

ENTOMOPATHOGENIC NEMATODES (RHABDITIDA) IN THE MEDITERRANEAN REGION OF TURKEY*

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Summary. The presence of naturally occurring entomopathogenic nematodes was surveyed in the Mediterranean Region of Turkey. Fiftytwo soil samples were taken, using the *Galleria* larva bait technique. Three soil samples were found positive. One sample contained *Steinernema carpocapsae* (Rhabditida: Steinernematidae) and two samples contained *Heterorhabditis bacteriophora* (Rhabditida: Heterorhabditidae). Morphometric characteristics are given. *S. carpocapsae* is recorded for the first time in the nematofauna of Turkey.

The economic importance of entomopathogenic nematodes of the families Steinernematidae and Heterorhabditidae is increasing because of their potential use in the biological control of different insect species. (Kaya *et al.*, 1993)

The first record of an entomopathogenic nematode in Turkey is that of *Steinernema feltiae* from Rize on the Black Sea coast (Özer *et al.*, 1995). Then *Heterorhabditis bacteriophora* was found in a population of sting bug, *Aelia rostrata* (Heteroptera: Pentatomidae) (Kepenekci *et al.*, 1999). *H. marelatus* occurred in the soil samples collected from different habitats of the Agriculture Faculty Campus of The Ankara University (Kepenekci and Susurluk, 2000).

The results of a survey carried out in Turkey are reported here.

MATERIALS AND METHODS

A total of 52 soil samples was collected from 15 locations of varied habitats (grass-land, woodland and cultivated land) in the Mediterranean region of Turkey (Fig. 1). At each sampling site five random subsamples of approximately 200 ml were collected to a depth of 10 cm over an area of 50 m². A representative sample of 250 ml was placed in a plastic box and five final instar larvae of *Galleria mellonella* L. (Lepidoptera: Galleriidae) were added. The boxes were incubated at 20-25 °C for five days. Then, dead larvae were transferred to a White trap (White, 1927) to extract the infective juveniles. All the samples were baited three times with *Galleria* to obtain the maximum number of positive soil samples. The infective juveniles collected ten days later were then checked for their pathogenicity to *Galleria* larvae.

Identification of nematodes to genus level was attempted by making temporary mounts of ten infective

juveniles for each isolate. Infective juveniles were killed and fixed in 4% hot formaldehyde. Fixed nematodes were transferred to anhydrous glycerine by Seinhorst's (1959) rapid method as modified by De Grisse (1969). Permanent slides were prepared. All measurements were made using a drawing tube attached to the light microscope.

RESULTS AND DISCUSSION

Entomopathogenic nematodes were present in three samples. They were *Heterorhabditis bacteriophora* Poinar, 1976 (Rhabditida: Heterorhabditidae) in two samples and *Steinernema carpocapsae* (Weiser, 1965) Wouts, Maracek, Gerdin *et* Bedding, 1982 (Rhabditida: Steinernematidae). *S. carpocapsae* is recorded for the first time in the nematofauna of Turkey.

All the isolated populations multiplied on *G. mellonella* larvae confirming their entomopathogenic nature.

Morphometric characters of the populations are given in Table I. All specimens were characterized by body length less than 1 mm. In *S. carpocapsae*, mouth and anus were closed; pharynx and intestine were collapsed; the excretory pore was anterior to the nerve ring; symbiotic bacteria were present at the base of the pharyngeal bulb.

In *H. bacteriophora* the third stage infective juvenile was inside the second stage cuticle, which showed a number of longitudinal ridges; head possessed a small protection on dorsal side; the excretory pore was posterior to the nerve ring; cells of symbiotic bacteria were found in the lumen of the intestine.

Morphometric identification to species level was carried out on all of the populations by comparison with the revised descriptions of Poinar (1976; 1986).

