

Distribution of The Invasive Earthworm *Eudrilus Eugeniae* In Hyderabad- Karnataka Region, Karnataka, India

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Abstract- *Eudrilus eugeniae* is an exotic earthworm species of India and is exploited in the production of vermicompost along with *Eisenia fetida* and *Perionyx excavatus*. It is one of the most widely distributed earthworm species in Hyderabad-Karnataka region of Karnataka, India. A field survey was conducted in selected habitats viz., gutter, bore well, garbage, garden, nursery, pasture, irrigated and non- irrigated lands in six districts of Hyderabad-Karnataka region. *Eudrilus eugeniae* was collected by digging and hand sorting method from 18 different sites. *Eudrilus eugeniae* was most commonly found only in the gutter followed by near the bore well, where there was continuous rich water supply.

Keywords- Invasive, Earthworm, *Eudrilus eugeniae*, Karnataka

I. INTRODUCTION

Earthworms are the most important soil organisms in terms of their influence on organic matter breakdown, soil structural development and nutrient cycling, especially in productive ecosystems. When an exotic earthworm is naturalized in a new area it can seriously alter the structural properties of the soil, organic matter and nutrient dynamics, as well as plant and animal communities above and below ground (Hendrix et al, 2008). The major concerns about exotic earthworms have been the potential for certain species to invade new habitats and once established, the effects they may have on other organisms and soil processes within those habitats (Alban and Berry 1994, Dalby et al. 1998, Hale et al. 2000). In areas inhabited by native earthworms, exotic invasions often are preceded by disturbance of soils or vegetation (Kalisz and Dotson 1989, Fragoso et al. 1995, 1999, Callaham and Blair 1999).

At present, peregrines are found to occur in every continent including Antarctica, on oceanic islands every biogeographic region and in nearly all types of ecosystems including deserts. Most importantly this spread mainly through human activities (Blakemore, 2002 and Hendrix et al,

2008). There are 505 earthworm species in India out of which 51 are exotic (Blakemore, 2008; Julka, 2014).

Eudrilus eugeniae (Kinberg, 1867) belonging to Eudrilidae family is one of the peregrine and invasive species of earthworms found in the state. It can be easily identified by the following characters: Body length 30-200mm. Body diameter 5-7 mm. 145-200 body segments. Prostomium epilobitic. Setal arrangement lumbricine. Dorsal pores absent. Clitellum annular ranges from 13-18. 1 pair of male pores present in 18. Seminal groove absent. Spermathecae found under female organ, there is an atrium with muscular sheen in 14 that extends into a long flaccid, convoluted gland, filled with coagulum and enclosed in a sheath. Paired female pores present in 14. Single gizzard in 5. Prostate digitiform euprostate from 18-23. Last pair of hearts in 11. Intestine begins in 14. Typhlosole absent. The recent reports of *Eudrilus eugeniae* from Karnataka are by Siddaraju M., K.S. Sreepada and J.W. Reynolds (2010), Muddaiah Siddaraju, Kanale S. Sreepada and Krishna M P (2013). The entire diversity and distribution pattern of alien earthworm species of Hyderabad- Karnataka region is not studied. So that it is an attempt study distribution of this species in Hyderabad-Karnataka region.

II. STUDY AREA

Hyderabad-Karnataka region is located at 17° 35' and 18° 25' North latitudes and 75° 40' and 77° 11' East longitude in the north-eastern part of the Karnataka state. After merging with the Indian Union, the region was the part of the then Hyderabad State until 1956. The Hyderabad- Karnataka region comprises of Bidar, Kalaburagi, Yadgir, Raichur, Koppal and Ballari districts. This region is the second largest arid region after parts of Rajasthan in India. It has shown a high degree of underdevelopment compared to South Karnataka and therefore special status is given under article 371J. Very hot summers are the key causes for less fertile output in terms of agriculture in spite of two major rivers Krishna and Tungabhadra, flowing

through the region (Heena Mubeen and Shankerappa S. Hatti, 2018)

III. MATERIALS AND METHODOLOGY

Earthworms were surveyed from the selected habitats of damp places like gutter, bore well, irrigated land, garden, pasture and garbage of districts of Hyderabad- Karnataka region from June 2017- January 2018. Earthworms were collected by digging and hand sorting method (Julka 1988) and physical parameters like temperature, humidity and location were recorded. Morphological observations of the collected earthworm were also noted down. Live earthworms along with their habitat soil were taken to the laboratory. The earthworms were then fixed and preserved (Julka and Paliwal, 1993) and were grouped into two groups. One group of the earthworms was identified using taxonomic key charts (Stephenson, 1923; Gates, 1972; Julka, 1988) and the other group was sent to ZSI for confirmation.

