ASSEMBLAGE AND DISTRIBUTION OF EARTHWORMS IN THE TALACAUVERY WILDLIFE SANCTUARY, WESTERN GHATS

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ABSTRACT

Earthworms have the potential to biodegrade and biotransform chemical pollutants, there by converting them to less toxic substances in their bodies. Earthworms play an important role in soil ecology as they have the tendency to reach high densities. They are recognized as soil engineers, and occupy a vital position in soil food-webs. They improve the structure of the soil by tilting and mixing, Earthworms play important role in humus formation and increasing the water holding capacity of the soil. The distribution of earthworms is usually diverse and their numbers fluctuate in relation to the different abiotic factors and land use patterns of the soil. The fertility of soil depends on the biological diversity and soil faunal biomass. The present study was carried out in Talacauvery wildlife sanctuary of the Central Western Ghats. It is spread over an area of about 105sq km and is present at 1525m above sea level. Temperature in the region varies from 10º – 28º C. Annual rainfall ranges between 6500mm – 7500mm. The sampling was conducted during the months of May to October 2019. Earthworms were collected from selected site two to four quadrats were randomly laid, earthworms were sampled from different land use pattern like agricultural land, forest, gardens and nurseries by the hand-sorting method up to 30 cm deep by using quadrates (30 × 30 cm^2 area). In the present study twelve earthworm species have been recorded belonging to nine genera and five families. As per the ecological category, one species anecic two species are epigeic and nine endogeic species are identified. Out of these Family Megascolecidae six species, Moniligastridae three species, Family Glossoscolecidae, Acanthodrilidae and Eudrilidae one each species were recorded.

Keywords: Assemblage, Biodegrade, Distribution, Earthworms, Wildlife Sanctuary

INTRODUCTION

Talacauvery wildlife sanctuary of the Central Western Ghats is spread over an area of about 105sq km and is present at 1525m above sea level. Temperature in the region varies from 10º – 28º C. Annual rainfall ranges between 6500mm – 7500mm. It is a catchment area for Cauvery River and serves as an important catchment for perennial streams like Dodda Hole, Nadumale Hole, Bettamale Hole, Kume Kolli and Mundra Hole. The hills and valleys in the area are dense evergreen forests 63% of the evergreen trees reported are endemic. The diversity of forests provides varied habitats for a host of mammals, birds, reptiles and amphibians. And is threatened by increasing anthropogenic pressure on its natural resources. Soil biodiversity is key to sustainable organic farming (Ramakrishnan et al., 2005) and earth worms are the most dominant componant of soil biota in terms of biomass and crucial for maintaining soil fertility (Dash, 1978: Senapati and Dash,1981; Julka and Paliwal, 2005a and b; Dash et al, 2009; Bhadauria et al., 2012; Dash, 2012). Western Ghats region of India, the areas distinguished globally for their highly valuable bioidiversity and ecosystem services. On the basis of available data, the Western Ghats and West Coastal plains would stand out as the region with the highest level of earthworm species richness. The Western Ghats region is home to 53% species known from India. The Western Ghats harbour 193 native species. The distribution of earthworms is usually diverse and their numbers fluctuate in relation to the different abiotic factors and land use patterns of the soil. The fertility of soil depends on the biological diversity and soil faunal biomass. Earthworms are known to be the most important soil fauna biomass in humid soils of temperate and tropical regions (Lee, 1985). The beneficial role of earthworms in the breakdown of dead plant material in the forest litter was first documented by (Darwin, 1881). For a long time, earthworms have been known as the farmer's friend, natural ploughmen, soil ecosystem engineers and intestines of earth. Earthworms can significantly influence soil physical, chemical and biological properties, hence improving the fertility and structure of soil (Doan et al., 2013; Singh et al., 2016). Earthworms also play an important role in mixing of mineral soils and plant materials. Various studies reported that the disturbance and degradation of natural forest affect the number of earthworms and their distribution (Baretta et al., 2007; Chandran et al., 2012). The distribution of earthworm is usually heterogeneous (Guild, 1952; Satchell, 1955; Svendsen, 1957) and their numbers fluctuate in relation to the abiotic factors of the soil (Evans and Guild, 1948). Environmental factors like moisture, temperature, pH and soil texture also affect the distribution of earthworms. (Bhadauria and Ramakrishnan 1989) determined that regional earthworm biodiversity and species dispersal pattern was influenced by a variety of biotic and abiotic forces such as soil properties, surface litter inputs, surface vegetation type, dynamic land management history, local or regional climate and human pressure. The significance of diverse soil habitats is one of the most influencing factors affecting the overall earthworm distribution (Rajkhowa et al., 2014). Changes in land use patterns have also directly affected the composition and population structure of earthworm communities in different agro-climatic regions (Blanchart and Julka, 1997; Behera et al., 1999; Bhadauria et al., 2000; Lalthanzara et al. 2011). Endogeic earthworm appears a key feature of soil functioning in

the urban context through their roles on organic matter transformation, the formation and maintenance of soil structure (Amosse et al., 2015). The Western Ghats have 219 (193 native, 26 exotic) documented species (Siddaraju et al., 2013), which is about 52.4% of total numbers in India, followed by the Eastern Himalayas and Northeast Hills Region with 85 native and 25 exotic species (Julka, 2010). Therefore, current study of earthworm diversity and distribution in Talacauvery Wildlife Sanctuary, Western Ghats were carried out.

