



A SURVEY FOR ENTOMOPATHOGENIC NEMATODES IN CACHAR DISTRICT, ASSAM, INDIA

Sharma Rupak * Singha Baby** Sharma Gouri Dutt***

*Assam University, Department of Life Science & Bio-informatics, Silchar, Assam, India.

**Department of Zoology, G.C College, Silchar, Assam, India.

*** Bilaspur University, Chattishgarh, India.

Abstract

A random survey for the entomopathogenic nematodes conducted in different locations of Cachar district of Assam (n = 170) showed the occurrence of *Steinernema* sp. in 6 samples. During rabbi season, the occurrence of entomopathogenic nematodes was found more in comparison with other seasons. It was also noticed that during summer season rate of occurrence was found to be zero. The presence of *Steinernema* sp. is more frequent in loamy soil than clay and sandy soil but there is no relationship found to be existed between its occurrence with the cultivated crops types..

Introduction

Entomopathogenic nematodes have a wide distribution in the tropics, sub – tropics and temperate regions of the world. To date, the only places where these nematodes have not been found is Antarctica (Hominick 2002). Entomopathogenic nematodes (EPNs) are obligate lethal parasites of insect pests. They have been used as biological control agents of insect pests in a variety of crops (Gaugler & Kaya, 1990; Kaya & Gaugler, 1993). EPN comprises of two family Steinernematidae with two genera *Steinernema* and *Neosteinernema* and Heterorhabditidae with a single genus *Heterorhabditis*. Out of these three genera of EPNs, *Steinernema* have most wide distribution and their occurrences have been reported from both tropics and temperate regions. The third-stage juvenile (IJ) is the only free-living stage of these nematodes and is commonly found in soil and epigeal habitats by baiting with live insects (Bedding & Akhurst, 1975). Till today there is no report on the occurrence of entomopathogenic nematodes from this region of North East India, Cachar district Assam. This study was conducted to find out the distribution of this nematode in Cachar district of Assam.

Material and Methods

A total of 170 soil samples were collected between November 2011 to May 2012 from different areas of Cachar district to evaluate for the presence of insect pathogenic nematodes. Soil samples were collected from the fellow lands and standing crops of banana, rubber, fields, pineapple gardens, tea gardens, bamboo bushes etc. The samples were collected randomly at a depth of 10 to 15 cm upto 250 g and transported in polythene bags to the laboratory.

Propagation of isolates

The nematodes were propagated in 5th instars larvae of greater wax moth, *Galleria mellonella* at 28-30 C by baiting technique (Bedding & Akhurst, 1975). Four bait insect larvae were placed at the bottom of container filled with sampled soil, tightly plugged and incubated at 25± 1⁰C for near about 5 to 6 days. The insect larvae were found dead within 48 to 72 hours of day after infection (DAI). Two to three days after the infection dead larvae were dissected and examined for the presence of adult stages of nematodes and the remainder placed on white trap (white, 1927) from which emerging infective juvenile stages were collected for future use as well as for morphological analysis.

Seasonal activity of *Steinernema* sp. in field soil was studied by baiting 20 soil samples of 250gm collected from an infested site having loamy soil, at monthly intervals from October 2011 to August 2012.

Table 1: Distribution of entomopathogenic nematodes in soils of Cachar district

Sl. No	Locality	No. Of soil samples examines	EPN detected	Nematode species
1	Baskandi	11	NIL	-
2	Poilapool	13	NIL	-
3	Sonai	18	NIL	-
4	Kabuganj	14	NIL	-
5	Hmarkhawlin	15	NIL	-
6	Fokirtila	20	1	<i>Steinernema</i> sp.
7	Udharbond	10	NIL	-
8	Dorgakona	20	2	<i>Steinernema</i> sp.
9	Irongmara	22	2	<i>Steinernema</i> sp.
10	Silcorie	15	1	<i>Steinernema</i> sp.
11	Dakbanglow	12	NIL	-



Results and Discussion

An entomopathogenic nematode belonging to *Steinernema* sp. was found in 4 soil samples but *Heterorhabditis* was not detected. Out of this four soil samples, three soil samples are collected from rhizospheric soil of bamboo bushes and nearby places and only one from cabbage field. The probability of finding *Steinernema* sp. was greater in loamy soil than sandy and clay silt soil (**Table .2**) No apparent relationship was found between the *Steinernema* sp. and crop cultivated. Among the crop surveyed viz., potato field, cabbage field, rubber, banana, pineapple, bamboo bushes etc.

