



RESEARCH ARTICLE

A Checklist on nematode (Thelastomatoidea) parasites of *Gryllotalpa africana* (Orthoptera : Gryllotalpidea), recovered from the Meerut region

Jyoti Kumari* and Neelam Panwar

Abstract

The present study was carried out in the different localities of the Meerut region between September 2020 and November 2021 for the collection of entomopathogenic nematodes of *Gryllotalpa africana*. Host insect *G. africana* was found to be infected with 12 species belonging to 6 different genera included in 2 subfamilies of superfamily Thelastomatoidea. A list of all 12 species with information about their family, genus, type host and references, organized in a tabular form, has been provided. The main objective of this paper is to contribute to the knowledge about the *G. africana* nematodes and add some new information to the related areas.

Keywords: *Gryllotalpa*, Thelastomatoidea, Nematode, Oxyurida.

Introduction

The order Oxyurida includes two superfamilies viz., Oxyuroidea and Thelastomatidea comprising the parasitic nematodes with a wide range of vertebrate and invertebrate hosts. The superfamily Thelastomatoidea is a highly diverse assemblage of oxyurids occurring in cockroaches, diplopods, hydrophilid beetles, passalid beetles, several other coleopteran larvae, mole crickets, and, with few representative species documented, other arthropod hosts (Careno, 2014). Infestation of insects of different orders, with these pinworms, is quite common throughout India. Several species of parasitic nematodes have been described from the insect host, *Gryllotalpa africana* Beav. (mole cricket), a pest of many economically important crop plants across the country (Farooqui, 1968; Basir, 1942; Parveen *et al.* 1985;

Latheef, 1972; Singh *et al.* 1990). Parasitic nematodes harbor the gut (usually the hindgut) of *G. africana*. The total species of these entomopathogenic nematodes reported from *G. africana* so far can be classified under 12 genera, namely: *Basirella* Biswas and Chakravarty, 1963; *Binema* Travassos, 1925; *Cameronia* Basir, 1948; *Chitwoodiella* Basir, 1948; *Gryllophila* Basir, 1942; *Indiana* Chakravarty, 1943; *Isobinema* Rao, 1958; *Mirzaiella* Basir, 1942; *Mohibiella* Farooqui, 1970; *Pteronemella* Rao, 1958; *Hexasinghiella* (Rao 1958) Ceccolini and Cianferoni, 2021 and *Furrinema* Sanjoy and Gambhir, 2020.

In the present study, Oxyurid nematodes belonging to 6 genera, viz., *Binema*, *Cameronia*, *Chitwoodiella*, *Gryllophila*, *Isobinema* and *Mirzaiella* were collected and identified from the Meerut region.

Materials and Method

For the present investigation, the host insects collected from different localities of district Meerut (33°25' to 34°01' N and 73°58' to 74°35' E), Uttar Pradesh, India, were brought to the laboratory in live condition in a plastic box. After careful examination, insect hosts were anesthetized with chloroform (Standard protocol) and dissected to remove the intestine, which was immediately teased out, mixed with 0.7% normal saline and screened under a stereoscopic binocular microscope for parasites (Standard protocol). Nematodes picked up with the help of glass dropper were subsequently killed and fixed in hot 70% alcohol. (Singh *et al.*, 2013). Nematode parasites recovered from the gut region of the insect host were examined for morphological characteristics,

¹Department of Zoology, Meerut College, Meerut, Uttar Pradesh, India

*Corresponding Author: Jyoti, Department of Zoology, Meerut College, Meerut, Uttar Pradesh, India, E-Mail: JyotiKumarii7793@gmail.com

How to cite this article: Jyoti, Panwar, N. (2023). A checklist on nematode (Thelastomat(O)idea) parasites of *Gryllotalpa africana* (Orthoptera: Gryll(O)talpidea) recovered from the Meerut region. The Scientific Temper, 14(2):269-272.

Doi: 10.58414/SCIENTIFICTEMPER.2023.14.2.02

Source of support: Nil

Conflict of interest: None.

and a total of 12 species belonging to 6 different genera of superfamily Thelastomatoidea were collected and identified.

