JETIR.ORG ISSN: 2349-5162 | ESTD Year : 2014 | Monthly Issue
JOURNAL OF EMERGING TECHNOLOGIES AND INNOVATIVE RESEARCH (JETIR)
An International Scholarly Open Access, Peer-reviewed, Refereed Journal

Influence of Habitat Heterogeneity on the Distribution of Polypheretima elongata (Perrier, 1872) in Amravati District

Pankajkumar G. Ingle [1] and Ramesh B. Bahadure [2]
[1,2] Department of Zoology,
Shri Vasantrao Naik Arts Commerce and Science college Dharni, Dist. Amravati.
Corresponding Author: pankajgingle3012@gmail.com, rameshbahadure531@gmail.com

Abstract : Earthworms play a vital role in maintaining soil structure and fertility, and their distribution is strongly influenced by habitat conditions. The present study documents the occurrence and habitat-wise distribution of the earthworm species *Polypheretima elongata* (Perrier, 1872) across seventeen different locations in Amravati District, Maharashtra. Field surveys were conducted between September 2024 and January 2025 covering cultivated lands, non-cultivated lands, and garden habitats. The species showed a wider occurrence in non-cultivated habitats, followed by cultivated agricultural fields, while garden habitats recorded limited presence. The findings highlight the influence of habitat heterogeneity on the spatial distribution of *P. elongata* and emphasize the importance of natural and less-disturbed habitats for sustaining earthworm populations in the region.

Keywords: Earthworms, habitat heterogeneity, *Polypheretima elongata*, distribution, Amravati District

1. Introduction

Earthworms are considered ecosystem engineers due to their significant contribution to soil aeration, organic matter decomposition, and nutrient cycling. Their distribution and abundance are closely linked to environmental factors such as soil type, moisture, organic matter content, and land-use patterns. Among the diverse earthworm fauna of India, *Polypheretima elongata* (Perrier, 1872) is an important megascolecid species commonly associated with agricultural and semi-natural habitats.

Amravati District, located in the Vidarbha region of Maharashtra, exhibits diverse land-use patterns including cultivated agricultural fields, non-cultivated lands, institutional campuses, and garden habitats. Despite this heterogeneity, systematic documentation of earthworm distribution in relation to habitat types remains limited. The present study aims to assess the influence of habitat heterogeneity on the distribution of *P. elongata* by recording its occurrence across multiple habitat types within Amravati District.

2. Materials and Methods

Study Area

The study was conducted at seventeen locations across Amravati District, Maharashtra. The selected sites represent different habitat categories, namely cultivated land, non-cultivated land, and garden habitat.

Collection and Identification

Earthworm samples were collected between September 2024 and January 2025 using manual hand-sorting methods. Sampling was carried out during early morning hours when soil moisture was favorable. Collected specimens were cleaned, preserved, and labeled with unique sample IDs. Identification of *Polypheretima elongata* was carried out based on standard morphological characters described in taxonomic keys.

Data Recording

For each sampling site, the date of collection, habitat type, location, and sample ID were recorded. Habitat classification was done based on land-use characteristics observed during field visits.

3. Results

The present investigation documented the occurrence of *Polypheretima elongata* (Perrier, 1872) from seventeen different locations across Amravati District during the study period extending from September 2024 to January 2025. The species was recorded across three distinct habitat types non-cultivated land, cultivated land, and garden habitat indicating its adaptability to varying land-use conditions.

Habitat-wise Distribution

Among the seventeen sampling sites, *P. elongata* showed a marked dominance in non-cultivated habitats. Out of the total records, eleven occurrences (64.7%) were from non-cultivated lands, five occurrences (29.4%) from cultivated agricultural lands, and one occurrence (5.9%) from garden habitat.

Non-cultivated sites such as Dharni, Anjangaon Surji, Pohara, Tivsa, Batkuli, Chandur Bazar, Chandur Railway, and Sant Gadge Baba University campus consistently supported the presence of *P. elongata*. These areas are generally characterized by minimal soil disturbance, natural vegetation cover, and accumulation of organic matter, which appear to provide favorable microhabitat conditions for the species.

Cultivated lands including Mhasona (Achalpur), Ner Pingalai (Morshi), Jarud (Warud), and Asegaon Purna also recorded the presence of *P. elongata*, suggesting that the species can tolerate agricultural practices to a certain extent. However, its relatively lower frequency in cultivated habitats indicates that intensive land management practices may influence its distribution.

Only one record was obtained from a garden habitat at Mojhari, indicating limited occurrence under managed ornamental landscapes, possibly due to frequent soil modification and lower organic residue accumulation.

Spatial Distribution Across Amravati District

The species exhibited a wide spatial distribution across different talukas and localities of Amravati District, including Dharni, Daryapur, Achalpur, Anjangaon Surji, Dhamangaon Railway, Chandur Railway, Tivsa, Morshi, Warud, Batkuli, and Chandur Bazar. The presence of *P. elongata* across geographically distant locations suggests that the species is well established throughout the district rather than being restricted to a particular ecological zone.

