Evaluation of the efficacy of two the entomopathogenic nematodes Heterorhabditis bacteriophora and Steinernema carpocapsae for biocontrol of the leopard moth borer Zeuzera pyrina L. (Lepidoptera: Cossidae) larvae under laboratory conditions

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The objective of this study was to evaluate the biological traits of the entomopathogenic nematodes (EPNs), Steinernema carpocapsae and Heterorhabditis bacteriophora, against the larvae of the leopard moth, Zeuzera pyrina L. (Lepidoptera: Cossidae) the serious pest of walnut trees in Iran. Main purposes were pathogenicity assay in plate and branch, relationship between host body size and susceptibility to EPNs, reproduction and penetration potential as well as foraging behavior of EPNs versus Z. pyrina. Plate assay were performed using a range of EPN concentrations (5, 10, 20, 50 and 100 infective juveniles (Jls) per larva) in laboratory. The LC50 values indicated that S. carpocapsae (6.4 Jls larva⁻¹) was comparatively more virulent than H. bacteriophora (8.4 Jls larva⁻¹) against Z. pyrina larvae after 72 h. Both EPNs caused high insect mortality in branch experiments. The addressing relation between host body size and susceptibility of Z. pyrina larvae to EPNs showed significantly higher mortality rates in the larger larvae after exposing to S. carpocapsae. Both EPNs successfully penetrated and reproduced in the Z. pyrina larvae as well as in larvae of Galleria mellonella L. (Lepidoptera: Galleridae). The highest reproduction was recorded for H. bacteriophora at 8 Jls larva⁻¹ in Z. pyrina [551088±13150.9 Jls]. In a survey on foraging behavior, the proportional response of H. bacteriophora to the quarter with host-associated cues (feces and live larvae of Z. pyrina, as well as feces and live larvae of G. mellonella) was strongly higher than S. carpocapsae in petri dishes containing agar 1, 12 and 24 h after EPN application. These results indicate that EPNs could be ideal candidates for application against Z. pyrina larvae but due to the fact that EPNs effectiveness and persistence may vary in the field, further work is necessary to study the efficiency of these biocontrol agents for controlling Z. pyrina in field condition.

Key words: Steinernema carpocapsae, Heterorhabditis bacteriophora, Insect pathology, Zeuzera pyrina