Result

During this study, we recovered 12 species belonging to 6 different genera classified under two families: Thelastomatoidea and Travossinematidea. Four of the six genera (*Binema*, *Chitwoodiella*, *Isobinema*, and *Mirzaiella*) are members of the family Thelastomatoidea, while the other two genera (*Cameronia*, and *Gryllophila*) are members of the Travossinematidea. The major number of species recovered, belonging to the genus *Cameronia* and *Binema* with 4 (i.e., *C. biovata* Basir, 1948; *C. multiovata* Lebersperger, 1960; *C. triovata* Shah, 2007; and *C. meerutensis* Singh et al., 2014) and 3 (i.e., *B. korsakowi* (Sergiev, 1923) Basir, 1956; *B. ornata* Travassos, 1925 and *B. mirzaia* (Basir, 1942) Basir, 1956) species, respectively. Two species (*C. ovofilament* Basir, 1948 and *C. longicardia* Shah, 2008) were identified to belong to *Chitwoodiella*. From remaining three genera (*Isobinema*, *mirzaiella*, and *gryllophilla*) one species each i.e., *I. flagellocerca* Rao, 1958; *M. asiatica* Basir, 1942 and *G. skrjabini* (Sergiev, 1923) Basir, 1956, respectively, was recovered. A list of all 12 nematode species, summarized in a table, is provided here (Table 1). Five species viz., *C. biovata*, *C. multiovata*, *C. triovata*, *G. skrjabini*, and *C. longicardia*, represented with asterisk in Table 1, are recovered for the first time from the Meerut region.

Discussion

The literature on the nematode parasites of *G. africana* from the Meerut region is moderate with few reports. However, this contributes significantly to the knowledge of this nematode fauna, as many new species have been erected and described from this region in the last two decades. H.S. Singh was the pioneer to begin studying the nematode parasites of the *G. africana* from the Meerut region and publish his work (Singh, H. S., 2003) describing 6 new species (*Psilocephala gryllotalpae* (later synonymized with *cameronia gryllotalpae*), *Gryllophila basiri*, *Chitwoodiella asiatica*, *Isobinema jairajpurii*, *Mirzaiella meerutensis* and *B. atrophicaudata*) belonging to 6 different genera of *G. africana* nematode from this region. Later, two more species (*Cameronia meerutensis* (Singh et al., 2014a) and *Chitwoodiella. basiri* (Singh et al., 2014b)) were also described based on the morphological features from the Meerut region.

This region also provides the very first report of the molecular characteristics of some species of *G. africana* nematode, based on Cox1 of mitochondrial DNA and 18S of rRNA gene (Chaudhary et al., 2014; Singh et al., 2013; Singh et al., 2015). Records from Research articles and Thesis, (Malti 2003; Preveen Kumar 2004; Neetu Singh 2015.) retrieved from different online resources indicate that 5 (*C. biovata*, *C. multiovata*, *C. triovata*, *G. skrjabini*, *C. longicardia*) out of the 12 species mentioned in the present checklist are collected for the first time from this region. This suggests

Table 1: List of nematode species collected during the present study from the Meerut region

Superfamily	Family	Genus	Species	Type host	References	
Thelastomatoidea	Travossinematidae	# <i>Binema</i> Travassos, 1925	<i>B. ornata</i>	<i>Gryllotalpa hexadactyla</i>	Travassos, 1925	
			<i>B. mirzaia</i>	<i>G. africana</i>	(Basir, 1942) Basir, 1956	
			<i>B. korsakowi</i>	<i>G. africana</i>	(Sergiev, 1923) Basir, 1956	
			<i>C. ovofilament</i>	<i>G. africana</i>	Basir, 1948	
		<i>Chitwoodiella</i> Basir, 1948	<i>C. longicardia</i> *	<i>G. africana</i>	Shah, 2008	
			<i>Isobinema</i> Rao, 1958	<i>I. flagellocerca</i>	<i>G. africana</i>	Rao, 1958
		<i>Mirzaiella</i> Basir, 1942	<i>M. asiatica</i>	<i>G. africana</i>	Basir, 1942	
			<i>C. biovata</i> *	<i>G. africana</i>	Basir, 1948	
		Thelastomatidae	## <i>Cameronia</i> Basir, 1948	<i>C. multiovata</i> *	<i>G. africana</i>	Lebersperger, 1960
				<i>C. triovata</i> *	<i>G. africana</i>	Shah, 2007
	<i>C. meerutensis</i>		<i>G. africana</i>	Singh, et al., 2014		
		<i>Gryllophila</i> Basir, 1942	<i>G. skrjabini</i> *	<i>G. vulgaris</i>	(Sergiev, 1923) Basir, 1956	

#*Gryllocola* Basir, 1942 and *Trapicola* Basir, 1942 synonymized with *Binema* Travassos, 1925.

