Journal of Entomology and Zoology Studies

Available online at www.entomoljournal.com

E-ISSN: 2320-7078
P-ISSN: 2349-6800
JEZS 2019; 7(3): 549-550

Received: 08-03-2019
Accepted: 12-04-2019

Rimi Deuri
Assistant Professor, Faculty of Agricultural Sciences, Arunachal University of Studies, Namsai, Arunachal Pradesh, India

Anil Kumar Jena
Assistant Professor, Faculty of Agricultural Sciences, Arunachal University of Studies, Namsai, Arunachal Pradesh, India

Pranamika Sharma
Assistant Professor, Faculty of Agricultural Sciences, Arunachal University of Studies, Namsai, Arunachal Pradesh, India

Tara Bhuyan
Assistant Professor, Faculty of Agricultural Sciences, Arunachal University of Studies, Namsai, Arunachal Pradesh, India

Surya Prakash Singh
Assistant Professor, Faculty of Agricultural Sciences, Arunachal University of Studies, Namsai, Arunachal Pradesh, India

Toyir Nyori
Assistant Professor, Faculty of Agricultural Sciences, Arunachal University of Studies, Namsai, Arunachal Pradesh, India

Correspondence
Rimi Deuri
Assistant Professor, Faculty of Agricultural Sciences, Arunachal University of Studies, Namsai, Arunachal Pradesh, India

Occurrence of entomopathogenic nematodes in Assam

Rimi Deuri, Anil Kumar Jena, Pranamika Sharma, Tara Bhuyan, Surya Prakash Singh and Toyir Nyori

Abstract
The enormous use of pesticides is not only costly affair but also its residual effects are harmful for animals and human beings and to minimize the use of pesticides, it is required to find out such control measures that could reduce not only the application of this huge quantity of the pesticides but also could be eco-friendly. Entomopathogenic nematodes occur naturally in the environment as parasites of many insect larvae. Heterorhabditids and Steinernematids have mutualistic association with the bacteria of the genera *Photorhabdus* and *Xenorhabdus*, respectively which are lethal parasites of soil dwelling insects. The mass release of these nematodes provides an efficient and curative control of key insect pests in a wide range of crops. A large number of Entomopathogenic nematode *Steinernema* as well as *Heterorhabditis* nematodes have been reported by Nematologiest from this area from around the root zones different plants. This review aims to explore the occurrence of entomopathogenic nematode species in Assam.

Keywords: Assam, *Heterorhabditis* sp., *Steinernema* sp and *Lepidiota mansueta*

Introduction
Assam, situated between 28^0 18'N and 24 N latitude and 89º46′E and 97º4′E longitudes, is considered as one of the richest bio-diversity zones of the world. A large number of plant parasitic, Entomopathogenic nematodes and free living nematodes were reported from Assam. The large variability in EPN occurrence can also be increased due to insect host aggregation [1]. The state has fertile and loam to sandy loam soil and good vegetation cover. These conditions in addition to adequate rain that generally supported the survival and prevalence of host insects and ultimately high occurrence of EPNs especially in fruit crops due to shade and higher moisture under the big canopy of the tree.

Present Scenario of Entomopathogenic nematodes in Assam
Nematodes in genera *Steinernema* and *Heterorhabditis* are considered as potentially available biological control agents against insect pest. They are widely distributed infecting more than 250 different species of insects belonging to 10 orders [2]. Several species of entomopathogenic nematodes are successfully mass-produced and are commercially available to the farmers. These EPN are environmentally safe and there is no problem of insect resistance. entomopathogenic nematodes are exempted from the Environmental Protection Act (EPA) due to their safety to non -target organisms. Indigenous entomopathogenic nematodes may be more suitable for innundative release against local insect pests because of their adaptability to local climate [3]. The first entomopathogenic nematode was described by Steiner as *Aplectana kraussei* in 1923. Glaser and Fox in 1930 isolated *Neoaplectana glaseri* to control populations of the Japanese beetle that had invaded New Jersey.
Steinernema and *Heterorhabditis* have been isolated from Indian soil by various worker [4]. Indigenous isolates of entomopathogenic nematodes have been isolated from different Indian States or Union Territories, *viz*., Assam [5], Andaman & Nicobar Islands [6], Gujarat [7], Karnataka [8], Kerala [9], New Delhi [10], Tamil Nadu [11], Uttar Pradesh [12], and Uttaranchal [13]. So far, 11 species of *Steinernema* and 2 species of *Heterorhabditis* have been reported besides a number of unidentified isolates. Among the indigenous isolates, four have been described as a new species, *S. thermophilum* from New Delhi [14]. *H. bacteriophora* [15]. Identified *S. abbasi*, *S. tami* and an undescribed *Steinernema* sp *Steinernema* and *Heterorhabditis* from different habitat *viz*., fruit, ornamental, field and plantation crops of Assam and The percent of

occurrence of *Steinernema* and. *Heterorhabditis* were 19.73% and 19.72% respectively [16, 17] isolates *Heterorhabditis* and *Steinernema* from dead grubs of white grub (Lepidiota mansueta) endemic field of Majuli river Island, Assam, India and based on morphometric and cross- breeding studies, the *Heterorhabditis* isolates were identified as *H. bacteriophora.*

Conclusion

This indicates their potential role in the natural control of soil inhabiting insect pests which are of immense economic importance. Further studies on the characterization and host ranges of these EPN species are necessary to explore and ascertain their possible utilization in a biological control programme of this economically important pest.

Acknowledgement

We thank to Arunachal University of Studies for providing facilities in the Department of Agriculture, during this study.

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