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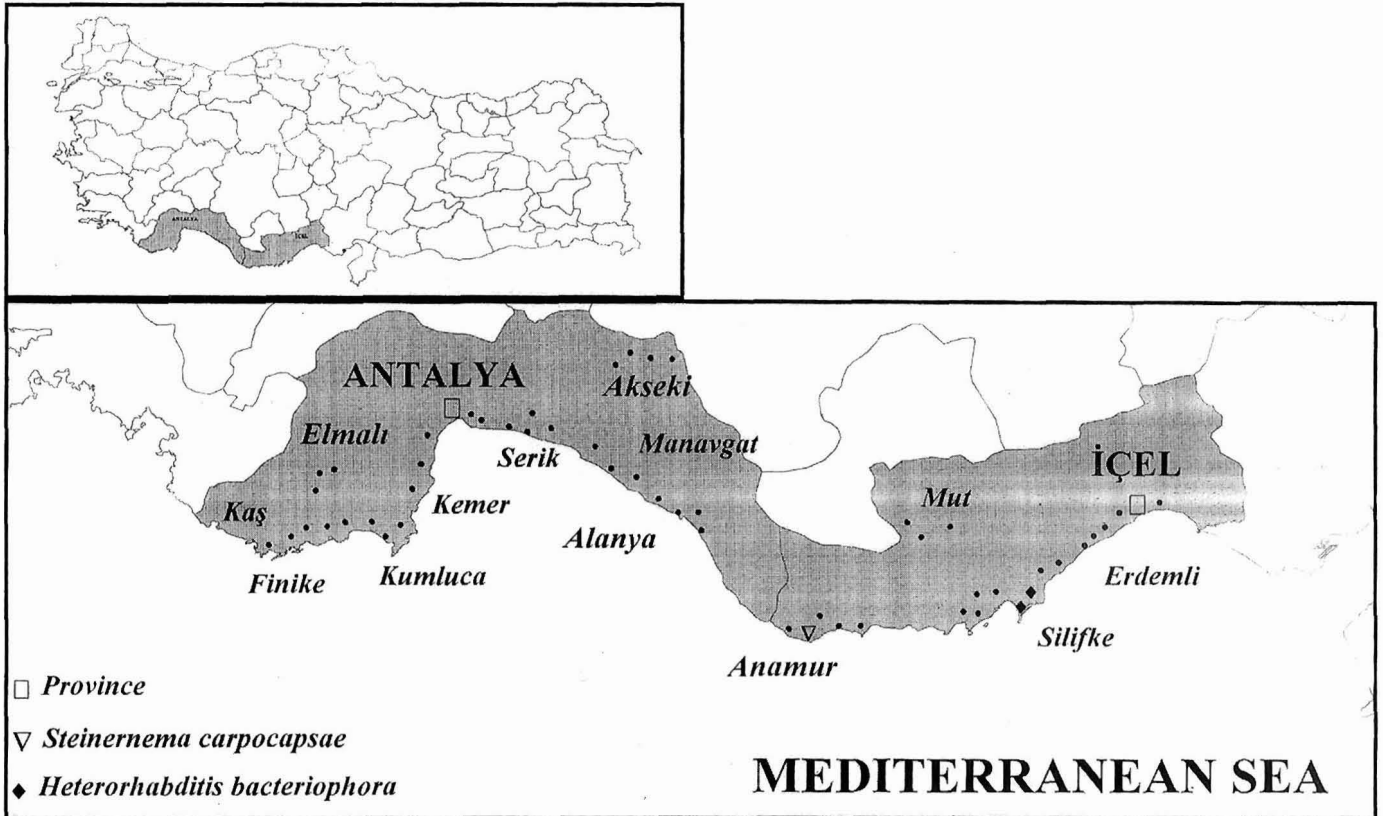


Fig. 1. Map of Turkey showing sampling sites in the Mediterranean Region.

All the entomopathogenic nematodes detected were in samples taken from woodlands.

Table I. Morphometrics of infective juveniles of populations of *Steinernema carpocapsae* and *Heterorhabditis bacteriophora* from Turkey.

Character	<i>S. carpocapsae</i>		<i>H. Bacteriophora</i>	
	Anamur	(after Poinar, 1986)	Silifke	(after Poinar, 1976)
Total length	543±7.46 (519-566)	558 (438-650)	552.7±9.1 (532-580)	588 (512-671)
Greatest width	23.3±0.35 (21.4-24.2)	25 (20-30)	24.4±1.1 (22.5-26.2)	23 (18-31)
Distance head to excretory pore	32.8±0.34 (31.6-33.5)	38 (30-56)	91.5±1.5 (88.6-94.5)	103 (87-110)
Distance head to nerve ring	73.7±1.6 (66.0-80.7)	85 (76-90)	84.4±7.4 (79.5-95.1)	85 (72-93)
Distance head to pharynx base	99.6±1.5 (93.0-104.2)	120 (103-190)	115.8±1.9 (110.0-122.6)	125 (100-139)
Tail length	50.9±0.94 (48.4-54.9)	53 (46-61)	92.5±3.2 (90.0-95.5)	98 (83-112)
Ratio a	23.4±0.26 (22.7-24.3)	21 (19-24)	34.2±2.1 (32.5-36.8)	25 (17-30)
Ratio b	5.4±0.05 (5.2-5.7)	4.4 (4.0-4.8)	5.0±0.02 (4.9-5.1)	4.5 (4.0-5.1)
Ratio c	10.6±0.12 (10.1-11.0)	10.0 (9.1-11.2)	6.7±0.8 (6.2-7.1)	6.2 (5.5-7.0)
Ratio d	0.32±0.007 (0.30-0.36)	0.26 (0.23-0.28)	0.88±0.04 (0.82-0.91)	0.84 (0.76-0.92)
Ratio e	0.64±0.0123 (0.60-0.69)	0.60 (0.54-0.66)	1.10±0.05 (1.05-118.8)	112 (103-130)
n	20	25	20	25

All the measurements are in micrometres, range in brackets.

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