Table 2: Soil Types and Distribution of *Steinernema* sp.

Soil type	No. of soil samples examines	No. of positive samples
Sand	48	NIL
Clay & silt	59	1
Loamy	63	3

Soil type has been shown to influence the distribution of these nematodes with porous drained loamy soil with low organic matter (Akhrust, 1986). Previous workers have attributed the preference of these nematodes to loamy soil for soil aeration and pore size which facilitate survival and motility of these nematodes in a better manner than the sandy and clay soil. The third stage juvenile which is infective stage can survive for several months, so it shows that nematodes can survive without host insect.

The activity of nematodes during different months was assessed and it was found that *Steinernema* sp. was more intercepted during the months of October and November followed by January and February. It was also observed that during the month of June, July and August most of the study area was affected by heavy rainfall and the activity of nematodes was not found. It shows that the activities of nematodes are related to rainfall. It was also found that entomopathogenic nematodes are abundant in acidic soil (pH 5.6 – 5.9). Our study indicates that *Steinernema* sp. is more abundant in our locality during the rainy season. Probability of occurrence of nematodes was found to be very less in summer season and during the rainy season it was become zero. It was also found that occurrence of nematodes was higher in loamy soil and not dependent on specific host.

Acknowledgement: This investigation was supported by Department of Science and Technology, India. We would like to thank Nematology Division of IARI, New Delhi for their necessary and kind help during this investigative work.

References

1. Akhrust, R.J. 1986. Natural occurrence of insect pathogenic nematodes (Steinernematidae and Heterorhabditidae) in soil in Australia. J. Aust. ent. Soc. 25: 241 – 244.
2. Hominick W. H 2002. Biogeography. In R Gaugler, Entomopathogenic Nematology, CABI Publishing, New York, p. 115-143.
3. Hominick, W. M. & Briscoe, B.R.1990. Occurrence of entomopathogenic nematodes (Rhabditida: Steinernematida: Steinernematidae and Heterorhabditidae) in British soils. Parasitology 100: 295 -302.
4. Khuong B. Nguyen, Zdenek Mracek, & John M. Webster. (2006) Morphological and molecular characterization of a new isolate of *Steinernema feltiae* (Filipjev, 1934) from Vancouver, Canada, with morphometrical comparison with the topotype population from Russia.
5. Long K. Phan, Sergei A. Subbotin, Lieven Waeyenberge & Maurice Moens. (2005). A new entomopathogenic nematode, *Steinernema robustispiculum* n. sp. (Rhabditida: Steinernematidae), from Chumomray National Park in Vietnam. Systematic Parasitology 60: 23–32.
6. Lorena Uribe-Lorio, Marielos Mora, S. Patricia Stock. (2005). First record of entomopathogenic nematodes (Steinernematidae and Heterorhabditidae) in Costa Rica. Journal of Invertebrate Pathology 88: 226–231.
7. Mohammad Agazadeh, Davoud Mohammadi, and Naser Eivazian Kary. (2010). Distribution of entomopathogenic nematode of the family steinernematidae and heterorhabditidae in potato fields in North – west Iran (Nematoda: Rhabditida). Mun. Ent. Zool. Vol. 5, No. 2.
8. Nuchanart Tangchitsomkid and Suebsak Sontirat. (1998). Occurrence of Entomopathogenic Nematodes in Thailand. Kasetsart J. (Nat. Sci.) 32 : 347 – 354.
9. RAJKUMAR, ARUNAPARIHAR & SIDDIQUI, A.U (2002). Isolation of indigenous entomopathogenic nematodes from Udaipur. Indian Journal of Nematology 33: 171-196.
10. Sivakumar, C.V., Jayaraj, S. And Subramanian, S. 1988 Observation on a Indian Population of entomopathogenic nematode *Heterorhabditis bacteriophora* poiner, 1976. J. Biol. Cont. 2: 112 – 113.