##*Psilocephala* Rao, 1958 synonymized with *Cameronia* Basir, 1948.

*Species recovered for the first time from this region.

that, although some attempts have been made to explore the species richness of the nematode parasite of *G. africana* from the Meerut region, the true diversity of this fauna is yet to be disclosed. Also, additional species can be obtained by enhancing the sampling from other unexplored localities.

During our study, several taxa could not be identified because morphological features sometimes create ambiguity and confusion about correct species identification. In addition, some species could not be recognized due to the lack of some crucial morphological traits. Immature specimens, for example, lack essential taxonomic identification traits, such as shape, size, and attachment of two or more eggs together, as in the case of Cameroonian species, making it difficult to accurately identify the species when no eggs are present. To clear up such confusion, molecular markers may be shown to be a potent differentiating tool for the accurate identification and validation of species.

Conclusion

This checklist offers a brief overview of the species recovered during the current investigation and contributes to the richness of the nematode parasite of *G. africana* from the Meerut region. This sort of checklist updates our knowledge about the diversity and taxonomic status of these species, as well as provides useful information for future studies in related areas, therefore should be provided on a regular basis.

Acknowledgments

University Grants Commission (U.G.C.), New Delhi, is sincerely acknowledged by the first author (Km. Jyoti) for financial support in the form of a fellowship (UGC Ref. no.: 191620000051) during this research work. The author is also thankful to the Head, Department of Zoology, Chaudhary Charan Singh University, Meerut for providing laboratory facilities.

We declare that there is no conflict of interest among us for the present work.

References

- Basir, M. A. (1942). Nematodes parasitic in *Gryllotalpa*. *Rec. Indian Mus.*, 44(1), 95-106.
- Basir, M. A. (1942). Nematodes parasitic in *Gryllotalpa*. *Records of the Indian Museum*, 44(1), 95-106.
- Basir, (1942) (Nematoda: Oxyuroidea) parasito de *Diloboderus abderus* Sturm. (Coleoptera: Scarabaeidae) de Argentina. *Acta Zool. Mex.*, 69: 117-120.
- Basir, M. A. (1948). *Cameronia biovata* gen. et sp. nov. (Thelastomatidae), a new nematode parasite of the mole cricket, *Gryllotalpa africana* Beauv. *Can. J. Res.*, 26: 201-203.
- Basir, M. A. (1956). Oxyuroid parasites of Arthropoda: A monographic study 1. Thelastomatidae 2. Oxyuridae. *Zoologica*, pp. 1-79, 13 plates.
- Biswas, P. K., and Chakravarty, G. K. (1963). The systematic studies of the zoo-parasitic oxyuroid nematodes. *Z. F. Parasitenkunde*, 23, 411-428.
- Chakravarty, G.K. (1943) On the nematode *Indiana gryllotalpae* gen. et sp. nov. from *Gryllotalpa* sp. *Current Science*, 12: 257-258.
- Carreno, R. A. (2014). The systematics and evolution of pinworms (Nematoda: Oxyurida: Thelastomatoidea) from invertebrates. *The Journal of Parasitology*, 100(5), 553-560.
- Chaudhary, A., Singh, N., and Singh, H. S. (2014). Molecular characterization of two insect nematode species (Oxyurida: Thelastomatidae) using small subunit (18S) ribosomal DNA sequence and secondary-structure analyses. *J. helminthol*, 88(2), 219-229.
- Ceccolini, F. and Cianferoni, F. (2021). Two nomenclature changes in Thelastomatoidea (Nematoda: Chromadorea: Rhabditida). *Bonn zoological Bulletin* 70 (2): 359–360.
- Farooqui, M. N. (1968). On the male of *Binema mirzaia* Basir, 1940 from *Gryllotalpa africana*. *Rivista di Parassitologia*, 29(3), 203-204.
- Farooqui, M. N. (1970). Some known and new genera and species of the family Thelastomatidae Travassos, 1929. *Riv. Parasitol.*, 31: 195-214.
- Gaugler, R. (1988). Ecological considerations in the biological control of soil-inhabiting insects with entomopathogenic nematodes. *Agr. Ecosyst. Environ.* 24(1-3), 351-360.
- Latheef, M. A., and Seshadri, A. R. (1972). *Cruzinema brevicaudatum* n. sp. (Nematoda: Rhabditidae) and *Indiana coimboriensis* n. sp. (Nematoda: Pulchrocephalidae) from the mole-cricket, *Gryllotalpa africana* Beauvois, from India. *Canadian Journal of Zoology*, 50(11), 1457-1462.
- Leibersperger, E. (1960). Die Oxyuroidea der europäischen Arthropoden. *Parasit. Schrift.*, H. 11, 150 p., 39 f
- Malti (2014) Studies on morphology and cytotaxonomy of some insect parasitic nematodes of Meerut *PhD thesis*, Department of zoology, Chaudhary Charan Singh University, Meerut, India.
- Parveen, R., and Jairajpuri, D. S. (1985). *Psilocephala nisari* sp. n. (Nematoda: Thelastomatidae), a new nematode parasite of the mole cricket, *Gryllotalpa africana* from Aligarh, India. *Helminthologia*, 22(4), 263-266.
- Sergiev, P. G. (1923). Two new nematodes from the intestine of *Gryllotalpa vulgaris*. *Trudy Gosudarstvennogo Instituta Eksperimental noi Veterinarii*, 1: 183-190.
- Singh, H. S., and Singh, K. (1990). A new species of the genus *Mirzaiella* Basir, 1942. *Indian journal of parasitology*, 14(2), 201-202.
- Singh, H. S. (2003). On a known and some unknown species of nematode parasites of *Gryllotalpa africana*. *Journal of Experimental Zoology, India*, 6(2), 329-350.
- Shah, M. M. (2008). A new species of *Chitwoodiella* Basir, 1948 with first report on *Mirzaiella asiatica* Basir, 1942 (Nematoda: Travassosinematidae) from Manipur, *Acta Parasitol.*, 53: 145-152.
- Shah, M. M. (2007). Two new species of *Cameronia* Basir, 1948 (Oxyurida, Thelastomatoidea, Thelastomatidae) from Manipur, North-East India. *Acta Parasitol.* 52: 225-232.
- Shapiro-Ilan, D. I., Gouge, D. H., Piggott, S. J., and Fife, J. P. (2006). Application technology and environmental considerations for use of entomopathogenic nematodes in biological control. *Biological control*, 38(1), 124-133.
- Singh, N., Chaudhary, A., and Singh, H. S. (2013). Identification of two species of *Binema* Travassos, 1925 (Oxyurida: Travassosinematidae) based on morphological and sequence analysis of genomic (18S) and mitochondrial (Cox1) gene