Multiple records from areas such as Morshi (Ner Pingalai and Shivaji Nagar) and Warud (Jarud and Rashtra Sant Colony) indicate localized clusters of occurrences, reflecting suitable habitat continuity within these regions.

Temporal Distribution

Temporal analysis of collection dates showed that the majority of records were obtained during October and November 2024, coinciding with the post-monsoon period. This period is characterized by optimal soil moisture and moderate temperatures, which are known to enhance earthworm surface activity and detectability. Fewer records were observed in late September and early January, suggesting seasonal influence on earthworm activity patterns.

The January 2025 record from Dharni indicates that *P. elongata* remains active during cooler months, provided favorable soil moisture conditions persist.

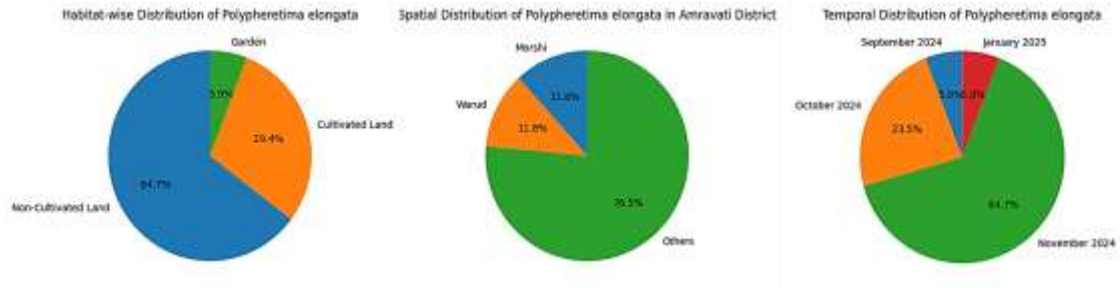

Fig: Showing various distribution patterns of *P. elongata*

Sr. No.	Date of collection	Habitat	Location of collection	Sample ID
1	4-Jan-25	Non Cultivated Land	Dharni, Dist. Amravati.	An8276/2
2	12-Oct-24	Non Cultivated Land	Yeoda, Daryapur, Dist. Amravati.	An8304/2
3	29-Sep-24	Cultivated Land	Mhasona, Achalpur, Dist. Amravati.	An8323/2
4	12-Oct-24	Non Cultivated Land	Anjangaon Surji, Dist. Amravati.	An8302/2
5	9-Nov-24	Non Cultivated Land	Dhamangaon Rly, Dist. Amravati.	An8275/2
6	9-Nov-24	Non Cultivated Land	Chandur Rly, Dist. Amravati.	An8334/2
7	9-Nov-24	Non Cultivated Land	Pohara, Dist. Amravati.	An8285/2
8	7-Nov-24	Non Cultivated Land	Tivsa, Dist. Amravati.	An8297/2
9	7-Nov-24	Cultivated Land	Ner Pingalai, Morshi, Dist. Amravati.	An8307/2
10	5-Nov-24	Non Cultivated Land	Shivaji Nagar/Morshi, Dist. Amravati.	An8326/2
11	7-Nov-24	Garden	Mojhari, Dist. Amravati.	An8295/2
12	5-Nov-24	Cultivated Land	Jarud, Warud, Dist. Amravati.	An8308/2
13	5-Nov-24	Non Cultivated Land	Warud, Rashtra Sant colony, Dist. Amravati.	An8288/2
14	14-Oct-24	Cultivated Land	Asegaon purna, Dist. Amravati.	An8303/2
15	6-Nov-24	Non Cultivated Land	Batkuli, Dist. Amravati.	An8273/2
16	7-Nov-24	Non Cultivated Land	Chandur Bazar, Dist. Amravati.	An8317/2
17	6-Nov-24	Non Cultivated Land	Sant Gadge Baba University, Dist. Amravati.	An8335/2

Table: Showing habitats and location of collection of earthworm *P. elongata*

Discussion

The dominance of *Polypheretima elongata* in non-cultivated lands suggests that stable soil conditions, higher organic matter, and reduced anthropogenic disturbance favor its distribution. Non-cultivated habitats often retain natural vegetation cover and leaf litter, which provide food resources and suitable microhabitats for earthworms.

The presence of *P. elongata* in cultivated lands indicates its tolerance to moderate disturbance and agricultural practices. However, lower frequency in cultivated habitats compared to non-cultivated lands may be attributed to soil tillage, use of agrochemicals, and seasonal drying of soils. The limited occurrence in garden habitat could be due to restricted sampling area or frequent soil manipulation.

Overall, habitat heterogeneity plays a significant role in shaping the distribution patterns of *P. elongata* in Amravati District. Similar observations have been reported in earlier studies where earthworm diversity and abundance were higher in natural and semi-natural habitats compared to intensively managed agricultural lands.

