



Research Article

## DIVERSITY OF MILLIPEDES (ARTHROPODA : DIPLOPODA) IN SELECTED AGRICULTURAL LANDSCAPES OF ACHALPUR CITY, DISTRICT AMRAVATI, MAHARASHTRA, INDIA

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### ABSTRACT

The present study tried to explore the diversity of Millipedes fauna in Achalpur City, Amravati district of Maharashtra, India. This diversity study was done during pre-monsoon to monsoon season in 2021 for six months, by visiting different agricultural landscapes, by using handpicking method in and around the study area. A total four species of millipedes belonging to order Polydesmida and Spirobolida and four families namely Xystodesmidae, Trigonulidae, Paradoxosomatidae and Spirobolidae were recorded from the study area. Species namely *Harpaphe haydeniana* and *Orthomorpha coarctata* were found to be more abundant than other species.

**Keywords:** Diplopoda, Millipedes, Diversity, Spirobolidae, Achalpur.

### INTRODUCTION

The name "millipede" derives from the Latin root which means "thousand feet". Millipedes belong to Class Diplopoda, Subphylum Myriapoda of Phylum Arthropoda, which is the largest and highly diverse group of invertebrate animals. They are soil loving animals living on the ground, in shallow habitats, among the leaf-litters or in the soil. Millipede ranges from 2 to 280 mm in length, and can have about 11 to over 100 segments. Generally they are black or brown in colour, but few are brightly coloured species. Millipedes move slowly due to presence of short legs, which are helping them push their way through the soil and vegetative litter. They are seasonal animals, generally seen in monsoon season and rarely in summer and winter season, as they are commonly affected by environmental conditions specially change in temperature (Ashwini and Sridhar, 2006), and so are predominantly abundant in the tropical and sub-tropical regions of the world.

Most millipedes are detritivorous animals; feed on decaying plant matter, functioning as decomposers in the

ecosystem. A few species of millipedes are omnivorous or occasionally carnivorous, feeding on small invertebrates like earthworms, insects, snails etc. Many species of millipedes can also serve as biological indicators of environmental changes in ecosystem and improve the structure content of organic matter and nutrient elements of soil (Loranger Merciris *et al.*, 2007, Seeber *et al.*, 2008). Millipedes are functionally important in facilitating nutrient cycling through decomposition of plant debris, and also play a vital role in soil formation process useful to the plant or crops. Globally there are 12,642 species of millipedes belonging to 2,001 genera of 163 families in 16 orders. There are over 270 species occur in India belonging to 90 genera, 25 families and 11 orders (Golovatch and Wesener, 2016). Study on Indian millipedes begins with Linnaeus (1758). Major studies on Indian millipedes made by Pocock (1899a, 1899b) and Carl (1932) works on South Indian millipedes and published his results on the Indian species of Ploydesmoidea in which he described 41 new species and 23 new genera from India. Attems (1936) reported total 290 species from Indian Territory in its monograph Diplopoda of India, which includes 62 new species and 15

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new genera. Carl (1941) again added 15 new species to Indian millipede fauna.

Work on millipede fauna of Maharashtra was found to be limited. Choudhari *et al.*, (2014) reported 04 species of millipede belongs to 04 families from Northern Western Ghat of Maharashtra. Patil *et al.*, (2018) also reported 05 species belongs to 03 families from tropical or agricultural landscape of Rajgurunagar, Northern Western Ghat of Maharashtra. Recently Mane *et al.*, (2020) added one more species *Anoplodesmus saussurii* to the millipede's fauna of Maharashtra. Dash and Priyadarsini (2013) recorded three species of millipedes from Gujarat. Similar work was done by Alagesab and Ramanathan, (2013) and Chezhan and Prabakaran, (2016) in Tamil Nadu. Past study shows no consolidated account published on millipede fauna is known from this study area. So the main objective of this study is to provide the information about the diversity and distribution of millipede species in Achalpur City of Amravati district, Maharashtra, India.