- markers. *J Nem. Morph. Syst.*, 16(2), 173-180.
- Singh, P.K., Rastogi, P. and Singh, H.S. (2014a). A new species of *Cameronia* Basir, 1948 (oxyurida, thelastomatidae) from insect host *Gryllotalpa* sp. from Meerut region, India. *J Exp Zool India*. 17(1):289-298.
- Singh, P. K., Rastogi, P., and Singh, H. S. (2014b). Description of a new species of *Chitwoodiella* Basir 1948 (Nematoda: Travossasinematidae) from the insect host *Gryllotalpa* sp. from Meerut region, India, *J. Exp. Zool*, 17(1), 317-326.
- Singh, P.K. (2014) Studies on taxonomical morphological and bioecological aspects of some household and agriculture_ insect parasitic nematodes in district Meerut. *PhD thesis*, Department of zoology, Chaudhary Charan Singh University, Meerut, India.
- Singh, N. (2015) Taxonomy and morphology of nematode parasites of *Gryllotalpa africana* at Meerut. *PhD thesis*, Department of zoology, Chaudhary Charan Singh University, Meerut, India.
- Singh, N., Chaudhary, A., and Singh, H. S. (2015). Molecular phylogeny of nematodes (Oxyurida: Travassosinematidae) from Orthoptera (Gryllotalpidae) inferred by mitochondrial cytochrome c oxidase subunit 1 gene. *Bioinformation*, 11(7), 343.
- Shanjoy, L., Sambhir, R. K. (2019). A new hairy nematode found in mole cricket from loktak lake, Manipur. *UP J Zool.*, 40(4): 210-213.
- Travassos, L. (1925). Quelques nematodes du *Gryllotalpa*. *Compte Rendu Societe Biologie, Compte Rendu de l' Academie des Sciences, Paris*, 93 : 140-141. (added this new reference)