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Use of the Entomopathogenic Fungus, *Beauveria bassiana* for the Biological Control of the Red Palm Weevil, *Rhynchophorus ferrugineus* Olivier

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ABSTRACT

The red palm weevil, *Rhynchophorus ferrugineus* Olivier is the major destructive insect pest of date palm trees in Egypt as well as Middle East. Dependence on chemical control constitutes a major constrain to develop an IPM strategy, because of resistance problems, disruptive effects on natural control of secondary pests and pesticide residue on fruits. Therefore, an entomopathogenic fungus constitutes interesting alternative tactic for changing pest status. Indigenous isolate of the fungus, *Beauveria bassiana*, isolated from red palm weevil cadaver was evaluated. Field application was conducted with the fungus against the red palm weevil at Elkassasin, Ismailia Governorate, Egypt through 2007 – 2008. Three methods were carried out: (1) injection of *B. bassiana* in naturally infested palm trees. The success of the treatment was up 90 %, 2) periodical dusting application of fungal spores on palm trees in March and September. A reduction of palm trees infestation following field application was noticed and 3) release of contaminated males of red palm weevil with fungal spores. These methods proved considerable reduction in the palm weevil population. The results suggest that fungus *B. bassiana* is a promising agent for use as bio-insecticide to control the red palm weevil.

Key words: Red palm weevil, *Rhynchophorus ferrugineus*, entomopathogenic fungus *Beauveria bassiana*.

INTRODUCTION

Red palm weevil, *Rhynchophorus ferrugineus* Olive. (Coleoptera: Curculionidae) is a destructive insect pest of palm trees. It invaded Egypt in 1992 (Cox, 1993) where it is now causing severe damage to date palm, *Phoenix dactylifera* L. *R. ferrugineus* can breed in a wide range of climates, and the larvae feed protected within their host palm (Wattanapongsiri, 1966). The weevil is able to complete several generations in a year (Avand Faghih, 1996), frequently, several generations can pass in the same host tree before the tree collapses. Red palm weevil proved three generations a year in Egypt, the first in Marsh - April, the second in June-July and the third in September-October (Biological control of red palm weevil project, Arab Organization of Agricultural Development in Egypt, unpublished data).

Crowded date palms offshoots are considered preferable breeding sites for the red palm weevil which are very hard to examine and control. Also, *R. ferruginous* is a strong flyer (Murphy and Briscoe, 1999). In addition, in Egypt, the bulk and quick movement of the date palm offshoots as planting material has led to the rapid spread of the pest (Abraham *et al.*, 1998). All these factors with absence of natural enemies contribute to the weevils' ability to colonize and breed at new sites and for its population to reach outbreak levels. Present control measures are largely based on insecticidal applications through injection into infested palm trees and regular spraying of palms in infested area (Oehlschlager, 1996 and El Ezaby, 1997). However, there are now deep concerns about environmental pollution and health risks associated with use of chemical insecticides. The entomopathogenic fungus, *Beauveria bassiana* (Balsamo) Vuillemin has gained considerable attention as biological control agent for weevils and other agriculture pests (El Sufty and Borei, 1987 and Meikle *et al*,. 2001). Fungi are especially important for controlling cryptic insects such as red palm weevil which are not accessible to its natural enemies. The use of entomopathogenic fungus *B. bassiana* against red palm weevil has been reviewed by Sewify and Fouad (2006).

Aim of the present work was to evaluate *B. bassiana* as a biocontrol agent for controlling the red palm weevil in Egypt.

MATERIALS AND METHODS

Pest species:

R. ferrugineus adults were obtained from the field at El–Kassasin, Ismailia Governorate, Egypt and kept at 29 °C, 60-70% R.H and 14h photoperiod. The weevils were transferred to plastic boxes containing shredded sugarcane stem for egg-laying. Newly, hatched larvae were transferred to plastic cups provided with a layer of semi artificial diet (Rahalker *et al.*, 1978). The full grown larvae were placed in plastic boxes (20 larvae/box) containing some of the palm bark fibers to pupate. Emerged adults were collected and kept in plastic containers provided with shredded sugarcane stem for feeding.