MATERIALS AND METHODS

The present study was carried out in Talacauvery wildlife sanctuary Western Ghats **(Fig. 1).** The sampling was conducted during the months of May to October 2019. Earthworms were collected from selected site two to four quadrats were randomly laid, earthworms were sampled from different land use pattern like agricultural land, forest, gardens and nurseries by the hand-sorting method up to 30 cm deep by using quadrates (30 × 30 cm^2 area). A global positioning system (GPS) was also used to mark the latitude and longitude of each sampling site. Moisture content was measured with a digital soil moisture meter (Micro make). The collected samples of earthworms with appropriate amount of soil were placed in polythene bags labelled with place name, date of collection, surrounding soil biota etc. and brought to the research lab for further study. Earthworms were washed in fresh water and sorted on the presence or absence of clitellum. Earthworms were narcotized in 70% ethyl alcohol and fixed in 5% formalin for 6-8 hours and finally preserved in 5% formalin. The preserved samples of earthworms were identified upto the species level by Dr (Mrs) P. Kathireswari, an earthworm taxonomist and also by referring the descriptions and keys of identification of earthworms published by (Stephenson 1915, 1923, Michaelsen 1910 and Julka 1988). The identified earthworms were deposited in the Museum of Zoology Department, Field Marshall K. M. Cariappa College, Madikeri.

RESULTS AND DISCUSSION

In the present study twelve earthworm species have recorded **(Table. 1)** belonging to nine genera and five families. As per the ecological category, one species anecic two species are epigeic and nine endogeic species are identified. Out of these Family Megascolecidae six species, Moniligastridae three species, Family Glossoscolecidae, Acanthodrilidae and Eudrilidae one each species were recorded. A great variety of vegetation

types coupled with high rainfall and moderate temperature provide many different niches for the occurrence of earthworms. The Western Ghats and west coast of the country, is considered as the richest in terms of earthworm biodiversity (Julka and Paliwal 2005). The overall findings showed that Talacauvery wildlife sanctuary, Western Ghats had higher number of native earthworm species. This is an indication that their habitat is less disturbed, habitat alteration and disturbance leads to the invasion of exotic species (Bhadauria and Saxena 2007). These results suggest that habitat plays a major role in the earthworm species diversity. Total number of species identified in this study showed a decreasing tendency at higher altitude, this observation coincides with the earlier reports on earthworm diversity (Decaens, 2010). Many studies shown that the same species occupy different altitudes, for example *Drawida ghatensis* was reported at an altitude 1,524-2438 m by (Stephenson 1923) and the same has been observed by (Julka and Chandra 1986) at 940-1,40 m in silent valley. On the contrary, the exotic species can tolerate a wide range of soil and environmental conditions. Therefore, any kind of disturbances to the natural ecosystems and vegetation of an area may lead to the elimination of native earthworm species and subsequent invasion of exotic species (Bhadauria and Ramakrishnan 1991; Fragoso etal., 1997). The successful colonisation of the exotic earthworm fauna is mainly due to their inherent ability to withstand disturbance and interference system (Julka 1988).

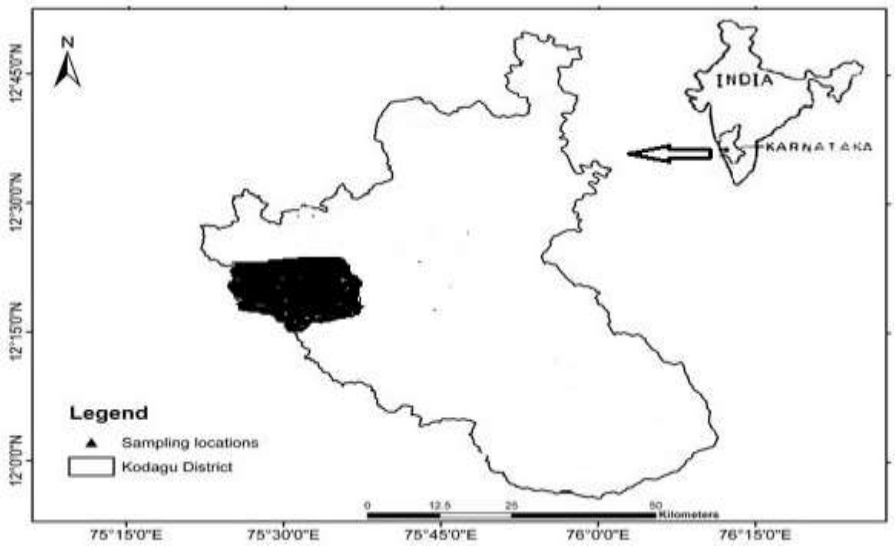

Fig. 1 Map showing sampling location of Talacauvery Wildlife Sanctuary

Sl no.	Family	Species	Exotic/ Native	Ecological category
1	Glossoscolecidae	*Pontoscolex corethrurus*	Exotic	Endogeic
2	Acanthodrilidae	*Plutellus variabilis*	Native	Epigeic
3	Megascolecidae	*Lampito mauritii*	Native	Anecic
		Amynthas corticis	Exotic	Endogeic
		Megascolex konkanensis	Native	Endogeic
		Megascolex trarancorensis	Native	Endogeic
		Notoscolex tenmalai	Native	Endogeic
		Metaphire houlleti	Native	Endogeic
4	Moniligastridae	*Drawida pellucida*	Native	Endogeic
		Drawida travancorensis	Native	Endogeic
		Drawida ghatensis	Native	Endogeic
5	Eudrilidae	*Eudrilus eugeniae*	Exotic	Epigeic

Table: 1 List of families and exotic/native species of earthworms sampled from Talacauvery Wildlife sanctuary, together with their ecological categories

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