Conclusion

The present study provides baseline information on the distribution of *Polypheretima elongata* across diverse habitats in Amravati District. The species shows a preference for non-cultivated lands, followed by cultivated fields, highlighting the importance of habitat quality and land-use practices in influencing earthworm distribution. Conservation of non-cultivated and semi-natural habitats is essential for maintaining earthworm diversity and sustaining soil health in the region. Further studies incorporating soil physicochemical parameters and seasonal variations would provide deeper insights into habitat-species relationships.

Acknowledgement

The author gratefully acknowledges the support and guidance of academic mentors and colleagues during fieldwork and data compilation. Sincere thanks are extended to local farmers and residents of Amravati District for permitting sample collection. The author is also thankful to Supervisor, Principal and the Head of the Department of Zoology, Shri Vasantrao Naik Arts, Commerce and Science College, Dharni, Dist. Amravati,

References

Bhadauria, T., & Saxena, K. G. (2010). Role of earthworms in soil fertility maintenance through the production of biogenic structures. *Applied and Environmental Soil Science*, 2010, 1–7.

Bhattacharjee, G., & Chaudhuri, P. S. (2002). Earthworm communities in the rubber plantations of Tripura, India. *Tropical Ecology, 43*(1), 131–137.

Blakemore, R. J. (2006). *Cosmopolitan earthworms—An eco-taxonomic guide to the peregrine species of the world*. VermEcology.

Blakemore, R. J. (2012). *On the distribution of Indian earthworms*. Zoological Survey of India.

Brown, G. G., & Doube, B. M. (2004). Functional interactions between earthworms, microorganisms, organic matter, and plants. In C. A. Edwards (Ed.), *Earthworm ecology* (2nd ed., pp. 213–239). CRC Press.

Chaudhuri, P. S., Nath, S., & Paliwal, R. (2008). Impact of land use on earthworm diversity and abundance in tropical ecosystems. *Journal of Environmental Biology, 29*(5), 709–714.

Dash, M. C., & Senapati, B. K. (1980). Niche separation and species diversity in tropical earthworm communities. *Pedobiologia, 20*, 431–438.

Edwards, C. A., & Bohlen, P. J. (1996). *Biology and ecology of earthworms* (3rd ed.). Chapman & Hall.

Fragoso, C., Brown, G. G., Patrón, J. C., Blanchart, E., Lavelle, P., Pashanasi, B., Senapati, B. K., & Kumar, T. (1997). Agricultural intensification, soil biodiversity and agroecosystem function in the tropics: The role of earthworms. *Applied Soil Ecology, 6*(1), 17–35.

Julka, J. M. (1988). *The fauna of India and adjacent countries: Megadrile Oligochaeta (Earthworms)*. Zoological Survey of India.

Julka, J. M. (2008). Distribution of earthworms in different states of India. *Records of the Zoological Survey of India, Occasional Paper*, 285, 1–36.

Julka, J. M., & Paliwal, R. (2005). Distribution of earthworms in different agro-climatic regions of India. *Indian Journal of Ecology, 32*(2), 99–104.

Kale, R. D., & Karmegam, N. (2010). The role of earthworms in soil fertility and crop productivity. *Journal of Soil Biology and Ecology, 30*(2), 91–101.

Karmegam, N., Daniel, T., & Kathireswari, P. (1999). Earthworm populations and soil characteristics in agro-ecosystems of Tamil Nadu, India. *Journal of Soil Biology and Ecology, 19*(1), 1–6.

Lavelle, P. (1988). Earthworm activities and the soil system. *Biology and Fertility of Soils, 6*, 237–251.

Lavelle, P., & Spain, A. V. (2001). *Soil ecology*. Kluwer Academic Publishers.

Lavelle, P., Decaëns, T., Aubert, M., Barot, S., Blouin, M., Bureau, F., Margerie, P., Mora, P., & Rossi, J. P. (2006). Soil invertebrates and ecosystem services. *European Journal of Soil Biology, 42*, S3–S15.

Lee, K. E. (1985). *Earthworms: Their ecology and relationships with soils and land use*. Academic Press.

Paliwal, R., & Julka, J. M. (2005). Checklist of earthworms of Maharashtra, India. *Zoos' Print Journal, 20*(6), 1907–1912.

Senapati, B. K., & Dash, M. C. (1984). Population dynamics of earthworms in tropical soils in relation to moisture and temperature. *Pedobiologia, 26*, 263–273.

Suthar, S. (2009). Earthworm biodiversity in western Rajasthan, India: Distribution, abundance and diversity. *Tropical Ecology, 50*(2), 309–316.

Tripathi, G., & Bhardwaj, P. (2004). Comparative studies on biomass production, life cycles and composting efficiency of earthworms. *Bioresource Technology, 92*(3), 275–283.

Zicsi, A., & Csuzdi, C. (1991). Earthworm species, populations and community structures under different land use systems in India. *Pedobiologia, 35*, 83–91.