**MATERIAL AND METHODS**

Achalpur city is a municipal council located in Amravati district of Maharashtra, India. The region Latitude is 21° 15' 26" North and Longitude is 77° 30' 31" East. The city is located in the lap of Satpuda range of hills in central India, hence rich in biodiversity. This region is well known for cotton, orange, sorghum, wheat, pulses, oilseeds crops. It has pleasant climate, with annual temperatures in the range of 24 to 33°C. The average rainfall in this region is 700-800 mm (27-31 inch) with daytime humidity 48%. The main rivers in this region are Sapan and Bicchhan, the tributaries of Chandrabhaga.

The study was carried out during the monsoon season in year 2021 for six months. Five different crop field areas were selected for study. We use handpicking method for the collection of millipedes. Samples can be taken from rotten woods, under stone, uppermost soil strata and all other kinds of plant debris. The photographs were taken to collected millipedes and then released them in their natural habitat. Finally the species were identified using various field guider and standard literature.

**RESULTS AND DISCUSSION**

In the present study total 04 different species of millipedes belongs to 04 genera of 04 families were recorded from the selected agricultural landscapes of Achalpur city, Amravati district of Maharashtra, India (Table 1). The following species of millipedes were identified from the study area. *Harpaphe haydeniana* (Wood, 1864): It is commonly known as yellow-spotted millipede. It belongs to order Polydesmida and family Xystodesmidae. The body is black in colour and both the sides with patches of yellow spots. It consists of approximately 15-20 segments, bearing a total of 30 (in case of males) or 31 (in case of females) pairs of legs. It reaches a length of 4-5 cm, width of 0.1 to 0.3 cm, and weight of 0.8 to 1.5 g. *Orthomorpha coarctata* (De Saussure, 1860): It belongs to order Polydesmida and family Paradoxosomatidae. The male are 14.5 to 20.5mm in length and female are 16.5 to 2.5 mm. The middle body portion is segmented, with longer gonopods. *Narceus americanus* (Palisot de Beauvois, 1817): It is commonly known as American giant millipede. It belongs to order Spirobolida and family Spirobolidae. It was found in maize farm near the Achalpur city. It was about 3 inches long, cylindrical and blackish brown in colour.

*Trigoniulus corallinus* (Gervais, 1842): It is commonly known as rusty millipede. It belongs to order Spirobolida and family Trigoniulidae. It is medium to large-sized millipede with brick red colour body. It grows up to 5cm in length and can often be found in bunch. During this survey it is noted that *Harpaphe haydeniana* and *Orthomorpha coarctata* were found to be most abundant species at all, seen on dry leaf, around the crop roots, wet landscape and on other plant debris. On the other hand *Narceus americanus* was single time recorded in maize farm near the city. It is due to the geographical location and habitat differences. *Trigoniulus corallinus* was found to be on dry landscape in bunch. *Harpaphe haydeniana* is generally found in agricultural area, breaking down leaf litter and freeing its nutrients for other organisms. *Orthomorpha coarctata* and *Trigoniulus corallinus* are capable of composting waste. Recently in Brazil, studies with the species *Trigoniulus corallinus* have shown that millicompost obtained from agricultural residues has physicochemical characteristics similar to vermicompost (Antunes *et al.*, 2016). The present study on millipedes was the first report of the distribution of millipede fauna in the Achalpur city, Amravati district, Maharashtra, India.

Table 1. List of Millipedes species recorded from study area.

S. No.	Millipede Species	Order	Family	Genus
1	<i>Harpaphe haydeniana</i>	Polydesmida	Xystodesmidae	<i>Harpaphe</i>
2	<i>Orthomorpha coarctata</i>	Polydesmida	Paradoxosomatidae	<i>Orthomorpha</i>
3	<i>Narceus americanus</i>	Spirobolida	Spirobolidae	<i>Narceus</i>
4	<i>Trigoniulus corallinus</i>	Spirobolida	Trigoniulidae	<i>Trigoniulus</i>



**Figure 1.** *Harpaphe haydeniana*



**Figure 2.** *Orthomorpha coarctata*



**Figure 3.** *Narceus americanus*



**Figure 4.** *Trigoniuulus corallines*

## CONCLUSION

About total 12.2% area of Maharashtra is a part Western Ghat, which is one of the major bio-geographic zone in India and rich in biodiversity. One the other hand our study area is closely connected with Melghat region, which is a part of the Satpuda Range of Hills, which is also a diversified area. But because of complex identification keys and less available literature this group is mostly neglected group of invertebrate animals. Like other soil fauna, deforestation, soil erosion, lack of rains and other artificial practices pose risk to the survival of millipedes. Present study indicates the necessity of further research on the diversity and distribution of Millipedes fauna in Maharashtra. Similarly it should be necessary to design specific conservation plan for preserving these economically important group of soil arthropods

