

### ***Abstract***

Among active insect pests on the palm trees, palm weevil *Rhynchophorus ferrugineus* as a domestic quarantine pest causes the irreparable damages to the trees, and so far its management has not been efficiently conducted. In this study, the lethal effects of garlic and eucalyptus essential oil as well as their side effects on the activity of detoxifying enzymes of *Rhynchophorus ferrugineus* larvae were examined. The insects were collected from the infected palm trees in Saravan (Sistan and Baluchistan, Iran) and were stored in the plastic containers with the dimension of  $7 \times 14 \times 20 \text{ cm}^3$  at  $25^\circ\text{C}$ , 60% R.H. and 12:12 h photoperiod. The essential oil of garlic and eucalyptus from local plant species was extracted using a Clevenger apparatus and then their toxicity was assayed on the second larval instar of *R. ferrugineus*. Following by the bioassay tests,  $\text{LC}_{25}$  values for garlic and eucalyptus essential oil and Imidacloprid (as control treatment) were determined as 0.92, 1.24, and 12.09%, respectively, while  $\text{LC}_{50}$  values for these compounds were calculated as 2.36, 3.34 and 25.10%, respectively. Then, the effects of these concentrations ( $\text{LC}_{25}$ ,  $\text{LC}_{50}$ ) on the activity of detoxifying enzymes (esterase, glutathion S-transferase and gamma glutamyltransferase) were evaluated at three time intervals (6, 12 and 24 hours after the treatment). The results of the present study showed an increase in the activities of esterase, glutathion S-transferase and gamma glutamyltransferase in the treated larvae of *R. ferrugineus*. According to the results, garlic essential oil was more effective than eucalyptus essential oil on the mortality rate of the larvae and the activity of detoxifying enzymes. In addition a significant decrease was observed on the larval protein content affected by both essential oil treatments. The studied essential oils showed the potential ability for the pest management program, therefore by performing the additional experiments in the future, these compounds could be used as alternative chemical and artificial compounds for the proper use in the control of *R. ferrugineus*.

**Key words:** *Rhynchophorus ferrugineus*, Biopesticides, detoxifying, Physiology



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**Effect of garlic and eucalyptus essential oil  
on some biochemical parameters of  
*Rhynchophorus ferrugineus* Olivier larva  
(Coleoptera: Curculionidae)**

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