, micronized sulfur, lemon jucise, propolis and plant oils**.**

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CONTENTS

INTRODUCTION

The Varroa mite (*Varroa destructor* Anderson and Trueman) is a major pest of honey bees (*Apis mellifera* L.) that has caused colony losses throughout the world (De Jong *et al.*, 1982; Finley *et al.*, 1996; Allam and Zakaria, 2009; Rosenkranz *et al.*, 2010; and Ellis and Nalen, 2016). Varroa is an ectoparasite that feeds on developing brood and adults. Colonies infested with varroa usually die within 2–3 years if left untreated. Varroa harm bees by parasitizing worker and drone brood causing a shortening of adult lifespans (Rosenkranz *et al*., 2010). Short-lived adults impact the demographics of the colony population and over time can cause colonies to perish (De Grandi-Hoffman and Curry, 2004). Varroa also transmit many types of virus during feeding causing further harm to colonies (Bowen-Walker *et al*.,1999 ; Shen *et al.*, 2005 and Zaki and Allam, 2012).

Honeybees are the most important insects that have benefited mankind for medicinal and nutritional purposes for thousands of years. Honeybees are of great economic importance to agriculture not only for honey production, but also for crop pollination. The ectoparasitic mite *V. destructor* (Anderson and Trueman, 2000) is considered a severe pest for honey bees causing serious losses to the beekeepers (De Jong *et al*., 1982). The most beneficial of all honey bees insect species (*Apis* spp.) are perhaps due to produce honey, royal jelly, pollen, propelis as well as for crop pollination. Honeybees products are well known possess great value for their use in the pharmaceuticals, food production and other industrial products (Wakhal *et al*., 1999).