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## REFERENCES

- Alagesab, P. and Ramanathan, B. (2013). Diversity of millipedes in Alagar Hills Reserve Forest in Tamil Nadu, India. *International Journal of Biodiversity*, 1-5.
- Antunes, L.F.S., Scoriza, R.N., Silva, D.G., and Correia, M.E.F., (2016). Production and efficiency of organic compost generated by millipede activity. *Ci`encia Rural*, 46, 815-819.
- Ashwini K.M. and Shridhar K.R. (2006). Seasonal abundance and activity of pill millipedes (*Arthrosphaera magna*) in plantation and semi-evergreen forest of southern India. *Acta Oecologica*, 2, 27-32.

- Attems, C. (1936). Diplopods of India. *Memoirs of the Indian Museum*, 1, 133-167.
- Carl, J. (1932). Diplopoden aus Süd-Indien und Ceylon I. Polydesmidea. *Revue Suisse de Zoologie*, 39 (17), 411-529.
- Carl, J. (1941). Diplopoden aus Südindien und Ceylon 2. Nematophora und Juliformia. *Revue Suisse de Zoologie*, 48 (22), 569-714.
- Chezian, Y., and Prabakaran, S. (2016). Diversity of millipedes (Myriapoda: Diplopoda) In Yelagiri hills, Eastern Ghats, Vellore district, Tamil Nadu, *International Journal of Fauna and Biological Studies*, 3(2), 91-97.
- Choudhari, C.R, Dumbare, Y.K. and Theurkar, S.V. (2014). Diversity of millipedes along the Northern Western Ghats, Rajgurunagar (MS), India, (Arthropod: Diplopod). *Journal of Entomology and Zoology Studies*, 2 (4), 254-257.
- Dash, S. and Priyadarsini, P. (2016). First record of three species of Millipedes (Diplopoda: Paradoxosomatidae) from Gujarat, India. *Journal of Biological Records*, e005, 52-60.
- Golovatch, S.I. and Wesener, T. (2016). A species checklist of the millipedes (Myriapoda, Diplopoda) of India. *Zootaxa*, 4129 (1), 001-075.
- Loranger-Merciris, G., Imbert, D., Bernhard-Reversat, F., Ponge, J.F. and Lavelle, P. (2007). "Soil fauna abundance and diversity in a secondary semi-evergreen forest in Guadeloupe (Lesser Antilles): influence of soil type and dominant tree species. *Biology and Fertility of Soils*, 44 (2), 269-276.
- Mane, S.B., Bhoite, S.H. , Bendre, N. N., Deshpande, V.Y., Pawar, P.A. (2020). Our Heritage (UGC Care Journal) Addition to the Millipede Fauna of Maharashtra State (Western Ghats) Anoplodesmus saussurii (Humbert, 1865), 68 (34).
- Patil S.S., Patil S.B., Bihade D.N., Takalakar D.L. (2018). Study of Diversity of Millipedes (Arthropoda : Diplopod) At In Around the Northern & Western Ghats of Rajgurunagar, (M.S.) India. *International Journal of Scientific Research in Science and Technology*, 5(2), 35-36.
- Pocock, R.I. (1899a). A monograph of the pill-millipedes (Zephroniidae) inhabiting India, Ceylon and Burma. *Journal of Bombay Natural History Society*, 12, 269-285.
- Pocock, R.I. (1899b). A monograph of the pill-millipedes (Zephroniidae) inhabiting India, Ceylon and Burma. *Journal of Bombay Natural History Society*, 12, 465-474.
- Seeber, J., Seeber, G.U.H., Langel, R., Scheu, S. and Meyer, E. (2008). "The effect of macro-invertebrates and plant litter of different quality on the release of N from litter to plant on alpine pastureland. *Biology and Fertility of Soils*, 44 (5), 783-790.