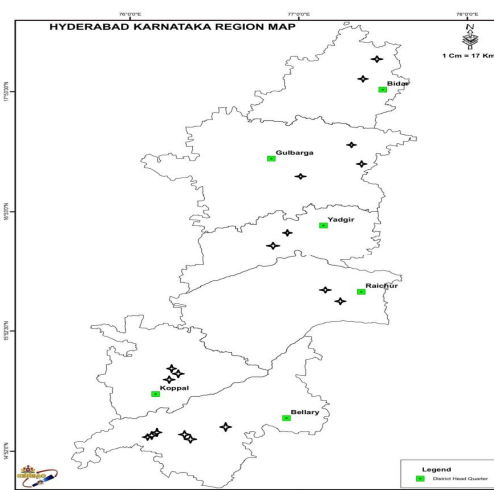


Figure 1: Map showing the distribution of *Eudrilus eugeniae* in Hyderabad- Karnataka region

IV. RESULTS

In the present study *Eudrilus eugeniae* was found to be peregrine species and was one of the most common and widely distributed species observed after *Lampito mauritii* in Hyderabad- Karnataka region (Fig. 1). It was found in 18 different sites from the total 135 sites from all the 6 districts of Hyderabad-Karnataka region. It was found in 2 sites among 18 sites in Bidar district. It was found in 3 sites among 27 sites in Kalaburagi district. It was found in 2 sites among 16 sites in Yadgir district. It was found in 2 sites among 25 sites in Raichur district. It was found in 3 sites among 20 sites in Koppal district. It was found in 2 sites among 3 sites in Ballari district. It was to be 13.33% widely distributed earthworm species among the other earthworm species.

The details of the collected localities are listed in the table. The occurrence of *Eudrilus eugeniae* was high in gutter when compared to other pedoecosystems. Their number is highest in the gutter and followed by near bore well. *Eudrilus eugeniae* was not found garbage, irrigated land and nurseries. Abundance and availability chances of this species vary according to different habitats. The presence of this species in particular habitats shows that this species have the ability to evolve and widely spread within short period of time in the habitats like gutter and bore well where there is high nutrient availability. It was found in the habitats, where there was a continuous supply of water and food. Due to the regional environmental effects it is observed that the *Eudrilus eugeniae* of different region had slight colour variation. The earthworms present in the red soil had reddish tint where has the earthworms found in the black soil has black tint.

Sl. No	DISTR ICT	AREA	LOC ATION	LOC ALIT Y	TEM PR(° C)	HUM IDIT Y (%)
1	BIDAR	Kommel kunda	NL18 ⁰ 0'12" EL77 ⁰ 17'17 "	Tap water	27	65
2		Mungnal	NL18 ⁰ 28'35 " EL77 ⁰ 21'10 "	Gutter	28	48
3	KALA BURA GI	Kupnoor	NL17 ⁰ 26'19 " EL77 ⁰ 28'40 "	Gutter	25	58
4		Chiknind halli	NL17 ⁰ 58'09 " EL77 ⁰ 11'19 "	Gutter	26	79
5		Chittapur	NL17 ⁰ 16'5" EL77 ⁰ 0'30"	Gutter	27	57
6	YADGI	Vibhutih	NL16 ⁰	Bore	26	56

	R	alli	40'12 " EL76 ⁰ 51'22 "	well		
7		Kurubra galli	NL16 ⁰ 30'41 " EL76 ⁰ 45'19 "	Gutter	27	42
8	RAICH UR	Kalmala	NL16 ⁰ 17'42 " EL77 ⁰ 25'27 "	Gutter	26	64
9		Yergera	NL15 ⁰ 45'42 " EL77 ⁰ 25'17 "	Gutter	29	48
10		Taralkatt i	NL15 ⁰ 38'30 " EL76 ⁰ 10'24 "	Gutter	29	56
11	KOPP AL	Kurubna l	NL15 ⁰ 42'38 " EL76 ⁰ 11'6"	Gutter	29	42
12		Budakun ti	NL15 ⁰ 41'29 " EL76 ⁰ 11'52 "	Gutter	30	29
13	BALL ARI	Ulavathi	NL15 ⁰ 0'20" EL76 ⁰ 9'30"	Gutter	27	56
14		Hosakeri	NL14 ⁰ 59'22 "	Bore well	30	31

			EL76 ⁰ 18'36 "			
15		Ittigi	NL14 ⁰ 57'12 " EL76 ⁰ 5'23"	Gutter	26	68
16		Yeshwan tnagar	NL15 ⁰ 2'41" EL76 ⁰ 29'41 "	Gutter	29	52
17		Danapur am	NL15 ⁰ 9'38" EL76 ⁰ 21'49 "	Bore well	29	46
18		Mariyam manahall i	NL15 ⁰ 9'27" EL76 ⁰ 41'33 "	Gutter	25	74

Table 1: Details of the distribution of *Eudrilus eugeniae* Hyderabad-Karnataka region.

V. DISCUSSION

Eudrilus eugeniae is an exotic species of India and is also known as African night crawler and is considered as the most efficient epigeic or composting earthworm in the tropics (Guerrero, 2009). It was first reported from India by Stephenson in 1923. It is assumed to be evolved from India. *Eudrilus eugeniae* along with *Eisenia fetida* and *Perionyx excavates* are being exploited for the production of vermicompost. This species, originating in tropical Africa has been raised and distributed in the India since several years by earthworm culturists.

Eudrilus eugeniae is a remarkably versatile vermicomposting species of the tropics or indoors in temperate regions. Apart from vermicomposting it is useful for recycling soil organic matter, enhancing carbon sequestration, soil bioremediation, providing stock-feed protein, bioprospecting for pharmaceuticals/cosmetics or perhaps silk production (from the Y-shaped glands as reported by Eisen, 1900). Azmi et al. (2014) recently found earthworm extracts, including those from *E. eugeniae*, to have anti-wrinkling properties as potential new 'anti-aging' agents.

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